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Publication Date

2023

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Abstract

Insider trading attracts unique attention in corporate and securities law, but despite the salience of the practice, there is limited empirical evidence on whether the law is effective at preventing it, and particularly whether the adoption of the main doctrine that forms the basis of the insider trading prohibition today – the doctrine of the “misappropriation theory” – had a meaningful deterrent effect. This paper examines this question by studying the impact of the Supreme Court’s decision in *O’Hagan*, which adopted the misappropriation theory, on target run-ups in mergers and acquisitions (a common proxy for insider trading). The data show that run-ups decreased significantly and immediately in relation to announcement returns after *O’Hagan*, which suggests that the misappropriation theory in fact deterred insider trading.

JEL classification: K20, K22.

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The impact of insider trading doctrine on the incidence of insider trading: An analysis of the effect of the misappropriation theory

1. Introduction

Few types of behavior in corporate and securities law attract as much attention as insider trading – that is, securities transactions on the basis of material non-public information (MNPI).¹ The Securities and Exchange Commission (SEC) and other enforcement entities have initiated dozens of enforcement actions to deter the practice, courts often wrestle with the contours of the insider trading prohibition, and there is a long list of academic studies on the design and potential effects of the prohibition. But despite the salience of this topic, there is very limited empirical evidence on whether the law effectively deters the practice, and particularly whether the adoption of the main doctrine that forms the basis of the insider trading prohibition today – the “misappropriation theory” – had any deterrent effect. This paper examines this question by studying the impact of the Supreme Court’s decision in *O’Hagan*, which adopted the misappropriation theory and, in doing so, significantly expanded the scope of the insider trading prohibition.

Since the 1980s, the “classical theory” of insider trading was the primary doctrine that courts employed to prevent the practice. Under this doctrine, a person is liable for unlawful insider trading if that person trades in the shares of a company using MNPI obtained from the company, and the person owes fiduciary duties to the company’s shareholders.² This prohibition covers not only situations in which corporate insiders trade on MNPI obtained from the issuer, but also situations in which insiders pass MNPI to a third party for a personal benefit and the third party in turn trades on the information.³ But precisely because the classical theory required that the person who traded on (or tipped) MNPI owe fiduciary duties to the shareholders of the issuer, the doctrine had the important limitation of capturing a very limited set of individuals: corporate officers and directors of the company, outsiders with a confidential contractual relationship with the firm, employees of the issuer other than directors and officers, and tippees of the previous individuals.⁴

¹ This is a common definition of insider trading, which I follow for ease of reference. However, as explained below, this definition is imprecise because under the doctrine that governs insider trading today, the term covers not only insiders but also outsiders that trade on MNPI. In addition, not all forms of trading on MNPI are illegal.

² *Chiarella v. United States*, 445 U.S. 222 (1980).

³ *Dirks v. SEC*, 463 U.S. 646 (1983).

⁴ *Dirks v. SEC*, 463 U.S. 646 (1983) (stating that individuals with a confidential contractual relationship with the firm are subject to the insider trading prohibition, and setting the doctrine for tipper/tippee situations); *U.S. v.*

The scope of the insider trading prohibition, however, radically changed in 1997, when the Supreme Court adopted the “misappropriation theory” of insider trading in its *O’Hagan* decision.⁵ Under this doctrine, a person violates the insider trading prohibition if two basic conditions are met: the person trades on (or tips) MNPI obtained from a source with whom the person has a confidential relationship (whoever that source is), and the transaction (or the tipping of MNPI) is not disclosed to the source. The misappropriation theory therefore eliminated the requirement that the person using confidential information for a personal benefit owe fiduciary duties to the shareholders of the issuer, which implies a significant expansion of the range of individuals captured by the law. As a result, it seems reasonable to expect that the incidence of insider trading declined after the adoption of the theory.

This paper tests this hypothesis by examining the impact of the *O’Hagan* decision on a common proxy for insider trading: target run-ups in mergers and acquisitions (“M&A”) – that is, the cumulative abnormal returns for the shares of the target company before the transaction is publicly announced. The intuition behind this proxy is that individuals who hold non-public information about mergers and acquisitions can make significant profits if they buy shares in the target company before the transaction is announced (since M&A typically involve the payment of a large premium over market prices); as a result, a significant increase in the target’s pre-merger price is likely indicative of a high incidence of trading on confidential information about the transaction (see, e.g., Keown and Pinkerton, 1981; Meubroek, 1992; Sanders and Zdanowicz, 1992; Meubroek, 1992).

Because *O’Hagan* applies to all public companies, there is no natural set of deals that may work as a control group for the analysis, which raises the concern that post-*O’Hagan* changes in the run-ups may not be driven by the decision. However, I mitigate this concern in various ways. First, I use the returns of the target company *at the announcement date* of the M&A transactions as a benchmark. If there are factors unrelated to *O’Hagan* that coincided in time with the decision and that affected how much investors value M&A targets, then it is reasonable to expect that those factors will affect both the pre-announcement returns and the

Whitman, 904 F. Supp. 2d 363, 370 (S.D.N.Y. 2012), as corrected (Nov. 19, 2012), aff’d, 555 Fed. Appx. 98 (2d Cir. 2014) (unpublished) (discussing that circuit courts have held that lower-level employees are subject to the insider trading prohibition).

⁵ U.S. v. O’Hagan, 521 U.S. 642 (1997).

announcement returns – not just the pre-announcement returns.⁶ Second, I use propensity score matching to build a control group of matched firms, and then I compare the runups of the M&A targets with the returns of the control firms. Third, I compare the runups of mergers with those of tender offers. Tender offers were subject to Rule 14e-3 since the 1980s (an SEC rule that is even more expansive than the misappropriation theory), so it is reasonable to expect that the effect of *O'Hagan* was stronger on mergers than on tender offers. Fourth, to minimize the possibility that the analysis will capture confounding events, I use a relatively short time frame around *O'Hagan*. Fifth, following standard practice, I isolate the effect of general market fluctuations during the period for which I compute the run-ups (30 days prior to the announcement of each transaction) by defining the run-ups in terms of abnormal returns – that is, by subtracting average market returns from the returns of the target. And sixth, as is also standard practice, in the multivariate analysis, I control for observable factors that may affect the returns.

The results show that the run-ups in fact decreased significantly in relation to the announcement returns after *O'Hagan*. In this sense, after *O'Hagan*, there was less anticipatory trading explaining the overall valuation effect of M&A bids, which is consistent with the notion of less insider trading. In addition, this conclusion is bolstered by the fact that the relative runups (i.e., the runups minus the announcement returns) declined in M&A targets in relation to similarly calculated returns for the matched control group, as well as in mergers in relation to tender offers.

The results presented in this paper have important implications. The insider trading prohibition is in large part motivated by the idea that investors will be disincentivized from collecting information about firms and even investing in the securities market if they anticipate that they will be trading with parties who obtained an informational advantage by misappropriating confidential information (Manove, 1989; Ausubel, 1990; Fishman and Hagerty 1992; Khanna, Slezak, and Bradley 1994). If this idea is correct, therefore, the results presented here suggest that the misappropriation theory may contribute to a stronger information environment, a lower cost of capital, and a more liquid securities market through its deterrent effect on insider trading.

⁶ For a similar approach, see, e.g. Del Guercio, Odders-White, and Ready (2017).

In addition, some commentators have advocated expanding the scope of the insider trading doctrine beyond the contours delineated by *O'Hagan* (and, in fact, some courts and Congress have taken some steps in this direction⁷). The fact that this paper shows that the misappropriation theory appears to deter insider trading suggests that those reforms also may have a deterrent effect – and may therefore be desirable. However, this conclusion requires two important caveats. First, the adoption of the misappropriation theory was a particularly major doctrinal step, which implies that further doctrinal expansions may not necessarily have the same impact. And second, this paper does not examine what the optimal level of deterrence is.

The rest of this paper is organized as follows. Section 2 reviews the evolution of the main doctrines that form the basis of the insider trading prohibition today, Section 3 reviews previous empirical studies on the relationship between insider trading law and the frequency with which insider trading occurs, Section 4 discusses the data and the methodology, Section 5 presents the results, Section 6 discusses the implications of the results, and Section 7 concludes.

2. Institutional background

Insider trading law in the United States is essentially a judicial creation. The SEC has historically relied on Rule 10b-5 (which broadly prohibits fraud in connection with the purchase or sale of a security) to prosecute insider trading; but since that rule does not directly prohibit the practice, courts have been ultimately responsible for defining the elements of the prohibition.

In the first Supreme Court case to address those elements, *Chiarella v. United States*,⁸ the court adopted the so-called “classical theory” of insider trading. Under this theory, a person violates Rule 10b-5 if the person trades in a company’s shares on the basis of material non-public information about the firm and the person owes fiduciary duties to the shareholders of the company. The directors and officers of the firm (typically referred to as “insiders”) are the standard individuals that owe fiduciary duties to the shareholders, but the classical theory also covers other employees and temporary agents of the firm – that is, outsiders with a confidential contractual relationship with the company, such as accountants, lawyers, and underwriters,

⁷ See, e.g., Sarbanes-Oxley Act § 807; *S.E.C. v. Dorozhko*, 574 F.3d 42 (2d Cir. 2009); *SEC v. Rocklage*, 470 F.3d 1 (1st Cir. 2006). See also Nagy (2009) and Bainbridge (2012) for a discussion.

⁸ 445 U.S. 222 (1980).

who become constructive insiders by virtue of their contractual position.⁹ In addition, the classical theory covers not only insiders that trade on MNPI; it also covers “tippers” and “tippees” of confidential information – that is, insiders that pass the information to a third party in breach of a duty of confidentiality and for a personal benefit (the “tipper”), and the third party who trades on that information and who knows or should know that the information was passed in breach of a duty of confidentiality (the “tippee”). In these situations, both the tipper and the tippee are considered to have breached Rule 10b-5.¹⁰

The classical theory is a narrow doctrine to prohibit insider trading precisely because the theory requires a fiduciary relationship between the person that trades on confidential information (or that passes the information for a personal benefit) and the shareholders of the company whose shares are traded.¹¹ In *Chiarella*, for example, various companies planning to acquire other companies hired Pandick Press, a financial printer, to print takeover documents. While working on the task, Vincent Chiarella, one of the employees of Pandick Press, inferred the identities of the parties to the transactions, bought shares in the target firms, and sold the shares when the transactions were publicly announced – thus making a significant profit. Even though Chiarella exploited MNPI obtained from Pandick Press and its clients, the Supreme Court held that he did not commit unlawful insider trading because he did not owe any fiduciary duty to the shareholders of the selling companies. According to the court, a person that fails to disclose material information prior to the consummation of a transaction commits fraud only when that person has a duty to disclose the information, and that duty exists only when there is a “fiduciary or similar relation of trust and confidence” between the parties to the transaction. As a result, according to the court, Chiarella’s trades could not be fraudulent.

An important motivation behind the classical theory was the desire to allow for the prosecution of traditional insiders that misused confidential information and, at the same time, avoid an overly broad insider trading prohibition.¹² However, the theory allowed a wide range of

⁹ *Dirks v. SEC*, 463 U.S. 646 (1983) (on temporary agents); *U.S. v. Whitman*, 904 F. Supp. 2d 363, 370 (S.D.N.Y. 2012), as corrected (Nov. 19, 2012), *aff’d*, 555 Fed. Appx. 98 (2d Cir. 2014) (unpublished) (on employees of the firm).

¹⁰ *Dirks v. SEC*, 463 U.S. 646 (1983).

¹¹ See also, for example, *Langevoort* (1995, p. 872); *Pritchard* (1998, p. 15); *Bainbridge* (1999, p. 1599); and *Nagy* (2009, p. 1326).

¹² See *Chiarella v. United States*, 445 U.S. 222, 233 (1980) (holding that “[w]e cannot affirm petitioner’s conviction without recognizing a general duty between all participants in market transactions to forgo actions based on material, nonpublic information. Formulation of such a broad duty ... should not be undertaken absent some explicit evidence of congressional intent”). See also *Pritchard* (2003, p. 933) and *Nagy* (2009, p. 1326) for

individuals outside the issuer to escape liability in instances in which such individuals traded on MNPI obtained in questionable ways, which led to significant resistance against the doctrine. In fact, the *Chiarella* decision itself was a divided opinion, with Chief Justice Marshall and Justice Blackmun dissenting and arguing that the “narrow construction” of the insider trading prohibition adopted by the court was inconsistent with the expectations of Congress – which, according to the justices, likely intended to generally limit trading on the basis of information that was unlawfully converted for personal gain, not just instances in which corporate insiders engage in such behavior.¹³

The SEC also responded to *Chiarella* by issuing Rule 14e-3, which the commission adopted by invoking its general authority to regulate tender offers under Section 14(e) of the Securities Exchange Act. Rule 14e-3 prohibits any person who possesses MNPI about a tender offer from trading in the securities of the target if the bidder has taken “substantial steps” to execute the offer and the person that possesses the information has reasons to know that the information is non-public and was received from the parties to the tender offer or any person acting on behalf of those parties. This broad prohibition was not premised on any breach of a fiduciary duty, so it captured a broader set of traders than the classical theory. However, Rule 14e-3 had two important limitations. First, it only covered trades on MNPI relating to tender offers – other material events in a firm’s life, including mergers (the most common form of consolidation between two companies), were not covered by the rule. And second, the validity of the rule was controversial. In *Schreiber v. Burlington Northern, Inc.*,¹⁴ the Supreme Court held that Section 14(e) of the Exchange Act was modeled on Section 10(b), which suggests that the two sections should be interpreted similarly; and, as some commentators point out, since Section 10(b) required a breach of a fiduciary duty, then a natural inference from *Schreiber* was that

a discussion of the goals behind the classical theory. In *Dirks*, the court reiterated the desire to avoid an overly broad insider trading prohibition, but this time the court emphasized its concern about chilling research by market analysts. According to the court, “Imposing a duty to disclose or abstain solely because a person knowingly receives material nonpublic information from an insider and trades on it could have an inhibiting influence on the role of market analysts, which the SEC itself recognizes is necessary to the preservation of a healthy market. It is commonplace for analysts to ‘ferret out and analyze information,’ and this often is done by meeting with and questioning corporate officers and others who are insiders. And information that the analysts obtain normally may be the basis for judgments as to the market worth of a corporation’s securities. The analyst’s judgment in this respect is made available ... to clients of the firm. It is the nature of this type of information, and indeed of the markets themselves, that such information cannot be made simultaneously available to all of the corporation’s stockholders or the public generally.” *Dirks v. S.E.C.*, 463 U.S. 646, 658–59 (1983).

¹³ *Chiarella v. United States*, 445 U.S. 222, 240-43; 245-46 (1980).

¹⁴ *Schreiber v. Burlington Northern, Inc.*, 472 U.S. 1 (1985).

the SEC had exceeded its rulemaking authority when it adopted Rule 14e-3 (Bainbridge, 2012).¹⁵

Reflecting the resistance faced by the classical theory, approximately two decades after its implementation, the Supreme Court decided to adopt a much broader doctrine to prohibit insider trading: the “misappropriation theory.” Under this theory, which the court articulated in its 1997 decision in *O’Hagan*, a person violates Rule 10b-5 if the person (1) trades securities on the basis of MNPI obtained from a source with whom the trader has a confidential relationship, and (2) the trader does not disclose the trades to the source. A person that engages in this conduct, according to the court, deceives those who entrusted him with access to confidential information, and therefore the behavior is fraudulent under Rule 10b-5 regardless of whether or not the trader owes fiduciary duties to the shareholders of the issuer.¹⁶ Moreover, like the classical theory, the misappropriation theory covers not only scenarios in which the misappropriator of MNPI trades on the information, but also scenarios in which the MNPI is passed to a third party for a personal benefit and the third party in turn trades on the information.¹⁷

The misappropriation theory thus significantly expanded the range of individuals captured by the insider trading prohibition. Although the theory still requires a confidential relationship between the source of the information and the misappropriator, as noted, the misappropriator does not need to have a fiduciary relationship with the shareholders of the issuer. In *O’Hagan*, for example, Grand Metropolitan PLC hired Dorsey & Whitney, a large law firm, as a legal advisor for the acquisition of Pillsbury Corporation in a hostile tender offer. James O’Hagan, a partner at Dorsey & Whitney who was not directly involved in the transaction, learned about the transaction and bought shares and call options for the shares of Pillsbury, thus realizing a large profit when he exercised the options and sold the shares after the tender offer was publicly announced. This is a situation that was remarkably similar to the fact pattern in *Chiarella*, which would not have triggered liability under the classical theory because O’Hagan did not have a fiduciary relationship with the shareholders of Pillsbury. However, in adopting the

¹⁵ In fact, before the Supreme Court expressly upheld the validity of the rule in *O’Hagan*, the circuit court in the case argued that the rule was invalid. See *U.S. v. O’Hagan*, 92 F.3d 612, 614 (8th Cir. 1996), *rev’d*, 521 U.S. 642 (1997).

¹⁶ *U.S. v. O’Hagan*, 521 U.S. 642, 652 (1997).

¹⁷ *Salman v. U.S.*, 580 U.S. 39, 46 (2016) (observing that “the parties do not dispute that *Dirks*’s personal-benefit analysis applies in both classical and misappropriation cases”).

misappropriation theory proposed by the SEC, the Supreme Court held that O'Hagan was liable because he secretly traded on MNPI that he confidentially obtained from Dorsey & Whitney and the firm's client.

The most immediate goal of the misappropriation theory was to address the fact that in many corporate events, and especially in M&A, "there is a fairly wide circle of people with confidential information" who do not owe any fiduciary duties to the shareholders of the issuer – but who may still misuse confidential information. However, the adoption of the theory also was motivated by the broader goal of fostering greater investor confidence in the capitals market. According to the court, "[a]lthough informational disparity is inevitable in the securities markets, investors likely would hesitate to venture their capital in a market where trading based on misappropriated nonpublic information is unchecked by law. An investor's informational disadvantage vis-à-vis a misappropriator ... stems from contrivance, not luck; it is a disadvantage that cannot be overcome with research or skill... [C]onsidering the inhibiting impact on market participation of trading on misappropriated information ... it makes scant sense to hold a lawyer like O'Hagan a Section 10(b) violator if he works for a law firm representing the target of a tender offer, but not if he works for a law firm representing the bidder."¹⁸

The possibility that some version of the misappropriation theory could form the basis of the insider trading prohibition under Rule 10b-5 was raised in *Chiarella*, and some justices in fact supported that idea.¹⁹ However, the court did not set any precedent in this regard because the majority held that the jury had not been charged properly with respect to a violation of Rule 10b-5 under the theory. Subsequently, some lower courts endorsed the theory,²⁰ others rejected

¹⁸ U.S. v. O'Hagan, 521 U.S. 642, 658-59, 674 (1997).

¹⁹ In his concurring opinion, Justice Stevens advocated the version of the misappropriation theory that was subsequently adopted in *O'Hagan*, arguing that it would be reasonable to conclude that *Chiarella* engaged in unlawful insider trading because he breached a duty of silence he owed to those who entrusted him with confidential information. Chief Justice Burger advocated a broader theory, which would not require a confidential relationship between the person that misused the information and the source. According to Chief Justice Burger, although the parties to a business transaction can generally abstain from disclosing material facts to the other party, that general rule "should give way when an informational advantage is obtained, not by superior experience, foresight, or industry, but by some unlawful means." See *Chiarella v. U. S.*, 445 U.S. 222, 239-40 (1980).

²⁰ See *United States v. Newman*, 664 F.2d 12 (2d Cir. 1981); *Rothberg v. Rosenbloom*, 771 F.2d 818, 823 (3d Cir. 1985); *SEC v. Clark*, 915 F.2d 439, 449 (9th Cir. 1990); *SEC v. Cherif*, 933 F.2d 403, 410 (7th Cir. 1991); *United States v. Carpenter*, 791 F.2d 1024, 1025-26, 1029 (2d Cir. 1986).

it,²¹ and the Supreme Court itself split when it had an opportunity to take a position.²² *O'Hagan* thus resolved the uncertainty that had emerged in this area.

In addition to adopting the misappropriation theory, *O'Hagan* upheld Rule 14e-3, concluding that the rule was a proper exercise of the authority that the Exchange Act vests on the SEC.²³ After *O'Hagan*, therefore, it became clear that in the particular case of tender offers, the SEC could rely not only on the misappropriation theory, but also on Rule 14-3 – which, as mentioned, also eliminates the need of a confidential relationship between the person that misuses MNPI and the source of information.

As mentioned earlier, and as various commentators have noted, the misappropriation theory was a major expansion of the insider trading prohibition (e.g., Seligman, 1998; Bainbridge, 2012; Nagy, 2009). The adoption of the doctrine therefore presents a unique opportunity to examine the relationship between the scope of the prohibition and the incidence of insider trading, which this paper exploits.

3. Literature review

The literature on insider trading is abundant. There are several studies on the justifications and consequences of the insider trading prohibition, the boundaries of the prohibition, the historical and economic factors that have shaped the prohibition, and whether insider trading should be regulated by law or by private mechanisms.²⁴ However, the empirical evidence on how effectively the legal system deters insider trading is significantly thinner.

²¹ See *United States v. Bryan*, 58 F.3d 933, 944 (4th Cir. 1995); *United States v. O'Hagan*, 92 F.3d 612, 614, 620 (8th Cir. 1996), *rev'd*, 521 U.S. 642 (1997).

²² In *United States v. Carpenter*, a Wall Street Journal reporter and his tippee traded on the basis of information that was going to appear in a column prepared by the reporter. The Second Circuit relied on the misappropriation theory to hold the defendants liable under Rule 10b-5 and also concluded that the defendants violated the federal mail and wire fraud statutes. *United States v. Carpenter*, 791 F.2d 1024, 1025-26, 1029 (2d Cir. 1986). The Supreme Court unanimously affirmed the convictions for mail and wire fraud but split 4-4 on the validity of the misappropriation theory. As a result, the court affirmed the convictions but did not set any precedent with respect to the theory. *Carpenter v. United States*, 484 U.S. 19, 24 (1987).

²³ *U.S. v. O'Hagan*, 521 U.S. 642, 666 (1997).

²⁴ See, for example, Ayres and Bankman (2001); Ayres and Choi (2002); Anand, Choi, Pritchard, and Puri (2019); Bainbridge (1986; 1995; 1999; 2012; 2021); Bebchuk (1994); Carlton and Fischel (1993); Coffee (2013); Cox (1986); Easterbrook (1981); Fisch (1991; 2016; 2018); Fox (1992; 1994); Glosten, Fox, and Rauterberg (2018); Goshen and Parchomovsky (2001); Gubler (2017); Jagolinzer, Henderson, and Muller (2015); Karmel (2015); Kim (2013; 2014); Langevoort (2006; 2020a; 2020b; 2023); Nagy (2009); Park (2018); Pritchard (2016; 2018); Verstein (2016; 2018; 2020).

Some studies examine trades reported to the SEC by registered insiders (directors, officers, and relatively large shareholders)²⁵ before the announcement of M&A (or, in some cases, earnings announcements). Within this line of research, Arshadi and Eysell (1991) study the effect of the Insider Trading Sanctions Act of 1984 (ITSA), which imposed monetary penalties of up to three times the profits made or the losses avoided through unlawful insider trading. Using a sample of tender offers in the 1967-1987 period, they find that registered insiders changed from being net buyers pre-ITSA to being net sellers post-ITSA. In other words, while insiders bought more shares than they sold during the weeks preceding a tender offer in the pre-ITSA years, this pattern disappeared after ITSA. Seyhun (1992) extends this analysis by examining not only tender offers, but also earnings announcements (during the 1975-1989 period), and confirms that insiders' net purchases before tender offers declined post-ITSA. Garfinkel (1997) examines the impact of a related regulatory change, the Insider Trading and Securities Fraud Enforcement Act (ITSFEA) of 1988, which introduced three reforms: an increase in the maximum civil penalty for insider trading to the greater of \$1 million or three times the profit gained or the loss avoided by the violator of the prohibition, an increase in the maximum prison time from 5 to 10 years, and the creation of a whistleblower program that allowed whistleblowers to collect 10% of the insider's trading profits. For a sample of earnings announcements between 1984 and 1991, Garfinkel finds that after ITSFEA, insiders more often postponed their sales until after negative earnings announcements became public.

Agrawal and Jaffe (1995) examine a sample of mergers between 1941 and 1961, a period during which the main mechanism to prevent insider trading was the "short-swing rule" – which mandates disgorgement of profits made (or losses avoided) by directors and officers that engage in a purchase and subsequent sale (or a sale and subsequent purchase) of securities within a six-month period. The authors find that insiders reduced their stock purchases in the target in the months preceding the announcement of the transactions, which suggests that the rule had some deterrent effect.²⁶

²⁵ Section 16(a) of the Securities Exchange Act requires "registered insiders" to report their trades in the shares of their companies. For the purposes of this provision specifically, a "registered insider" means a director, an officer, or a shareholder who owns more than 10% of the shares of the corporation.

²⁶ The short-swing rule was enacted as part of the Securities Exchange Act of 1934 (Section 16(b)) and was the main instrument to prevent insider trading in the period examined by the authors because the SEC only began enforcing Rule 10b-5 with its *Cady, Roberts* action in 1961 (*In the Matter of Cady, Roberts & Co.*, 40 S.E.C. 907 (S.E.C. Release No. Nov. 8, 1961)). The rule forces insiders to disgorge gains from pre-merger purchases that were within six months of the merger because a merger requires that all the shareholders sell their shares to the buyer of the target. However, the rule has some important limitations. The most basic one is that if the purchase of the shares is more than six months apart from the merger, then the insider is not captured by the rule. In addition,

Agrawal and Nasser (2012) compare insider trades in takeover targets with insider trades in companies not involved in takeovers in a more recent period (1988-2006). Their results show that while insiders of takeover targets reduced their purchases below normal levels (that is, in relation to trades in non-targets), they reduced their sales even more, thus increasing their net purchases.²⁷

One important limitation of these studies is that they only capture trades reported to the SEC by registered insiders – they do not capture trades that were not reported and trades by non-insiders. Several studies therefore examine indications of illegal insider trading by examining whether M&A targets experience abnormally high returns before the announcement of the transactions – and the answer to this question is consistently positive (Keown and Pinkerton, 1981; Sanders and Zdanowicz, 1992; Kedia and Zhou, 2009).²⁸ Keown and Pinkerton (1981), for example, conclude that their “results confirm ... what most traders already know. Merger announcements are poorly held secrets, and trading on this non-public information abounds.”

enforcement of the rule may be difficult if the trades were not reported to the SEC. There was also uncertainty about the validity of the rule in the context of sales pursuant to merger agreements because some defendants argued that a merger involves an involuntary sale of a security; however, that argument was ultimately rejected by courts (*Kern County Land Co. v. Occidental Petroleum Corp.*, 93 S.Ct. 1736, 36 L.Ed.2d 503 (1973)). Today, Rule 16b-7 exempts only a very limited set of mergers from the short-swing rule.

²⁷ Some studies study insider trades within specific types of deals. Harlow and Howe (1993) focus on management buyouts (“MBOs”) because they hypothesize that the potential for insider trading is stronger in those transactions. The reason is that like any individual who trades on MNPI, insiders may sell the shares at the higher post-announcement price (even if the transaction does not ultimately close); however, in the case of MBOs, the acquisition of shares before the announcement of the merger also has the effect of reducing the number of shares that the management team must purchase at the buyout price. In line with that prediction, for the 1980-1989 period, Harlow and Howe find an increase in the net number of insiders buying (that is, the number buying minus the number selling) during the year preceding the announcement of the MBO; in contrast, they did not find a similar pattern for other buyouts. Madison et al. (2004) focus on bank mergers because they argue that enforcement authorities might be especially interested in preserving the integrity of the capitals market in the banking sector, which can enhance the quality of enforcement in that sector. Using a sample of deals for the 1991-1997 period, the authors find that insiders reduced their purchases of shares before the transactions – but they also reduced their sales significantly. In addition to these studies, there are several papers that examine the relationship between reported insider trading and other corporate events. See, for example, Agrawal and Cooper (2015) (examining the relationship between earnings announcements and insider trading); Gosnell, Keown, and Pinkerton (1992) (examining the relationship between bankruptcy and insider trading); Seyhun and Bradley (1997) (same); Blackburne, Kepler, Quinn, and Taylor (2021) (examining the relationship between SEC investigations and insider trading); and Salman, Kepler, and Schroeder (2022) (examining the relationship between private audits and insider trading). Some studies do not focus on specific corporate events but rather point out that reported insider trades are generally suspicious when the trades are reported late or when investors face barriers to monitor them – either because the law allows a long window to report the trades or because the trades are not electronically accessible. See Jackson and Taylor (2023); Jackson, Lynch-Levy, and Taylor (2023).

²⁸ Although the literature typically examines run-ups in M&A (or earnings announcements), like in the literature on reported insider trades, some studies focus on runups around material events other than M&A – and also find evidence suggesting insider trading. See, e.g., Cohen, Jackson, and Mitts (2016); Mitts and Talley (2019); Bolandnazar, Jackson, Jiang, and Mitts (2020).

Jarrell and Poulsen (1989) show that public rumors about an upcoming deal explain part of the pre-announcement returns. However, Meubroek (1992) shows that insider trading remains a key determinant: using a sample of insider trades that were prosecuted by the SEC during the 1980-1989 period, she finds that the pre-announcement returns were predominantly explained by the days on which the prosecuted insider trading took place.

Within the same line of research, some studies examine the relationship between the law and pre-announcement returns. Del Guercio, Odders-White, and Ready (2017) analyze the impact of SEC enforcement on run-ups in M&A and earnings announcements, and find that both types of run-ups were negatively associated with resource-based measures of enforcement intensity. Chira and Madura (2013) focus on the impact on M&A target run-ups of the 2009 *Galleon* case – a case that received significant attention in the media and that the authors (and other commentators) interpreted as signaling greater scrutiny by the SEC. Confirming the notion that strong enforcement can have a deterrent effect on insider trading, they found that run-ups declined after the case. Patel (2019) examined the Second Circuit’s 2014 decision in *United States v. Newman*,²⁹ which attempted to limit the scope of tippee liability until the Supreme Court rejected that attempt in *Salman v. United States*.³⁰ Consistent with the view that relaxing the insider trading prohibition can facilitate insider trading, Patel finds an increase in M&A run-ups in the months between the two court decisions.³¹ Moreover, Pierce (2023) finds that

²⁹ 773 F.3d 438 (2d Cir. 2014).

³⁰ 137 S. Ct. 420, 420 (2016).

³¹ As mentioned earlier, in *Dirks*, the Supreme Court held that for a tippee of MNPI to be liable for insider trading, two conditions must be met: the tipper passed the MNPI in breach of a duty of confidentiality and for a personal benefit, and the tippee knows or should know that the tipper breached a duty of confidentiality. And for the purposes of the first condition, if a tipper discloses confidential information to a “trading relative or friend,” then the disclosure is considered to have been made for a “personal benefit.” *Dirks v. SEC*, 463 U.S. 646 (1983). The Second Circuit in *Newman* interpreted these conditions in a way that enhanced the burden of proof on the government. With respect to the first condition, the Second Circuit held that the inference that a tipper personally benefited from the disclosure of MNPI when he or she passed the information to a trading relative or friend was impermissible unless the tipper and the tippee had a “meaningfully close personal relationship,” and there was an exchange between them that was “objective” and “consequential,” and that represented “at least a potential gain of a pecuniary or similarly valuable nature” for the tipper. With respect to the second condition, the Second Circuit held that it was not enough for the government to prove that the tippee had reason to know that the tipper breached a duty of confidentiality; according to the court, the government should also show that the tippee had reason to know that the tipper received a personal benefit for the disclosure of the information. *United States v. Newman*, 773 F.3d 438 (2d Cir. 2014). Shortly after *Newman*, however, the Ninth Circuit rejected some aspects of the decision, and that posture was affirmed by the Supreme Court in its *Salman* decision. According to the Supreme Court, passing MNPI to a trading relative or friend was enough to establish a “personal benefit” for the tipper. In addition, the court rejected the argument that the government needed to prove that the tipper received a tangible benefit in exchange for the information. The Supreme Court did not address the Second Circuit’s argument that the tippee must have known of the tipper’s personal benefit, or the argument that the tipper and the tippee had to have a “meaningfully close personal relationship.” *Salman v. U.S.*, 580 U.S. 39 (2016).

after *Newman*, there was an increase in informed trading by hedge funds increased and a reduction of market liquidity.

In addition to the studies described above, there are various cross-country studies that examine the relationship between the first time that the insider trading prohibition was enforced in a country and various capital-market variables: the cost of capital, liquidity, and proxies for the quality of the information environment (that is, the extent to which trading relies on collection of information about securities issuers). In general, these studies suggest that the cost of capital fell, liquidity increased, and the information environment improved after the insider trading prohibition became enforced (Bhattacharya and Daouk 2002; Bushman, Piotroski, and Smith 2005; DeFond, Hung, and Trezevant 2007; Fernandes and Ferreira 2009; Aitken, Cumming, and Zhan 2015).

As shown in this section, a large part of the literature that tries to identify whether insider trading law deters insider trading is based on trades reported by insiders (which, as mentioned, is an approach that does not capture unreported trades or trades by third parties); and even within the literature that focuses on run-ups, there is no evidence on the impact of the misappropriation theory (even though the doctrine represents, as discussed earlier, one of the most significant expansions of the insider trading prohibition since the prohibition was first considered by the Supreme Court). This paper therefore contributes to filling this gap in the literature.

4. Methodology

Because the misappropriation theory significantly expanded the scope of the insider trading prohibition, it is reasonable to expect that trading on MNPI decreased after the adoption of the theory. As discussed earlier, this paper tests this hypothesis by examining M&A target run-ups before and after the adoption of the theory. Because mergers and acquisitions typically involve the payment of a substantial premium for the shares of the target company, the public announcement of the transaction almost always leads to a significant increase in the price of the company, which means that it is very likely that individuals that possess confidential information about the transaction will make significant profits (or avoid significant losses) if they buy shares in the target company (or if they refrain from selling shares they were planning to sell) before the transaction is announced. In this light, a significant pre-announcement increase in the price of the target can be reasonably interpreted as indirect evidence of insider

trading (Keown and Pinkerton, 1981; Meulbroek, 1992; Bhattacharya, Daouk, Jorgenson, and Kehr, 2000; Del Guercio, Odders-White, and Ready, 2017).

To account for general market fluctuations that may affect the pre-announcement returns, I compute the run-ups as the cumulative abnormal returns (CARs) for the stock of the target company before the announcement of the transaction – that is, as the difference between the returns of the target and the returns of the Center for Research in Securities Pricing (CRSP) index. I use the value-weighted CRSP index in the baseline estimations, but the results are similar with the equal-weighted version of the index. In addition, the time window to compute the run-ups is 30 days before the announcement of each transaction, but I obtain similar results with longer windows.

It is possible that the valuation of M&A targets changed during the sample period, which may affect the average run-ups even if insider trading levels remained similar after the adoption of the misappropriation theory. Completely ruling out this possibility is difficult because *O'Hagan* applies to all public companies, so there is no natural set of firms that could work as a control group. However, to mitigate this concern, in addition to controlling for observable factors that may affect the valuation of the targets, I use the stock market reaction to the public announcement of the transactions as a benchmark. If the run-ups changed after *O'Hagan* because the misappropriation theory disincentivized trading on MNPI, then those returns should decrease after the decision *in relation to the announcement returns* because the misappropriation theory is supposed to affect the pre-announcement returns, not the announcement returns. In this sense, I measure the impact of *O'Hagan* using a difference-in-differences estimator: the post-*O'Hagan* change in the run-ups relative to the post-*O'Hagan* change in the announcement returns.

To operationalize the difference-in-differences analysis, I create a panel of transactions with two periods per transaction: one before the announcement of the deal and another one at the announcement. The dependent variable in the panel is the returns of the target during the corresponding period, and I use an indicator variable, *Undisclosed*, to denote whether an observation corresponds to the pre-announcement period (in which case the variable takes the value of 1) or the announcement period (in which case the variable is 0). In addition, I create another indicator variable, *Post*, which takes the value of 1 for transactions announced after June 25, 1997, the date of the *O'Hagan* decision, and 0 otherwise. The main independent

variable of interest is therefore $Undisclosed \times Post$, which measures the post-*O'Hagan* change in the pre-announcement returns (i.e., the run-up) in relation to the announcement returns.

The regressions also include transaction fixed effects, which account for transaction-invariant characteristics that may affect the pre-announcement and the announcement returns. However, as an alternative to this specification, I run the regressions using a random-effects model (or, alternatively, an ordinary least squares (OLS) model) in which I explicitly control for factors that may affect the returns. These factors include the target's size (market capitalization), profitability (return on equity or ROE), sales growth, market-to-book ratio, leverage (the ratio of debt to assets), cash holdings, and industry (the two-digit Standard Industry Classification Code); capital market liquidity (the spread of the prime rate over the federal funds rate); and controls for public rumors about the transaction, the buyer's toehold, and whether the transaction was friendly or hostile. Section 5 discusses in more detail the motivation for each of these controls.

I examine the impact of *O'Hagan* using a sample period of five years before the decision, plus the year of the decision, and a symmetric period afterwards (that is, twelve years in total). I use a relatively short time window to reduce the potential impact of confounding factors, but the results hold if I use a longer window.

In addition to the estimations described above, I run sensitivity analyses that compare the runups of the M&A targets with the returns of a matched control group before and after *O'Hagan*. In addition, I compare the runups of the merger targets with those of tender offer targets – since, as mentioned earlier, tender offers were already subject to Rule 14e-3. As discussed in Section 5, the conclusions from these tests are consistent with the baseline results.

The data come from various sources. The M&A transactions come from the Refinitiv, stock market prices are from the Center for Research in Securities Prices (CRSP), and the companies' financials come from Compustat and Refinitiv.

5. Results

Table 1 shows descriptive statistics. The main variable of interest in the table is the difference between the run-ups and the announcement returns – a difference I denote as the “relative run-ups.” As shown in the table, the average relative run-up before *O'Hagan* was -9 percentage

points – that is, run-ups were 9 percentage points lower than the announcement returns. After the decision, the difference became -12, meaning that *O'Hagan* was associated with a decline in relative run-ups of 3 percentage points. The table also shows that there were other deal characteristics that changed after *O'Hagan*, so, as discussed before, I mitigate the effect of those factors not only by adjusting the run-ups for the announcement returns, but also by including controls in the multivariate analysis and using matched subsamples.

Table 2 shows the regression results. As discussed in the methodology section, the regressions take the form of panel regressions in which there are two periods per transaction (the pre-announcement period and the announcement period), and the dependent variable is the returns during the corresponding period. There are three models in the table: Model 1 is the baseline model, which includes transaction fixed effects and standard errors clustered at the transaction level; Model 2 clusters the errors at the industry level to account for industry variation; and Model 3 employs industry-by-time standard errors because the returns around M&A may cluster at the industry level and, in turn, the industry effects may change over time. As shown in the table, the interaction *Undisclosed*×*Post* was negative and statistically significant in all the estimations, confirming that the pre-announcement returns (that is, the run-ups) declined significantly in relation to the announcement returns. The coefficient of the variable was 0.033, which is similar to the coefficient in the univariate analysis.

Figure 1 explores the relationship between the run-ups and the announcement returns over time. As shown, the run-ups and the announcement returns followed roughly parallel trends before *O'Hagan*, but after the decision, the relative run-ups declined immediately and significantly. The figure therefore lends additional support to the idea that the post-*O'Hagan* decline in the relative run-ups can be plausibly attributed to the misappropriation theory.

Table 3 shows the results of five sensitivity analyses. In the first one (Model 1), I run the regressions using a longer sample period. As mentioned earlier, the baseline period is relatively short to minimize the effect of potential confounding factors, but I repeat the analysis with a longer period (which doubles the size of the baseline post-*O'Hagan* period) to examine the long-term persistence of the results.

In Model 2, I compute the run-up for each merger using a longer window of 60 days prior to the announcement of the deal. The disadvantage of this approach is that it increases the

likelihood of capturing factors unrelated to the transactions, but the advantage is that it may capture insider trading that was not captured by the baseline period.

In Model 3, I replace the fixed-effects model with a random-effects model, which explicitly controls for observable factors that may affect the returns. These factors include, as mentioned earlier, the size, profitability, sales growth, market-to-book ratio, leverage, cash holdings, and industry of the target; capital market liquidity; and controls for public rumors about the transaction, the buyer's toehold, and whether the transaction was friendly or hostile. These controls are motivated by various considerations. In some papers, the size of a firm exhibits a negative correlation with the premium paid by the buyer (e.g., Schwert, 2000). In addition, a buyer may pay more for targets that are more profitable, that have a strong growth trajectory, and that are more highly valued by the market in relation to the company's assets – which justifies the controls for ROE, sales growth, and the market-to-book ratio. Leverage and cash holdings are indirect proxies for the efficiency with which a firm is managed, because, according to Jensen (1986), firms that are inefficiently run are likely to have too little debt or too much cash. Capital market liquidity is a proxy for the ease with which companies can access financing, which can affect the premium paid by a buyer (e.g., Harford, 2005).³² The last three proxies are more directly related to the runups: public rumors about the deal can exert upward pressure on the run-up because they may arouse interest in the target; the toehold may affect the run-up because it may lead investors to infer that the target is undervalued or that a merger or acquisition is likely; and the attitude of the buyer (hostile versus friendly) may matter because in friendly (i.e., negotiated) deals there is more sharing of information between the advisors of the bidder and the target, which creates greater opportunities for leakage of information (Jarrell and Poulsen, 1989).³³

Model 4 is aimed at enhancing the comparability of the sample before and after *O'Hagan*. To this end, I matched the post-*O'Hagan* transactions with their most similar pre-*O'Hagan* transactions using propensity score matching, and then I repeated the regressions using that

³² I define capital market liquidity as the spread of the prime rate over the federal funds rate. The prime rate is a reference rate at which banks price short-term business loans. The federal funds rate is the rate at which commercial banks borrow and lend their excess reserves among themselves. Both variables are published by the Federal Reserve. Harford (2005) computes capital market liquidity as the spread between the commercial and industrial loan rate (that is, the average interest rate on commercial and industrial loans) and the federal funds rate. The results are similar if I use that version of the variable.

³³ I control for all the variables at the transaction level, but the results are similar if I include the variables that are most directly related to the runups (rumors, the toehold, and the friendly or hostile attitude of the buyer) as controls for the runups only.

subset of the sample. The methodology to construct this matched sample is similar to the methodology I use to build the matched sample of M&A targets and non-M&A targets, which is described later in this section, in the discussion of Table 4.

Model 5 compares the relative runups in mergers and tender offers. As discussed earlier, since the 1980s, tender offers were subject to Rule 14e-3, which prohibited the same kinds of scenarios (as well as others) that were subsequently prohibited under the misappropriation theory. As a result, the effect of *O'Hagan* could be reasonably expected to be stronger on mergers than on tender offers. Because the dependent variable in these estimations is the relative runup, and because the regressions compare the change in the relative runup in mergers and tender offers, the independent variable of interest is *Merger* × *Post*, an interaction between *Merger* (a dichotomous variable that takes the value of one for mergers and zero for tender offers) and *Post* (the post-*O'Hagan* variable).

As shown in Table 3, the results of Models 1 through 4 were roughly similar to the baseline regressions (and, in fact, the magnitude of the effect becomes stronger in some of them), indicating once again that runups declined in relation to announcement returns after *O'Hagan*. In addition, Model 5 of the table shows that the relative runup in mergers declined in relation to the runup in tender offers.³⁴

Table 4 shows another set of sensitivity analyses: regressions in which I compare the relative runups of the M&A targets (the “treatment” group) with similarly calculated returns for a matched control group, which I built using propensity score matching.³⁵ I matched the M&A targets with their closest peers in the CRSP database using the firms’ two-digit SIC code and market capitalization.³⁶ I did not impose any specific caliper or common support condition, but

³⁴ The comparison between mergers and tender offers requires an important caveat. As noted in Section 2, Rule 14e-3 was controversial since its inception because it was inconsistent with the classical theory, and it was only in *O'Hagan* that the Supreme Court definitely upheld the validity of the rule. In this sense, tender offers were affected by *O'Hagan* to some extent, which may attenuate any potential difference in the effect of the decision between mergers and tender offers. In fact, this might be part of the reason why I find that although the coefficient of the difference-in-differences estimator (i.e., *Merger* × *Post*) is similar to the baseline analyses, the statistical significance of the estimator is lower than that of the baseline regressions.

³⁵ The dependent variable in these regressions is therefore the relative runup. In the case of the treatment group, as discussed in Section 4, that variable is the difference between the pre-announcement returns of the M&A targets and the returns at the announcement of the transaction. In the case of the control firms, there is no M&A announcement, so the “relative runups” in those cases are the returns of the firm computed over the same days used to compute the returns of the corresponding treatment firm.

³⁶ The vector of variables that I use to form the control firms is similar to vector used in other studies (see, e.g., Agrawal and Cooper, 2015). However, the results are similar if I use all the observable characteristics of the

the results are similar if I use a standard caliper of 0.25 times the standard deviation of the propensity score (Rosenbaum and Rubin, 1985) or if I require common support (that is, if I use control observations whose propensity score is not higher than the maximum or lower than the minimum propensity score of the treatment observations). I performed one to one matching, so there is one control firm for each target firm. The main independent variable of interest in these regressions is $Treatment \times Post$, an interaction between *Treatment* (which takes the value of one for M&A targets and zero for control firms) and the post-*O'Hagan* variable. Model 1 does not include controls, Model 2 includes controls, and Model 3 extends the sample size (like in Model 4 of Panel A) to examine the long-term persistence of the results. As shown in the table, the $Treatment \times Post$ variable was negative and statistically significant across all the models, indicating that the relative runups of M&A targets in fact declined in relation to similarly calculated results for similar firms.

One important potential confounder of the results presented in Tables 1 through 4 is changes in enforcement. Increases in enforcement intensity should deter insider trading, and prior empirical studies in fact show that there is a negative correlation between various proxies for enforcement intensity and target runups (e.g., Del Guercio, Odders-White, and Ready, 2017; Chira and Madura, 2013). I therefore repeat the regressions with controls for enforcement intensity. I use two baseline proxies for enforcement, which I obtain from Del Guercio, Odders-White, and Ready (2017):³⁷ the SEC's annual budget and the commission's number of staff positions. Table A.2 of the appendix reproduces the proxies (in levels and in annual percent changes). As shown in the table, and as Del Guercio, Odders-White, and Ready (2017) also note, that the SEC's resources have generally increased over time, but not in a linear manner: there are years with small positive and negative changes, as well as years with large changes.

Table 5 presents the regression results on the relationship between *O'Hagan* and relative runups, after controlling for enforcement. As shown in the table, the decline in runups relative to the announcement returns remains statistically significant at the 1%. This is true regardless of which proxy for enforcement intensity is included in the regressions: annual budget (Model 1), percent change in the annual budget (Model 2), number of staff positions (Model 3), or

targets. Control firms matched with any given target firm are taken out of the pool of potential control firms for other target firms during the next two fiscal years.

³⁷ The original data come from SEC's annual reports and the congressional budget justifications that support the SEC's fiscal year budget and number of staff positions, and the budget numbers are adjusted for inflation.

percent change in the number of staff positions (Model 4). The correlation between the SEC's annual budget and number of staff members is high, so I do not simultaneously include them in the regressions, but the results hold if I do.

The proxies used in Table 5 are “input” measures of SEC enforcement intensity. An alternative way to measure enforcement is by examining “output” measures. Table A.2 of the appendix shows two types of such proxies: number of informal investigations (for which the SEC requests information on a voluntary basis), number of formal investigations (for which the SEC can compel the defendants to provide evidence), number of insider-trading cases, and number of insider trading defendants. I repeated the regressions with each of these proxies, and the results were qualitatively similar, but it is important to keep in mind that, as Del Guercio, Odders-White, and Ready (2018) point out, output proxies are less reliable than input proxies for three reasons. First, because they seem less exogenous to insider trading activity: a high number of investigations might be the result of more insider trading activity, not necessarily more enforcement. Input measures are unlikely to be fully exogenous, but they seem less endogenous because they change in response to the idiosyncrasies of the federal budgeting process. Second the interpretation of a response to output measures is further complicated by the fact that low output in terms of prosecuted cases could be the result of SEC inattention to violations or, alternatively, effective deterrence. And third, there is a significant lag between enforcement effort and the output measures because enforcement actions take considerable time.

Another important source of enforcement in addition to the SEC is the Department of Justice (DOJ), which has the authority to initiate criminal actions. However, proxies for SEC enforcement are a good predictor for DOJ enforcement because the DOJ rarely prosecutes individuals for insider trading independently of the SEC. In a typical insider trading action, the SEC initiates the investigation, and the DOJ only participates if the case is referred to it because the SEC considers that there is enough merit for a criminal investigation. As Del Guercio, Odders-White, and Ready (2018) observe, citing remarks by Mary Jo White, former chair of the SEC, “In the vast majority of criminal securities fraud prosecutions, the SEC’s enforcement staff works closely with the criminal authorities ... [I]t is the lawyers, accountants, and other professionals from the SEC’s enforcement and exam[ination] programs who initially detect the misconduct and put the preliminary case together... When we find sufficient evidence of a

serious violation to justify criminal involvement, we alert the criminal authorities, and we may conduct parallel investigations” (Del Guercio, Odders-White, and Ready, 2018).

In theory, private litigation is another alternative source of enforcement. However, private actions for insider trading are rare and usually depend on public enforcement (Bainbridge, 2012), possibly because private parties have more limited investigative tools than the SEC does (e.g., Dooley, 1980; Jackson and Roe, 2009; Del Guercio, Odders-White, and Ready, 2018), and possibly because the economic incentives to initiate a private lawsuit are low. Section 20A of the Exchange Act only allows contemporaneous traders to sue insiders, tippers, and tippees. In addition, although the plaintiff could in theory recover the trading profits, the recovery is reduced if the SEC has already obtained disgorgement of the profits. This rule is thus much narrower than the private right of action that Rule 10b-5 grants in the context of corporate misrepresentation, where litigation is more frequent. In a class action in that context, all the individuals that traded between the time of the breach and the time of the disclosure of the relevant information have standing to sue, and the class of plaintiffs can typically recover the difference between the trading price and the value of the shares in the absence of the misrepresentation.³⁸

FINRA, the self-regulatory organization for the securities market, is also a potential source of enforcement. However, the universe of individuals covered by this form of enforcement is much smaller, as FINRA does not have jurisdiction to discipline traders who are not broker-dealer members of the organization (GAO, 2007; Del Guercio, Odders-White, and Ready, 2018).

It is important to note that before *O’Hagan* adopted the misappropriation theory, some circuit courts endorsed the theory.³⁹ In untabulated analyses, therefore, I examined whether the effect of *O’Hagan* was different among companies headquartered in the Second Circuit (the circuit that most clearly endorsed the misappropriation theory) and companies headquartered in other circuits. However, the results do not show significant differences. There are three possible (non-mutually exclusive) interpretations for this result. One is that *O’Hagan* provided certainty

³⁸ See, e.g., *Blue Chip Stamps v. Manor Drug Stores*, 421 U.S. 723 (1975).

³⁹ See *United States v. Newman*, 664 F.2d 12 (2d Cir. 1981); *Rothberg v. Rosenbloom*, 771 F.2d 818, 823 (3d Cir. 1985); *SEC v. Clark*, 915 F.2d 439, 449 (9th Cir. 1990); *SEC v. Cherif*, 933 F.2d 403, 410 (7th Cir. 1991); *United States v. Carpenter*, 791 F.2d 1024, 1025-26, 1029 (2d Cir. 1986).

in all circuits. Despite the Second Circuit's decisions endorsing the misappropriation theory, that posture was controversial because it was perceived as inconsistent with *Chiarella*, which is illustrated by the circuit court decisions that explicitly rejected the theory⁴⁰ and the split within the Supreme Court on the issue.⁴¹ In contrast, after *O'Hagan*, it became completely clear that the misappropriation theory was the law. Second, it may be possible that the market (across all circuits) is lulled into inattention until a salient event wakes it up – and that *O'Hagan* was such an event. Under this hypothesis, *O'Hagan* could be associated with lower insider trading across all circuits, even if one assumes that it did not significantly change in the law (or did not reduce uncertainty) in some of them. And third, the circuit of the headquarters of the issuer does not necessarily determine the federal court in which an insider trading case will be brought. In particular, if the defendant is domiciled (or the violation took place) in a different jurisdiction, the case might not be brought in the circuit of the target's headquarters. In this light, the lack of significant differences across circuits might simply reflect the fact that comparing circuits is not a clean test.

Before closing this section, I note three inherent limitations of the empirical analysis. First, although lower runups seem to indicate a lower incidence of insider trading, it is possible that *O'Hagan* changed the way in which insiders try to profit from MNPI. In particular, it is possible that after the case, insiders started trading in economically connected firms (a practice known as “shadow trading”) expecting that the prices of those firms will experience movements that are similar to those of the target company (and that trading in those firms will attract much less attention).⁴² This paper, however, does not capture that potential change in the behavior of insiders and their tippees.

Second, there are unobservable factors that interact with the misappropriation theory and without which the theory probably would not have significant effects. As mentioned before, a particularly important factor is the enforcement environment in which the theory operates (e.g., Del Guercio, Odders-White, and Ready, 2017; Chira and Madura, 2013). The SEC in particular devotes significant resources to prosecute insider trading and has in place surveillance systems to monitor the practice, which (at least to some extent) creates a threat that a violation of the

⁴⁰ See *United States v. Bryan*, 58 F.3d 933, 944 (4th Cir. 1995); *United States v. O'Hagan*, 92 F.3d 612, 614, 620 (8th Cir. 1996), *rev'd*, 521 U.S. 642 (1997).

⁴¹ *Carpenter v. United States*, 484 U.S. 19 (1987).

⁴² Suggesting that shadow trading occurs, see, e.g., Mehta et al. (2021); Lee et al. (2022).

law will be penalized. I therefore emphasize that while this paper suggests that there is a negative relationship between the breadth of the doctrine that governs insider trading and the incidence of the practice, that relationship probably will not materialize in contexts of lower enforcement intensity.

And third, as discussed earlier, run-ups are a common proxy for insider trading, but there are other factors that can affect them. I try to remove the effect of such other factors by adjusting the run-ups for market fluctuations, controlling for variables that the literature considers important, and employing the announcement returns as a benchmark for the analysis. However, I acknowledge that those are imperfect methods to ensure that pre-announcement returns capture only insider trading.

6. Implications

This paper's empirical evidence suggesting that the misappropriation theory deters insider trading has various economic and doctrinal implications. An important economic implication is that the theory can affect the cost of capital, the liquidity of the securities market, and the information environment in which that market operates. As mentioned before, the insider trading prohibition is in large part motivated by two ideas: that outside investors will have low incentives to participate in the capital market if they believe that they are trading with individuals who have an informational advantage derived from misappropriated information, and that this kind of informational disparity can reduce the incentives of outside investors and market professionals to collect information about firms (since the opportunities to profit from that kind of research will be limited). These ideas in turn imply that in a scenario of a strong insider trading prohibition and strong enforcement, the cost of capital will fall (as investors will charge a lower premium for their capital), liquidity will increase (as it will be easier for investors to dispose of their securities), and the information environment will be stronger (which can have the desirable effect of making stock prices reflect more accurately the fundamental value of a company) (Manove, 1989; Ausubel, 1990; Fishman and Hagerty 1992; Khanna, Slezak, and Bradley 1994). Therefore, since the misappropriation theory seems to represent a meaningful doctrinal enhancement, the theory may ultimately contribute to all these capital-market effects.

It is important to emphasize, however, that there are commentators who think that there should be no insider trading prohibition at all because insider trading can lead to more informative

prices (e.g., Manne, 1966; Carlton and Fischel, 1982; 1983). According to these commentators, if insiders can trade on non-public information, then that information will be more quickly incorporated into securities prices and therefore prices will be more efficient, not less, at reflecting the fundamental value of a company (e.g., Manne, 1966; Carlton and Fischel, 1982; 1983). In this sense, from the perspective of these commentators, the insider trading prohibition is economically undesirable.⁴³

A related line of commentary does not go so far as to question the idea that insider trading should be prohibited at least to some extent, but these commentators do emphasize that there is a risk of over-deterrence if the law is too broad. As discussed earlier, this was precisely Justice Powell's concern in *Dirks*, where he expressed the potentially deleterious impact of an overly broad insider trading prohibition on market analysts (see also, e.g., Bainbridge, 2018). According to Justice Powell, "It is commonplace for analysts to "ferret out and analyze information," and this often is done by meeting with and questioning corporate officers and others who are insiders. And information that the analysts obtain normally may be the basis for judgments as to the market worth of a corporation's securities. The analyst's judgment in this respect is made available ... to clients of the firm, [and] ... such information cannot be made simultaneously available to all of the corporation's stockholders or the public generally."⁴⁴

Given this debate, I acknowledge that the ultimate economic consequences of the misappropriation theory can be controversial, and in fact it may well be possible to over-deter insider trading – as Justice Powell suggested. However, some observations are noteworthy. First, there is empirical evidence that suggests that strong enforcement against insider trading is in fact correlated with a lower cost of capital, higher liquidity, and more informative prices (Bhattacharya and Daouk 2002; Bushman, Piotroski, and Smith 2005; DeFond, Hung, and Trezevant 2007; Fernandes and Ferreira 2009; Aitken, Cumming, and Zhan 2015). In light of this evidence, it becomes even more reasonable to think that the misappropriation theory could ultimately have positive capital-market effects. Second, even ignoring these empirical studies, an important premise behind the arguments offered by both the proponents and the critics of the insider trading prohibition is that the law meaningfully deters insider trading (Del Guercio, Odders-White, and Ready, 2017). Since this paper provides evidence on that common premise,

⁴³ Some commentators have pointed out, however, that there are reasons to think that eliminating the insider trading prohibition would not lead to more accurate pricing. See, e.g., Kahan (1992).

⁴⁴ *Dirks v. S.E.C.*, 463 U.S. 646, 658–59 (1983).

the findings presented here are relevant to both sides of the debate. Third, there are non-economic considerations (such as considerations of fairness or doctrinal coherence) that may justify a strong insider trading prohibition (and therefore the misappropriation theory or even a stronger doctrine) regardless of whether or not the ultimate capital-market effects of the prohibition are clear.⁴⁵ And fourth, although, as Justice Powell suggests, insider trading law involves a balancing act between over-deterrence and under-deterrence, the purpose of this paper is not to advocate for a particular configuration of the insider trading prohibition. Rather, its purpose is to show that a particular doctrine appears to have meaningful deterrent effects.

In terms of doctrinal implications, the fact that the misappropriation theory appears to deter insider trading suggests that further expansions of the doctrine may have a similar effect. The proponents of these expansions mainly advocate for the elimination of two limitations of the doctrine. The first is that although the theory does not require a fiduciary relationship between a trader (or a tipper of MNPI) and the shareholders of the issuer, it still requires a fiduciary relationship between the person who misuses confidential information and the source of the information (whoever that person is). And the second is that the theory does not subject to liability the “brazen fiduciary” – that is, a person who trades on (or tips) confidential information but discloses his or her intention to do so to the source (e.g., Nagy 2009).

According to the proponents of the reforms, there is no convincing rationale for maintaining these limitations because insider trading by someone who does not have a confidential relationship with the source of the MNPI or by a brazen fiduciary undermines investor confidence (the motivating concern behind *O’Hagan*) as much as secret trading by a fiduciary. In fact, some courts have already signaled their willingness to endorse these reforms,⁴⁶ and Congress also took a step in this direction when it adopted Section 807 of the Sarbanes Oxley

⁴⁵ For example, some authors think that insider trading should be prohibited because firms have property rights over MNPI, and those rights should be protected even in the absence of evidence that doing so has beneficial effects on the capitals market (Bainbridge, 2012). Similarly, the Supreme Court in *O’Hagan* found no fairness or doctrinal justification for premising the insider trading prohibition on a fiduciary relationship with the issuer. U.S. v. O’Hagan, 521 U.S. 642, 658-59, 674 (1997). Describing all the justifications for the insider trading prohibition that do not rely on the implications of the prohibition for the securities market is beyond the scope of this paper. However, theories like the one proposed by Bainbridge (2012) illustrate that economic considerations are not the only ones that determine whether a strong prohibition is desirable.

⁴⁶ SEC v. Dorozhko, 574 F.3d 42 (2d Cir. 2009) (subjecting to Rule 10b-5 liability a computer hacker who stole confidential information and traded on the information, even though the hacker did not have any relationship of trust and confidence with the source of the information. According to the court, the hacker deceived the source of the information, and deception is the key to trigger liability under Rule 10b-5); SEC v. Rocklage, 470 F.3d 1 (1st Cir. 2006) (suggesting that a trader that discloses his intent to trade on MNPI should not be exempt from liability if the trader acquired the information by another form of deception that does not involve non-disclosure).

Act, which provides a criminal insider trading prohibition that does not require a fiduciary relationship with the source of the information.⁴⁷

In light of the results presented here, it seems reasonable to presume that expanding the misappropriation theory along these lines should have a deterrent effect on insider trading; and if deterrence is a desirable goal, then these reforms may be desirable as well. However, as discussed earlier, it is important to keep in mind that the misappropriation theory represented a particularly significant step in the evolution of the insider trading doctrine (which implies that further expansions of the doctrine may not have the same impact), and that examining exactly how strong the insider trading prohibition should be is a topic beyond the scope of this paper.

7. Conclusion

After more than two decades following the adoption of the misappropriation theory in the Supreme Court's decision in *O'Hagan*, it remains unclear whether the theory (one of the pillars of the insider trading doctrine today) has had any deterrent effect on insider trading. This paper contributes to filling this gap by examining the effect of *O'Hagan* on M&A target run-ups – a common proxy for insider trading. The results show that run-ups fell immediately and significantly after *O'Hagan*, and this result holds after the returns are adjusted for common market fluctuations, observable characteristics of the target companies, and the announcement returns. The results thus suggest that the strength of the insider trading prohibition has a meaningful effect on the incidence of insider trading, at least in the particular enforcement environment in which the misappropriation theory was adopted.

⁴⁷ Section 807 of the Sarbanes-Oxley Act provides the following: “Whoever knowingly executes, or attempts to execute, a scheme or artifice — (1) to defraud any person in connection with any security of [a public issuer]; or (2) to obtain, by means of false or fraudulent pretenses, representations, or promises, any money or property in connection with the purchase or sale of any security of [a public issuer], shall be fined ... or imprisoned...” As Bainbridge (2012) points out, the language and history of the provision provide little guidance on how exactly it differs from Rule 10b-5. However, the provision has already been interpreted as not requiring a breach of a duty of confidence to trigger liability. *U.S. v. Mahaffy*, 446 F. Supp. 2d 115 (E.D.N.Y. 2006). A limitation of the rule, however, is that it is only criminal – it is not part of the SEC’s toolkit because it cannot be used to bring civil cases.

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Table 1
Descriptive statistics

Table 1 presents summary statistics before and after *O'Hagan*. The key variable of interest is the *relative run-up*, which is the difference between the run-ups and the announcement returns of a takeover bid. The appendix contains additional details about this variable and the definition of the remaining variables. The tests of statistical significance are *t*-tests of mean differences. The coefficients of the differences may be slightly different than the differences of the mean values shown in the table due to rounding. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Pre- <i>O'Hagan</i>				Post- <i>O'Hagan</i>				Difference
	Mean	Median	S.D.	N	Mean	Median	S.D.	N	
Relative run-up	-0.09	-0.07	0.25	2098	-0.13	-0.10	0.28	3445	-0.03***
Log(mcap)	4.54	4.51	1.88	2098	4.91	4.80	1.80	3445	0.37***
ROE	-0.06	0.03	0.53	2098	-0.14	0.02	0.71	3445	-0.08***
Sales growth	0.06	0.06	0.33	2098	0.08	0.08	0.38	3445	0.02*
Liquidity	0.29	0.05	0.70	2098	0.15	0.05	0.31	3445	-0.14***
Leverage	0.33	0.26	0.32	2098	0.28	0.21	0.29	3445	-0.05***
Hostile	0.09	0.00	0.29	2098	0.02	0.00	0.13	3445	-0.07***
Toehold	0.05	0.00	0.16	2098	0.05	0.00	0.16	3445	0.00

Table 2
Regression results

Table 2 presents regression results. The dependent variable is the returns of the target shareholders in takeover bids. For each transaction, I measure the returns in two periods (before and after the announcement of the transaction), and therefore the dataset takes the form of a panel with two observations per transaction. The variable *Undisclosed* takes the value of 1 for the period during which the transaction was undisclosed and zero for the days surrounding the announcement, and therefore this variable identifies the portion of the returns that consist of the run-up. *Post* is a variable that takes the value of 1 if a transaction was announced after *O'Hagan* and zero otherwise. The interaction *Undisclosed*×*Post* thus captures the change in the run-ups in relation to the announcement returns after *O'Hagan*. All the models include fixed effects at the transaction level. The *t*-statistics are in parentheses and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1)	(2)	(3)
<i>Undisclosed</i> × <i>Post</i>	-0.033*** (-4.60)	-0.033*** (-5.87)	-0.033*** (-3.21)
R-squared	0.157	0.157	0.157
N	11086	11086	11086

Figure 1
Evolution of relative run-ups

Figure 1 shows the evolution over time of the relative run-ups (i.e., the run-ups minus the announcement returns). Each circle represents the difference in relative run-ups between the first year in the sample and the corresponding year. Black circles denote a difference that is statistically significant at least at the 5% level. The reference line is 1997, the year of the Supreme Court decision in *O'Hagan*.

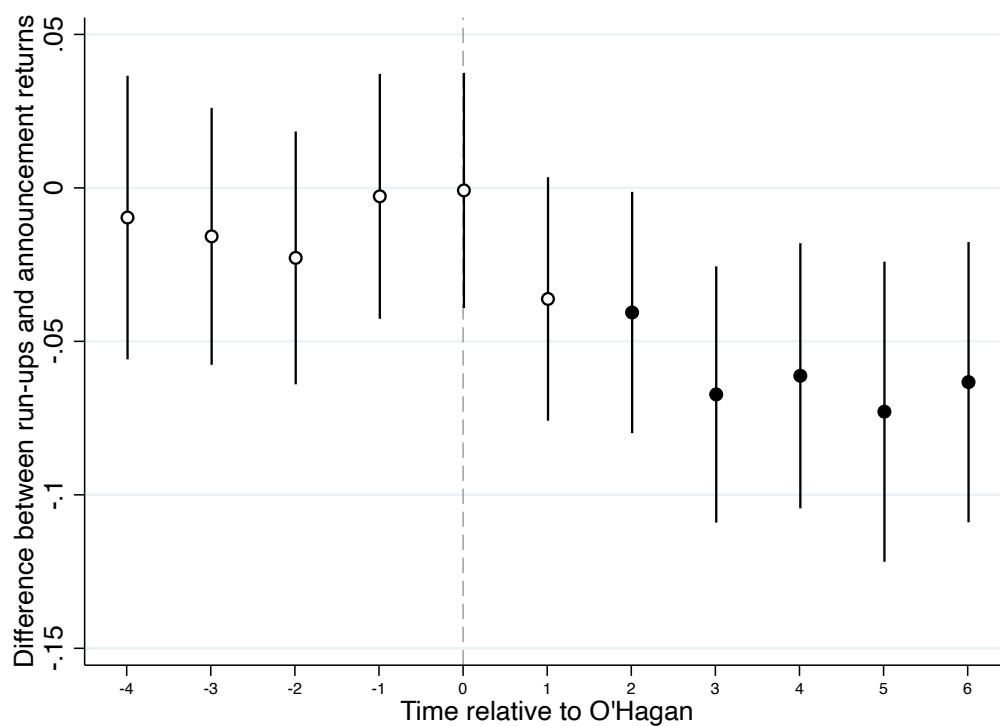


Table 3
Sensitivity analyses: alternative specifications

The table shows alternative specifications. Model 1 shows regressions with a post-*O'Hagan* period that is twice as large as the baseline period. Model 2 replaces the run-up of 30 days prior to the announcement of the M&A transaction with a 60-day run-up. Model 3 replaces the fixed-effects model with a random-effects model and includes explicit controls for target and deal characteristics. These controls include target's size (market capitalization), profitability (ROE), sales growth, and leverage, as well as the toehold and whether the transaction was friendly or hostile. Model 4 is based on a sample that matches post-*O'Hagan* transactions with pre-*O'Hagan* transactions. Model 5 compares mergers and tender offers. *Merger* is a dummy variable that takes the value of 1 for mergers and 0 for tender offers. The dependent variable in this model is the relative runup. The *t*-statistics are in parentheses and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1)	(2)	(3)	(4)	(5)
<i>Undisclosed</i> × <i>Post</i>	-0.045*** (-6.87)	-0.046*** (-5.43)	-0.033*** (-4.58)	-0.036*** (-4.41)	
<i>Merger</i> × <i>Post</i>					-0.042** (-2.01)
Transaction fixed effects	Yes	Yes	No	Yes	No
Controls	No	No	Yes	No	Yes
R-squared	0.190	0.075	0.157	0.152	0.05
N	14116	11086	11086	8392	5543

Table 4
Sensitivity analyses: estimations with a matched sample

The table shows regressions using a matched control group of firms that were not targeted by M&A. The dependent variable in these estimations is the relative run-up – or similarly calculated returns for the control observations. The variable *Treatment* takes the value of 1 for the M&A targets and 0 for the matched controls. Model 1 does not contain controls other than the main variables of interest (and the stand-alone *Treatment* and *Post* variables), Model 2 contains all the controls, and Model 3 shows the results over a longer sample period (as defined in Model 1 of Panel A) and with all the controls. The *t*-statistics are in parentheses and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1)	(2)	(3)
<i>Treatment</i> × <i>Post</i>	-0.028*** (-3.38)	-0.027*** (-3.21)	-0.041*** (-5.39)
R-squared	0.091	0.101	0.119
N	11086	11086	14116

Table 5
Regressions with controls for enforcement intensity

The table repeats the baseline regressions but includes controls for enforcement intensity. Model 1 includes a control for SEC budget levels, Model 2 controls for growth in budget levels, Model 3 controls for staff levels, and Model 4 controls for growth in staff levels. The dependent variable in these estimations is the relative run-up. The models are run as random-effects models to allow for the inclusion of the enforcement proxies. The *t*-statistics are in parentheses and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1)	(2)	(3)	(4)
<i>Undisclosed</i> × <i>Post</i>	-0.033*** (-4.58)	-0.033*** (-4.58)	-0.033*** (-4.58)	-0.033*** (-4.58)
R-squared	0.157	0.157	0.157	0.157
N	11086	11086	11086	11086

Appendix

Table A.1.
Variable definitions

Variable	Definition
<i>Friendly</i>	Indicator variable that takes the value of 1 if the transaction was friendly and zero if it was hostile.
<i>Leverage</i>	Total debt to total assets
<i>Liquidity</i>	Cash and short-term investments to total assets.
<i>Market capitalization</i>	Market capitalization of the target company, which is defined as the number of shares outstanding multiplied by the stock market price of the target thirty days before the announcement of the transaction.
<i>Post</i>	Indicator variable that takes the value of one for observations measured after the <i>O'Hagan</i> decision and zero otherwise
<i>Sales growth</i>	Change in sales in relation to the fiscal year preceding the announcement of the transaction.
<i>Returns</i>	Cumulative abnormal returns around a takeover bid. This value includes the run-up (the abnormal returns for the target during the -30,-1 period in relation to the announcement), and the returns at the announcement of the takeover bid. This is the dependent variable in the regressions.
<i>ROE</i>	Return on equity: ratio of net income to common equity for the 12 months ending on the date of the most recent financial information prior to the announcement of the transaction.
<i>Rumored deal</i>	Indicator variable that takes the value of 1 if there were public rumors about the deal and zero otherwise.
<i>Toehold</i>	Buyer's holding in the target before initiating a merger.
<i>Undisclosed</i>	Dichotomous variable that takes the value of 1 for the period during which a takeover bid was undisclosed and zero otherwise.

Table A.2.
Proxies for SEC enforcement intensity

The table shows the proxies for enforcement intensity built by Del Guercio, Odders-White, and Ready (2018) during the sample period. Budget figures are in millions of dollars. Staff numbers are in thousands.

Fiscal year	Inputs				Outputs			
	Budget	% Change	Staff	% Change	Informal investigations	Formal investigations	Insider trading cases	Insider trading defendants
1992	362	15.9	2,918	12.30	334	133	32	99
1993	394.2	8.9	2,940	0.80	377	184	31	69
1994	408.5	3.6	2,825	-3.90	560	281	35	78
1995	443.4	8.5	3,039	7.60	436	245	35	96
1996	431.4	-2.7	3,039	0.00	426	189	29	92
1997	436	1.1	3,039	0.00	408	265	48	148
1998	434.7	-0.3	3,039	0.00	536	275	41	93
1999	461.2	6.1	3,101	2.00	520	282	57	165
2000	492.5	6.8	3,193	3.00	558	345	40	116
2001	537	9.0	3,285	2.90	570	324	57	115
2002	642.6	19.7	3,228	-1.80	479	300	59	144
2003	875.7	36.3	4,009	24.20	910	254	50	104