



Religion and insider trading profits[☆]

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ABSTRACT

We use the controversial aspect of insider trading to analyze the impact of local social norms on insiders' profits. We argue that religiosity is a source of social norms curbing self-interested behavior and, accordingly, it limits corporate insiders' opportunistic trading on private information. Our results confirm that trades by insiders in firms located in more religious areas are followed by lower profits, those insiders are less likely to trade on future earnings news, and their trades are less likely to be opportunistic. The effect of religion on profitability of insider trading holds across different levels of disclosure environments and is more pronounced in firms with poor corporate governance. Overall, we offer new insights into the effect of social norms on individuals' financial decisions.

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1. Introduction

Share trading by corporate insiders is regulated and fully transparent,² yet it remains a controversial issue. On the one hand, it provides information about the officers' and directors' views on the prospects of their firms and can be used by outside investors to develop profitable investment strategies.³ On the other hand, insid-

ers have privileged access to private information about their firms, and if they buy or sell the firms' shares using that information, they profit at the expense of less-informed outside investors from whom they buy or to whom they sell shares.

Because of that controversial aspect of insider trading, the literature debates its welfare implications, fairness, legality, ethics and even morality (e.g., Manne, 1966; Carlton and Fischel, 1983; Ausubel, 1990; Leland, 1992; Strudler and Orts, 1999). The consensus among regulators around the world is to introduce and enforce laws that aim to prevent insiders from trading on material private information on grounds of fairness and equity (Bhattacharya and Daouk, 2002; Bainbridge, 2019), and, additionally, firms introduce their own rules to monitor and restrict insider trading (Bettis et al., 2000). Still, numerous studies document that corporate insiders trade, on average, profitably, particularly when they buy shares in their own firms (e.g. Seyhun, 1986; Jeng et al., 2003; Cohen et al., 2012), and they strategically trade on foreknowledge of corporate news and developments (e.g., Damodaran and Liu, 1993; Seyhun and Bradley, 1997; Ke et al., 2003; Piotroski and Roulstone, 2005; Agrawal and Nasser, 2012).

Studies which look at the determinants of insider trading traditionally focus on rational explanations such as information asymmetry (e.g. Aboudy and Lev, 2000; Frankel and Li, 2004) or agency considerations (e.g. Ravina and Sapienza, 2010; Jagolinzer et al., 2011), or indicate that insiders, as sophisticated traders, ratio-

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¹ Our friend and colleague Piotr Korczak died in June 2021 after first submission to the Journal of Banking and Finance. Piotr's contribution was invaluable.

² In this paper we focus on disclosed transactions by corporate insiders (board members and top managers), which is often classified as *legal* insider trading, as opposed to secret insider trading on undisclosed material information, which is a criminal offense (see, e.g., Kacperczyk and Pagnotta, 2019).

³ Insider transactions are regularly reported in newspapers (e.g. *Wall Street Journal* and *Financial Times*) and popular internet sites (e.g. *Yahoo! Finance*). Seyhun (1998) provides an overview of how the information on insider trading can be used in investment decisions.

nally trade against mispricing (e.g. [Rozeff and Zaman, 1998](#); [Jenter, 2005](#)). More recently, the literature has turned to behavioral explanations of insider trading and person-specific or innate attributes that determine insider trading decisions (e.g. [Alldredge and Cicero, 2015](#); [Hillier et al., 2015](#); [Davidson et al., 2016](#); [Inci et al., 2017](#); [Ali and Hirshleifer, 2017](#); [Kallunki et al., 2018](#)). In this paper we move beyond behavioral finance to social finance ([Hirshleifer, 2015, 2020](#)), a new paradigm which recognizes the importance of social processes in shaping economic decisions. Specifically, we study the relation between insider trading and religion. We are interested in understanding if social norms associated with religiosity in the area where the firm is located affect share trading by the firm's insiders. So far, the literature explores corporate decisions and firm policies but is silent about the impact of social norms on corporate insiders' individual decisions.⁴ It is important to understand the impact of social norms on insider trading that maybe opportunistic, based on private information, and hence generating profits at the expense of outside investors. Throughout the paper, we follow [Hong and Kacperczyk \(2009\)](#) and define social norms in the spirit of [Akerlof \(1980\)](#) as rules of behavior that determine the utility of an act to the agent performing it partially based on "the beliefs and actions of other members of the community" ([Hong and Kacperczyk, 2009](#), p. 15).

We build on the controversial aspect of insider trading profits and on the large literature in psychology and sociology which documents a link between religiosity and 'good' behavior.⁵ Religious values and beliefs are part of broader culture, with a documented impact on social and economic attitudes and outcomes (e.g., [Iannaccone, 1998](#); [Guiso et al., 2003, 2006](#)). Religious teaching, reflected in the 'Golden Rule' shared by different religions ([Brammer et al., 2007](#)), puts emphasis on behavior that respects and benefits others, condemns self-interest and prescribes treating others as one would like to be treated. Therefore, we argue that a higher level of religiosity in the area creates social norms that regard self-interested profits from private information as less acceptable even if the available rents are lower due to higher transparency and lower information asymmetry. Individuals conform to social norms in their local community because deviating from them imposes sanctions such as public disapproval, lost reputation, or feeling of embarrassment and shame ([Sunstein, 1996](#)). To the extent that profitable insider trading can increase litigation risk and reputational loss, risk aversion can be another way through which religion curbs opportunistic insider trading activities (e.g., [Hilary and Hui, 2009](#); [Kumar et al., 2011](#); [Adhikari and Agrawal, 2016](#)). In investment decisions, those social norms constraints can override the profit motive ([Hong and Kacperczyk, 2009](#)). Consequently, we hypothesize that social norms associated with religion reduce opportunistic, self-interested trading on private information, and hence abnormal returns following insider trades are lower in firms headquartered in more religious areas.

To test our hypothesis, we use data on religious adherence across U.S. metropolitan areas, which allows us to keep the country-level legal and regulatory system constant while exploiting large geographical variation in adherence rates. In line with our hypothesis, we document that higher religiosity in the area where the firm is located is associated with lower trading profits of the firm's insiders. Our results on trading profits remain significant af-

ter controlling for information asymmetry and disclosure, and a set of socioeconomic characteristics. Our main results are robust to alternative specifications including profits calculated in dollars ([Cziraki and Gider, 2021](#)). The effect of religiosity on insider profits holds for purchase transactions, which are more likely to be based on private information, and does not hold for sales, which are usually executed for liquidity and diversification reasons rather than based on information (e.g. [Lakonishok and Lee, 2001](#); [Ravina and Sapienza, 2010](#)). Moreover, consistent with the argument that religiosity reduces trading on private information, we find that insiders in high-religiosity areas are less likely to trade on future earnings news and are less likely to be classified as opportunistic, based on the method proposed by [Ali and Hirshleifer \(2017\)](#).

Corporate Governance is an important mechanism in our setup. [Ravina and Sapienza \(2010\)](#) and [Jagolinzer et al. \(2011\)](#) find that insider trading profits are lower in firms with stronger corporate governance. [Jagolinzer et al. \(2011\)](#) and [Dai et al. \(2016\)](#) specifically document a strong positive link between corporate governance and the effectiveness of firm-level voluntary insider trading restrictions. [Bettis et al. \(2000\)](#) shows that the voluntary insider trading restrictions influence insiders' trading decisions. Corporate governance in general and firm level trading restrictions in particular, are established on a similar principle of fairness and equity as the local social norms on respect, fairness, and equality, thus one could argue that our main results are associated with firm-level governance mechanisms rather than local social norms. However, quality of corporate governance is heterogenous and if strong corporate governance that should reign in managerial opportunism is lacking, there is a potential for religiosity as a source of local social norms to influence individual opportunistic behavior and to curb profitability of insider trading. The association should be more pronounced for firms with poorer corporate governance located in more religious areas because fairness and equality form stronger fundamentals for local social norms in more rather than less religious areas.

We empirically assess the association between profitability of insider trading and religiosity taking into consideration firm-level governance mechanisms. We analyze the impact of firm-level voluntary trading restrictions and strength of board monitoring. We show that the effect of religiosity is indeed more pronounced in firms without the voluntary trading restrictions, i.e., those with weaker corporate governance. We follow [Coles et al. \(2014\)](#) to analyze the impact of board monitoring and look at the ratio of independent directors appointed after the incumbent CEO appointment (co-opted independent directors) with higher level of the ratio correlated with weaker board monitoring. Our empirical results show that religiosity has a negative impact on profitability of insider purchases in firms with the highest proportion of co-opted independent directors. These results confirm that the effect of religiosity is stronger in firms with weaker corporate governance.

Another concern is that our main findings are associated with insiders' individual religious beliefs and individual traits rather than the social norms induced by religious teaching. Individual religiosity levels are unobservable like other individual traits, such as powerful status, strong personality, hubris or narcissism characteristic of insiders. Given insiders highly individualistic profiles the influence of social norms on their behavior and decisions is not warranted because such individuals are less susceptible to the impact of community and less influenced by local social constraints (e.g. [Crossland and Hambrick, 2011](#)). As such, it is an open question whether it is local norms or individuals' characteristics that are associated with the profitability of insider trading. To disentangle between the impact of individual traits and local norms, we analyze the profitability of insiders who moved between firms. We find that insiders who move from firms lo-

⁴ E.g. [Grullon et al. \(2010\)](#); [McGuire et al. \(2012\)](#); [Dyreng et al. \(2012\)](#); [Callen and Fang \(2015\)](#) investigate religion and quality of financial reporting. [Dyreng et al. \(2012\)](#); [Boone et al. \(2013\)](#) tax policy choices.

⁵ For example, religiosity is linked with lower crime rates and lower antisocial behavior ([Ellis, 1985](#); [Evans et al., 1995](#); [Baier and Wright, 2001](#)), stronger prosocial attitudes ([Wilson and Musick, 1997](#); [Shariff and Norenzayan, 2007](#)), and lower acceptance of unethical business choices ([Longenecker et al., 2004](#)).

cated in less religious to more religious areas generate lower abnormal returns for purchases. This confirms that community religion is a significant factor in curbing profitability of insider purchases, which on average generate significant abnormal returns and is more likely to be based on information. The results for sales indicate that after moving, insiders are better at avoiding losses, however, sales are usually undertaken for liquidity and diversification reasons and on average generate insignificant abnormal returns.

We also explore whether other unobservable firm and/or geographical characteristics could have an impact on our main results. Geographically focused firms are expected to have a stronger local identity, and therefore the impact of local norms and the local social pressure on insiders are expected to matter more there, compared to geographically dispersed firms. When classifying dispersed firms following the method of Garcia and Norli (2012), we find, in line with our expectations, the effect of religiosity on insider profits after purchases to be concentrated by trades in geographically focused firms and not in geographically dispersed firms. The results for sales are insignificant.

Similarly, in high religiosity areas with low level of networking opportunities for insiders, profitability could be low because of lack of networking rather than religiosity. To address this concern, we analyze linked insiders, using data from Alldredge and Cicero (2015), and show that networking does not play any role in moderating the negative relationship between religiosity and profitability of purchases. For sales, in turn, we find that linked insiders trades are profitable in low religious areas suggesting that the dense network may be a factor in the insiders' ability to avoid larger losses.

To complement our finding that religiosity curbs opportunistic behavior of insiders, in further tests we document that higher religiosity reduces the probability of observing insider trading in a firm-quarter, and it also decreases the quarterly volume of total trading. We also provide evidence on the effect of different religious denominations and document a negative association between profitability of purchases and Protestants, and weak evidence that Catholics are better at avoiding bigger losses after sales. The results corroborate previous evidence that individuals in more Protestant areas are more risk averse than Catholics (Hilary and Hui, 2009 and Kumar et al., 2011).

Our main results hold in a smaller, propensity score matched sample in which we match firms headquartered in high-religiosity metropolitan areas with firms with a comparable estimated propensity in high-religiosity areas but located in areas with a low level of religiosity. This test addresses a potentially endogenous choice of firm location and hence endogenous nature of our religiosity variable. We additionally provide supporting causal evidence based on a difference-in-difference test which exploits an exogenous drop in religious participation in areas affected by sexual abuse scandals in the Catholic church (Bottan and Perez-Truglia, 2015). The finding allows us to conclude that insiders generate lower profits because of social norms imposed specifically by religion in the firm's local area.

Beyond corporate insider trading, this paper contributes to different strands of the literature. First, it adds to the emerging social finance literature which explores the broader social context and social interactions to get new insights into financial behaviors (Hirshleifer, 2015, 2020). This paper is also related to the previous literature on the impact of religion on investment decisions which has focused on the link between religion and risk aversion, based on the view that religiosity leads to higher risk aversion. It is documented that in more religious areas, firms (Hilary and Hui, 2009), banks (Adhikari and Agrawal, 2016) and hedge funds (Gao et al., 2017) pursue less risky strategies. Kumar et al. (2011) and Shu et al. (2012) look at heterogene-

ity of religious denominations and document that individual and institutional investors in areas with a higher concentration of Catholics relative to Protestants pursue more risky stock investment strategies. In this paper we offer evidence on how religiosity, through social norms, affects trading on private information by individuals.

This paper also contributes to the finance and accounting literature on how religiosity affects managerial choices and firm policies. Using a similar setup to ours, in line with the arguments that religiosity reduces opportunistic behavior, the earlier literature finds that firms located in more religious environments are less likely to backdate options (Grullon et al., 2010), are less likely to grant excessive compensation (Grullon et al., 2010), engage less in earnings management and bad-news hoarding and overall have higher-quality financial reporting (Grullon et al., 2010; McGuire et al., 2012; Dyreng et al., 2012; Callen and Fang, 2015), and are less likely to avoid taxes (Dyreng et al., 2012; Boone et al., 2013). As a result, firms in more religious areas enjoy higher valuations and lower cost of equity and debt (El Ghoul et al., 2012; Jiang et al., 2018). Furthermore, this related literature provides correlational evidence and we make an additional and novel attempt to move towards identifying causality using exogenous variation in religious participation.

Our paper provides large-scale evidence contributing to earlier survey results on the link between religiosity and (illegal) insider trading. Longenecker et al. (2004) document that respondents who attach high importance to religious interests find a hypothetical insider trading decision less acceptable than other respondents, but the difference is statistically insignificant (p-value of 0.193). In a similar study, Terpstra et al. (1993) conduct a small survey-based study of the impact of several personal and socioeconomic characteristics on ethical judgements related to insider trading. They do not find clear and statistically significant results related to religiosity but conclude that religious beliefs may have an impact on insider trading decisions, in line with our argumentation.

Our paper also contributes to literature on social capital. Community religiosity can be viewed as a form of social network because it is based around similar principles of building and participating in local social networks that evolve around trust and cooperation. The networks constrain opportunistic behavior of individuals and imply high cost on individuals deviating from the norms. To the extent that the community religion is a form of social capital we add to the existing literature that focuses on the link between social capital and corporate decisions (e.g. Hasan et al., 2017; Hoi et al., 2019) and provide novel evidence on the effect of social norms on individual trading decisions.

2. Literature background and hypothesis development

2.1. Insider trading controversies

In law, insider trading is defined as trading in a security based on undisclosed, hence 'inside', material information related to that security (Bainbridge, 2019), and so defined insider trading is widely prohibited across the world (Bhattacharya and Daouk, 2002). In legal practice, materiality of undisclosed information is restricted to information on 'bomb-shell' events such as tender offers or substantial changes in financial results, which lead to sharp stock price reactions when publicly announced (Carlton and Fischel, 1983; Fried, 1998). The finance literature often applies the term insider trading to transactions by corporate insiders (officers or directors), who do not necessarily trade on material information in the strict legal sense but can still legally trade on undisclosed information which allows them to generate moderate abnormal trading profits. To guarantee transparency and to enable monitoring, corporate insiders are required by law to disclose all their trades

in a timely manner, and there is a general perception that the disclosure reveals insiders' economically valuable private information.⁶ As the Securities and Exchange Commission admits, "many investors believe that reports of directors' and executive officers' transactions in firm equity securities provide useful information as to management's views of the performance or prospects of the company".⁷

Regulation of insider trading is introduced on grounds of fairness and equity (Bainbridge, 2019). It is considered that directors and officers should not exploit their information advantage over other investors, as by trading on private information which they obtain because of their specific position within a firm, they personally benefit at the expense of uninformed investors from whom they buy or to whom they sell shares. Abnormal profits generated by insiders reduce dollar-for-dollar the opposing uninformed traders' profits (Seyhun, 1986). Based on the principles of fairness and equity in access to information, the disclose or abstain rule requires those in possession of material private information either to disclose it before trading or to abstain from trading (Bainbridge, 2019).

Insider trading remains a controversial topic and it has been widely debated in the law and economics literature. Proponents of insider trading (Manne, 1966; Carlton and Fischel, 1983) argue that insider trading increases market efficiency by incorporating private information into stock prices and hence benefits the firm and the society, and profits from insider trading are a form of compensation for managers for producing information. Manne (1966) argues that insider trading is a victimless crime. Less-informed investors trade for exogenous reasons and they would trade anyway, even if they end up trading against an insider. Moreover, without insider trading, a less-informed investor would trade at less attractive prices, as insider trading moves prices towards fundamentals. On the other hand, the arguments in favor of restricting insider trading highlight the negative link between insider trading and outsiders' confidence and hence investment in the stock market (Ausubel, 1990), reduced welfare of outside investors and reduced market liquidity when insider trading is permitted (Leland, 1992), and the negative impact of insider trading on outsiders' incentives to acquire information and trade, which hurts market efficiency (Fishman and Hagerty, 1992). Some argue that the discussion should go beyond the pure economic arguments and should condemn insider trading as simply morally and ethically wrong (Strudler and Orts, 1999; Fried, 1998). Based on the arguments of proponents of insider trading, there should be nothing controversial in insiders' profits. However, the literature documents indirectly that insider trading profits are viewed as a result of opportunistic, self-interested behavior at the expense of uninformed investors (Ravina and Sapienza, 2010; Jagolinzer et al., 2011; Gao et al., 2014; Ali and Hirshleifer, 2017; Dai et al., 2015).

2.2. Social norms, religion and behaviors

Social norms are rules of behavior enforced by social sanctions (e.g. Akerlof, 1980; Sunstein, 1996; Bendor and Swistak, 2001). They determine what is approved and what is not approved in the community and define what should and what should not be done in a given situation. Those rules of behavior shared by the community determine the utility of acts performed by each of its members (Akerlof, 1980; Hong and Kacperczyk, 2009) and as such specify acceptable and unacceptable choices in all as-

pects of human behavior. While some social norms are codified in law and explicitly enforced by relevant legal institutions, all social norms, whether codified or not, are enforced by social sanctions which are often pervasive (Sunstein, 1996). Deviating from social norms is costly, as the social disapproval brings various negative consequences including embarrassment, shame, rejection or stigma.

Social norms differ across cultures, and religion is one of the most important sources of culture and shared values (Fukuyama, 2001). Religion determines social norms by promoting the system of values, beliefs and moral prescriptions. When it comes to social teachings, many religions put a similar emphasis on respectful behavior towards others and they condemn opportunism and self-interest, as reflected in the 'Golden Rule' common in many religions (Brammer et al., 2007). The Golden Rule prescribes treating others as one would like to be treated, and, for example, in Christianity and Judaism, it is illustrated by the commandment of 'Love your neighbor as yourself' (Leviticus 19:18, Luke 10:27), and in Islam by the teaching of 'Love for your brother what you love for yourself' (Hadith 13).

A large body of the literature in psychology and sociology studies the channels through which social norms linked with religiosity reduce misbehavior, and how it translates into higher common compliance with social norms established by religion. The exact mechanism is complex and not yet completely understood though (Tittle and Welch, 1983; Welch et al., 2006). Among the different theoretical views, Tittle and Welch (1983) propose that religion leads to internalization of moral commitments, and the feeling of guilt effectively restricts potential deviance from the rules. McCullough and Willoughby (2009) argue that religiosity leads to greater self-control and hence higher propensity to comply with ethical and moral prescriptions, while Hirschi and Stark (1969) propose that religion influences behaviors because religious people believe in a reward or punishment ('hellfire') for current actions in eternal life.

Religion also impacts behavior through the social context and interactions associated with religious practices. Hirschi (1969) proposes the social control theory and argues that religious activities create social bonding and the sense of commitment and participation which encourages obeying societal norms. The differential association theory (Sutherland and Cressey, 1978) views misconduct as associated with excess exposure to messages favorable of deviance, and hence religiosity can lead to lower misconduct as it creates formal and informal exposure to messages promoting good behavior. Stark (1996) argues that the social environment ('moral community') motivates individual behaviors, and higher religiosity in the area reinforces compliance with an individual's own religious norms. This extends to the effect of religiosity among peers or in the local community on an individual's behavior beyond own religious beliefs. According to Kohlberg (1984), an individual's moral development is determined by the moral rules in the community and the motivation to comply with societal rules to gain others' approval. As a result, all individuals tend to comply with social norms prevalent in the community to avoid reputational costs and public disapproval or rejection (Sunstein, 1996).

All those theoretical arguments lead to a prediction that higher religiosity of an individual or in the individual's community leads to a lower propensity to engage in misconduct or to make ethically or morally questionable decisions which would go against social norms. This prediction is confirmed by various empirical studies considering crime rates (Ellis, 1985; Evans et al., 1995; Baier and Wright, 2001), cheating (Grasmick et al., 1991), social attitudes (Wilson and Musick, 1997; Shariff and Norenzayan, 2007), as well as business, finance and accounting choices (Longenecker et al.,

⁶ See for example Seyhun (1986), Jeng et al. (2003) or Cohen et al. (2012) for some evidence in this regard.

⁷ <https://www.sec.gov/rules/final/33-8230.htm>

2004; Grullon et al., 2010; McGuire et al., 2012; Dyreng et al., 2012; Boone et al., 2013; Callen and Fang, 2015).

2.3. Testable hypothesis

Insider trading profits, even though not illegal in a vast majority of cases are controversial as they result from the insiders' opportunistic behavior at the expense of less-informed outsiders.

Arguments against trading on private information are established on fairness and equity grounds and form basis of formal and informal set of rules dealing with insider trading. Laws protecting outside investors against insider trading are established at a country level and apply to all listed companies, and at a firm level via corporate governance regulations such as restrictions from trading before earnings announcements. Although firm level trading restrictions are established on the same fairness and equity basis as the country level law, the firm level regulations are voluntary and thus create heterogeneity across firms. We argue that there is also scope for informal, local social norms to influence insiders' opportunistic behavior. Social norms linked to religions are based on the 'Golden Rule' that promotes behavior towards others based on respect, fairness, and equality. As such both formal and informal rules are based on similar grounds and aim to constrain opportunistic behavior, and there is a scope for religiosity to play an important role to protect uninformed outside investors from being exploited by insiders along the formal sets of rules. Where strong corporate governance that should reign in managerial opportunism is lacking, there is a potential for religiosity as a source of local social norms to influence individual opportunistic behavior and to curb profitability of insider trading. The association should be more pronounced for firms located in more religious areas because fairness and equality form stronger basis for local social norms in more than less religious areas.

Strong local social norms reign in managerial opportunism also by promoting fairness and risk aversion. Firms located in more religious counties have less private information, more transparent disclosure environment and are less likely to manage earnings and thus insiders have less opportunities to exploit high rents. We argue, however that regardless of the level of rents available, insiders who would like to profit from access to private information are not constrained by the lower potential profits but by potential legal and reputational costs imposed by formal rules and social norms. Local social norms impose reputational sanctions, over and above sanctions in a strict legal sense, which are expected to increase with the strength of religiosity in the community. We argue that insiders refrain from trading when the legal and social cost is high because religion is an important source of social norms affecting all individuals in a community, with a documented impact reducing opportunistic and self-interested behavior. Insiders though are known to be highly individualistic with strong personalities and therefore less likely to be affected by the social pressure to behave morally and respect local social norms. It is possible that despite the disciplining role of local social norms insiders are less susceptible to their impact and trade profitably on private information. However, deviating from social norms and moral attitudes linked with religiosity causes social disapproval, shame or embarrassment and therefore it is costly. Moreover, while insider trading can be considered a victimless crime, empirical evidence confirms a strong impact of religiosity on reduction of victimless crime.

Building on these arguments, we formulate the following testable hypothesis:

Hypothesis: Social norms associated with religiosity reduce opportunistic, self-interested trading on private information and

therefore insider trading profits are lower in firms located in more religious areas.

3. Data and methodology of main tests

3.1. Insider trading profits

Insider trading data are collected from the Thomson Reuters Insider Filing Data Feed, which includes information on all trades undertaken by insiders in their firms' shares since 1986. We consider only open market purchases and sales of common shares. We focus on trades by officers and directors and exclude transactions by beneficial owners, defined as shareholders in possession of at least 10% of shares outstanding who are not officers or directors. In cases where the same insider executes more than one trade in a day in the same direction, we cumulate them and consider as one observation. Supplementary stock market and accounting data are from CRSP and Compustat. Following the literature (e.g. Lakonishok and Lee, 2001; Cohen et al., 2012; Ali and Hirshleifer, 2017) we exclude from the sample observations with the market closing share price lower than USD 2.00 on the transaction day, with negative book-to-market ratio on the day of the trade, with reported insider transaction volume higher than the reported total daily volume for the stock, and with the transaction value below USD 5000.

In the main tests, we analyze the profitability of individual insider transactions calculated as size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR) over 180 trading days from the date of the trade.⁸ They are calculated as the stock return over the given period less the corresponding 5 × 5 size and book-to-market (BM) portfolio return. Stock returns are from CRSP and the size-and-BM portfolio returns are downloaded from Kenneth French's web page.

3.2. Religiosity

Following several related studies (e.g. Hilary and Hui, 2009; Shu et al., 2012; Callen and Fang, 2015; Jiang et al., 2018), we collect data on religiosity from the website of the Association of Religion Data Archives (ARDA). The ARDA makes available decennial studies of religious congregations and membership organized by the Association of Statisticians of American Religious Bodies. We use the county file merged and cleaned for longitudinal analysis which covers the 1980, 1990, 2000 and 2010 collections (Bacon et al., 2018). The data file provides county-level information on the number of adherents of individual churches and religious groups.

We aggregate the county-level data to core based statistical areas (CBSA). A CBSA is a county or a group of counties, made of a core created by an urbanized area of at least 10,000 people and adjacent areas (counties), with a high degree of social and economic integration created by commuting ties. When the core has more than 50,000 inhabitants, the CBSA is defined as a metropolitan statistical area, and otherwise it is a micropolitan statistical area. There are about 900 CBSAs in total, and a CBSA is normally made of between one and three counties but contains more counties for larger metropolitan areas. For example, the 'New York-Newark-Jersey City, NY-NJ-PA' CBSA is made of more than 20 counties.

The CBSA-level religiosity allows us to better capture social norms in our empirical setup. By definition, the social integration within a CBSA leads to shared norms. Moreover, the economic integration and commuting ties make it a relevant geographical unit

⁸ 180-day window is most relevant because of the SEC's short swing rule that prohibits insiders from executing round-trip transactions within a six-month window.

for which firm-level social norms can be defined. To aggregate county-level data to the CBSA level, we use a county-CBSA mapping file available from the U.S. Census Bureau website. We calculate CBSA-level religiosity, our main variable of interest, as the sum of adherents across all churches and religious groups in the CBSA and scale it by the CBSA's total population, available from the U.S. Census Bureau via the NBER data website. The ARDA data are available at the decennial frequency, and similarly to other studies we linearly interpolate the data to the annual frequency. The availability of insider trading data from 1986 and the last ARDA data available for 2010 limit the sample period of our study to 1986–2010.

Religiosity is a firm-level variable and is measured for the CBSA in which the firm is headquartered. We collect the ZIP code for each firm from Compustat and match the ZIP code to a county using a file available from SAS, and then to the CBSA using the county-CBSA mapping file from the U.S. Census Bureau.⁹

Throughout the paper, for easier understanding of geographical units, we refer to the area for which we measure religiosity as a 'metropolitan area', even though some of our observations are by firms located in CBSAs formally classified as micropolitan statistical areas. This is the case for only 2.2% of all trades (3.4% of purchases and 1.8% of sales) though.

3.3. Main regression tests

In our main tests we regress post-trade BHARs on religiosity in the firm's metropolitan area, controlling for a set of firm-, trade- and insider-level characteristics documented in previous literature to be related to insider trading profitability, as well as transparency, information asymmetry and governance. The regressions are separately run for buys and sells. The main regression models are as follows:

$$BHAR_{i,j,t} = \beta_0 + \beta_1 Religiosity_{i,j,t} + \sum \delta_n Basic\ Controls_{i,j,t}^n + \sum \alpha_m Industry_i^m + \sum \gamma_l Year_t^l + \varepsilon_{i,j,t} \quad (1)$$

$$BHAR_{i,j,t} = \beta_0 + \beta_1 Religiosity_{i,j,t} + \sum \delta_n Basic\ Controls_{i,j,t}^n + \sum \theta_k Transparency\ and\ Governance\ Controls_{i,j,t}^k + \sum \alpha_m Industry_i^m + \sum \gamma_l Year_t^l + \varepsilon_{i,j,t} \quad (2)$$

$$BHAR_{i,j,t} = \beta_0 + \beta_1 Religiosity_{i,j,t} + \sum \delta_n Basic\ Controls_{i,j,t}^n + \sum \theta_k Transparency\ and\ Governance\ Controls_{i,j,t}^k + \sum \varphi_s SocioEconomic\ Controls_{i,j,t}^s + \sum \alpha_m Industry_i^m + \sum \gamma_l Year_t^l + \varepsilon_{i,j,t} \quad (3)$$

Where *BHAR* and *Religiosity* are the abnormal returns and religious level following a trade by insider *i* in company *j* on day *t*. Model (1) is our basic specification where we control for a set of firm-, trade- and insider-level characteristics documented in the previous literature to be related to insider trading profitability. The vector of *Basic Controls* includes: (1) *Ln(Mcap)* defined as the natural logarithm of the firm's market capitalization (in USD millions) on the transaction day. (2) *Book-to-Market* ratio defined as the

firm's book value of common equity at the end of the most recent fiscal quarter, divided by its market capitalization on the trading day. (3) *Past return* calculated as the stock's size-and-book-to-market-adjusted buy-and-hold abnormal return over 90 trading days preceding the transaction day. (4) *Trade size* defined as the number of shares traded divided by the number of shares outstanding on the transaction day and multiplied by 100. (5) *CEO (CFO)* defined as a dummy variable which takes the value of one if the trade is executed by the Chief Executive Officer (Chief Financial Officer), and zero otherwise.

Model (2) is extended to control for corporate governance and for information/disclosure environment (*Transparency and Governance Controls*) because firms located in more religious areas have better disclosure environment which reduces information asymmetry (e.g. Grullon et al., 2010; McGuire et al., 2012; Dyreng et al., 2012; Callen and Fang, 2015) and insiders in firms with better corporate governance generate lower abnormal returns (Ravina and Sapienza, 2010; Jagolinzer et al., 2011).¹⁰ Consequently, we add the following variables: (1) *Institutional Ownership*, the percentage of shares owned by institutions in a firm for a given year, as a broad measure of corporate governance and monitoring. (2) *Accruals* as a measure of quality of financial reporting. *Accruals* correspond to the residuals of the modified-Jones model, which we estimate as a cross-sectional specification by year and two-digit SIC code:

$$TA_{i,t} = \beta_0 + \beta_1 \left(\frac{1}{Assets_{i,t-1}} \right) + \beta_2 (\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_3 PPE_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where *TA* is Total Accruals calculated as income before extraordinary items minus cash flow from operations divided by total assets. $1/Assets$ is the inverse of Total assets. ΔREV corresponds to changes in revenues and ΔREC to changes in receivables and the difference between the two is scaled by Total Assets. *PPE* corresponds to the amount of Gross Property, Plant and Equipment scaled by Total Assets. *Accruals* are calculated for non-financial firms only due to different financial reporting requirements for financial companies and in line with previous literature. (3) *Amihud* is a measure of information asymmetry calculated as an average Amihud liquidity level 180 days prior to the insider transaction date. The Amihud (2002) liquidity measure is computed as the daily ratio of the absolute stock return over the dollar trading volume of the stock. (4) *Number of analysts (Ln(Analysts))* is implemented to control for disclosure environment, information asymmetry and monitoring, and is calculated as a natural logarithm of the average number of analysts following a firm in a given year.

In Model (3) we extend the set of explanatory variables to control for a range of socioeconomic characteristics (*SocioEconomic Controls*) of the metropolitan area in which the firm is headquartered, which are possible determinants of religious adherence (Iannaccone, 1998; Hilary and Hui, 2009). We control for population, income, education, age and minority ratio. (1) *Ln(Population)* is the natural logarithm of the total population of the metropolitan area. (2) *Ln(Income)* is the natural logarithm of the average income per capita in the CBSA. (3) *Education* is the percentage of the CBSA's population with a bachelor's degree or higher. (4) *Minority ratio* is the percentage of non-white population in the CBSA. (5) *Median age* is the median age of the CBSA population. We want to make sure that our key variable of interest captures the effect of religiosity and as such does not pick up the socioeconomic characteristics that are correlated with, and also that the link between

⁹ Compustat reports only the current address of the firm which potentially introduces noise in the measurement of our religiosity variable if a firm relocates to a different CBSA. Relocations are very rare though. Hoi et al. (2019) report that in their sample period (1996–2010) which overlaps with ours, only 3.2% of firms (76 out of 2,396) relocated, therefore we do not expect the effect of this possible misclassification on our results to be meaningful.

¹⁰ Models (2) and (3) are run for non-financial sectors only because we employ accruals as a measure of quality of financial reporting. This approach follows previous literature.

religiosity and insider trading profits is not spurious if our main test omits variables which are correlated with both religiosity and insiders' profits.

We collect socioeconomic data from different sources. Income is obtained at the annual frequency at the metropolitan statistical area level from the website of the U.S. Bureau of Economic Analysis. The data for education are obtained from the website of the Economic Research Service of the U.S. Department of Agriculture. They are based on the 1980, 1990 and 2000 censuses of population and the 2012–2016 5-year average from the American Community Survey. They are available at the county level, and we cumulate the county data to the metropolitan statistical area level. We linearly interpolate the data between the available time points, dating the 2012–2016 survey data as 2014. The data on ethnicity, as well as the data on age we use to calculate the median age in the area, are from the Survey of Epidemiology and End Results (SEER), available via the NBER website. The data are at the annual frequency and at the county level, which we cumulate to obtain a metropolitan area-based measure. All variables definitions and sources are also outlined in [Appendix A](#).

Each regression includes year dummies (γ) to control for possible time patterns in insider trading profits, linked for example with changing regulations. We also control for industry fixed effects (α), defined using the 2-digit SIC code. This specification addresses the possible correlation between religiosity and industry, given that industries cluster in specific geographical areas, and a potential concern that industry-specific factors rather than religiosity are correlated with insider trading profits. To limit the impact of possible outliers and data errors on our results, all variables are winsorized at the 1st and 99th percentile. Standard errors of the coefficients are robust and clustered at the firm-year level.

3.4. Geographical distribution and descriptive statistics

3.4.1. Geographical distribution

[Figs. 1–3](#) provide an overview of the distribution of religiosity and insider trading for our sample.

[Fig. 1\(a\)](#) presents the overall geographical variation in the CBSA-level religiosity and in line with [Kumar et al. \(2011\)](#), it shows that religiosity is higher in the central area of US than on the coast. [Fig. 1\(b\)](#) presents the level of religiosity in CBSA areas with insider trading revealing that in the majority of the CBSA areas there is at least one firm with insider trading across our sample period (1986 – 2010). To give some examples, in [Appendix B](#), we present fifteen most and least religious CBSAs with a name of the largest firm with insider trading. [Fig. 1\(c\)](#) presents the number of firms with insider trading across CBSA areas. In our sample most of the CBSA areas have 50 firms or less with insider trading, except for areas like New York (New York-Newark-Jersey City), Boston (Boston-Cambridge-Newton), Los Angeles (Los Angeles-Long Beach-Anaheim) and Chicago (Chicago-Naperville-Elgin) which have more than 200 firms.

Set of [Figs. 2](#) show the distribution of insider trading across geographical areas. [Figs. 2\(a\)](#), (b) and (c) display the cumulated number of trades, purchases and sales, respectively. In order to make the scale more evenly distributed across the color scheme, we transform numbers to $\log_{10}x$. Thus, the scale of the color scheme for all [Figs. 2](#) goes from 1 (10^0) up to 316,228 ($10^{5.5}$) transactions. The distribution of insider transactions in our sample is relatively heterogeneous with some coastal areas showing the highest number of trades (e.g. New York, San Jose, San Francisco, Boston, Los Angeles). A similar pattern is observed when dividing the sample by purchases and sales.

[Figs. 3\(a\)](#) and [3\(b\)](#) show distribution of post-trading abnormal returns, BHAR (0,+180) at CBSA level separately for purchases and sales. The color scheme for these plots considers middle quintiles

of distribution of returns for our sample and go from –24% up to 24%. For both purchases and sales we observe a relatively heterogeneous distribution across CBSAs.

3.4.2. Descriptive statistics

Descriptive statistics of the dependent variables, the main explanatory variable and control variables are reported in [Table 1](#), separately for purchases (Panel A) and sales (Panel B). The final sample includes 217,230 purchases and 777,437 sales trades.

In line with a large body of the literature (e.g. [Seyhun, 1986](#); [Jeng et al., 2003](#); [Cohen et al., 2012](#)), we find that, on average, insiders trade profitably, particularly when they buy shares in their own firms. The average post-trade abnormal return for purchase transactions is 2.8% for 180 days. For sale transactions, the magnitude of insider profits is much smaller, consistent with insiders selling for liquidity and diversification reasons rather than based on information. The average buy (sell) trade is executed by an insider in a firm located in a metropolitan area with the religious adherence rate of 51.7% (50.8%). We confirm that insiders are, on average contrarian traders (e.g. [Rozeff and Zaman, 1998](#); [Jenter, 2005](#)) and they buy (sell) after abnormal stock price decreases (increases), and the average book-to-market ratio of a stock they buy is much higher compared to the average ratio for a stock they sell (0.776 vs. 0.403). About 11% of trades in the sample are executed by the CEO and about 5% by the CFO.

On average insider purchase in companies with lower institutional ownership, less liquid stock, lower discretionary accruals, and lower number of analysts following in comparison with companies in which insider sell. It suggests that insiders purchase stock in less liquid firms with worse information environment but better quality financial reporting. The socioeconomic characteristics of the area in which a firm is located are similar across purchases and sales.

4. Religiosity and insider trading

4.1. Main results

The main argument underlying our empirical analysis is that religiosity in the firm's local area curbs self-interested behavior and is expected to limit the firm's insiders' opportunistic trading on private information. As a result, we expect to observe lower profitability of insider trading in firms located in more religious areas.

The results of the multivariate regression tests specified in Models (1) – (3) are reported in [Table 2](#). In line with the theoretical prediction, for purchase transactions the coefficient of religiosity is negative and statistically significant for all specifications. The significance and the magnitude of the religiosity effect strengthens after controlling for information and disclosure environment and governance (Model 2), and the additional controls for socioeconomic characteristics (Model 3). For baseline specification, the effect of religiosity is statistically significant at the 10 percent level and for Models (2) and (3) at a 1 percent level. To illustrate the economic magnitude of the effect, all else constant, a one-standard-deviation higher level of the religious adherence in the firm's metropolitan area (10.2%) is associated with a 53-basis-point, 1.21% and 1.30% lower post-trade profit over the 180-day window for Models (1), (2) and (3), respectively.¹¹ To put the effect in a perspective, the average 180-day profit is 2.8%.

For sale transactions, none of the coefficients of religiosity are statistically significant. Given that the theoretical prediction builds

¹¹ The annualized difference is approximately 0.75% ($=0.0053 \times (255/180)$), 1.71%, and 1.84% for Models (1), (2) and (3) respectively.

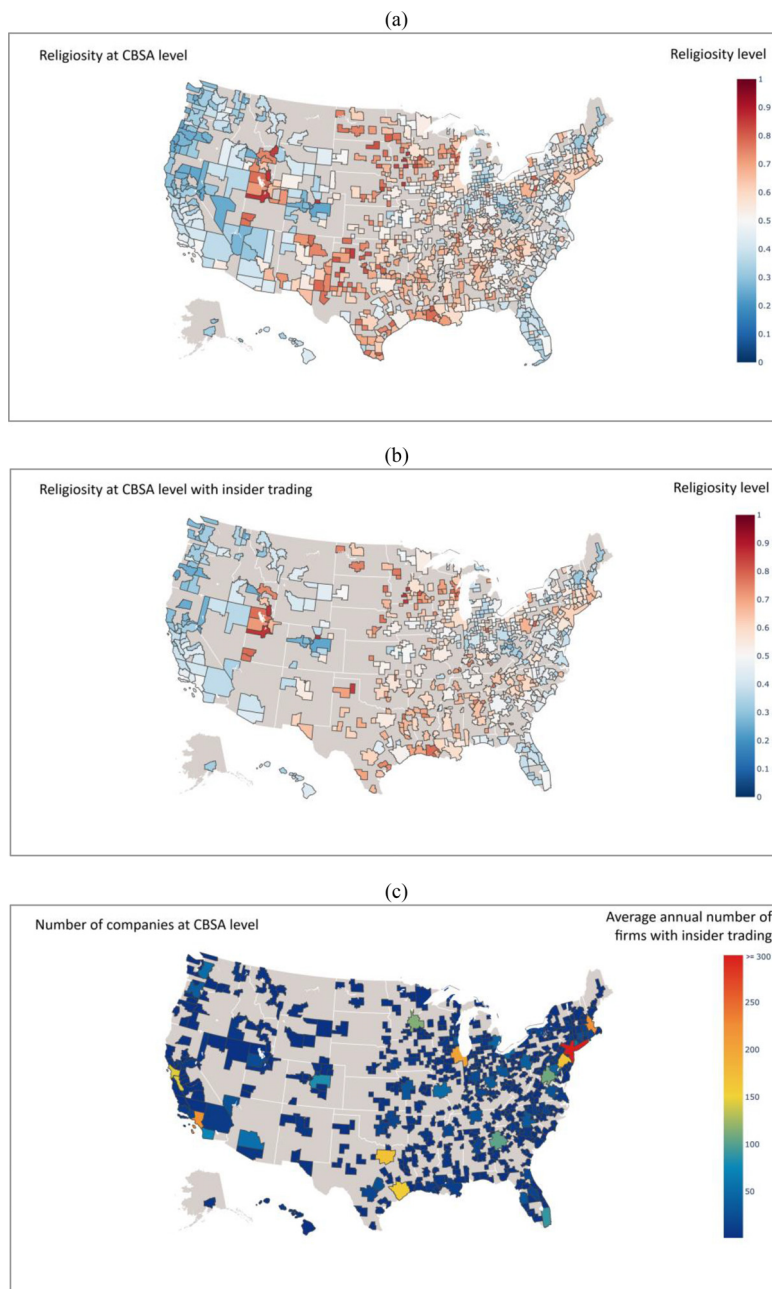


Fig. 1. Average religiosity and firms with insider trading at CBSA level (1986 – 2010)
 This Figure presents geographical variation in religiosity and number of companies with insider trading across the U.S. at Metropolitan level. Figure 1(a) shows the overall geographical variation in the CBSA-level religiosity. Figure 1(b) shows the level of religiosity in CBSA areas with insider trading and 1(c) shows the number of companies with insider trading across CBSA areas.

on disincentives to trade on private information, the result is not surprising because insiders sell mainly for non-information reasons, as indicated by descriptive statistics in Table 1 and in line with the earlier literature.

In our robustness tests, we check whether the results hold for the buy-and-hold abnormal returns calculated for 30, 60 and 90 trading days, starting on the transaction date. In a further set of sensitivity checks, we use market-adjusted buy-and-hold abnormal returns, and intercept (or alpha) from the four-factor model (Jagolinzer et al., 2011). In the final robustness check, we limit our sample to insider trades in ARDA religious census years only (1990, 2000 and 2010). The main results are confirmed but not presented for space consideration.

4.2. Trading on future earnings news

We argue that religiosity reduces opportunistic insider trading on private information, and our main tests reported in Section 4.1 above provide evidence in line with this argument. To provide further support for this claim, in this section we build on Piotroski and Roulstone (2008) and test the impact of religiosity on the link between insider trading and future earnings news.

We aggregate individual insider transactions, financial information and stock returns to a fiscal-year level and form a panel of firm-year observations. We then run the following regression, separately in subsamples of low- and high-religiosity firm-years divided on the basis of the annually calculated sample median of

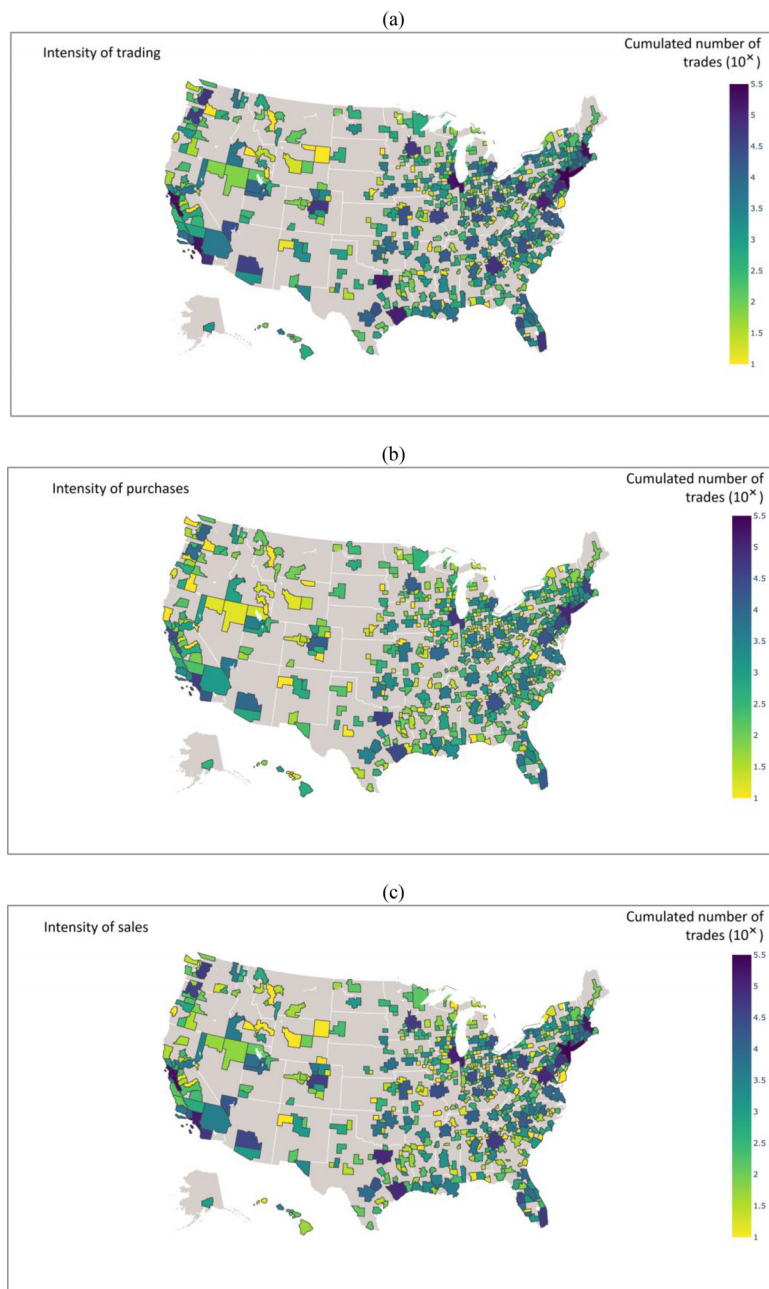


Fig. 2. Insider trading intensity across the U.S. at CBSA level. This Figure presents geographical variation in insider trading across the U.S. at Metropolitan level. Figures 2(a), (b) and (c) show the cumulated number of trades, purchases and sales respectively. The numbers in the color scheme are transformed to $\log_{10}x$. Then the color scheme for all the Figures 2 go from 1 (10^0) until 316,228 ($10^{5.5}$) transactions.

religiosity:

$$\begin{aligned}
 \text{Prob}(\text{Purchase}_{i,t} = 1) = & \text{clogit}(\beta_1 \Delta \text{Earnings}_{i,t+1} + \beta_2 \text{BHAR}_{i,t+1} \\
 & + \beta_3 \text{BHAR}_{i,t} + \beta_4 \text{LnMcap}_{i,t} + \beta_5 \text{BooktoMarket}_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t})
 \end{aligned}
 \tag{5}$$

The dependent variable, $\text{Purchase}_{i,t}$, is a dummy variable equal to 1 if insiders in firm i in year t are net buyers, that is the total number of shares bought by the firm’s insiders is greater than the total number of shares sold, and the variable is equal to zero otherwise. Zeros also include firm-year observations without any insider trading. Private information about future earnings news is captured by $\Delta \text{Earnings}_{i,t+1}$, defined as the difference between the next fiscal year’s earnings ($t + 1$) and the current fiscal year’s earnings (t), scaled by the firm’s total assets at the end of year t . Earnings are

measured as net income before extraordinary items, and the data on net income and assets are collected from Compustat.

We are interested in the sign and significance of the coefficient of $\Delta \text{Earnings}_{i,t+1}$ (β_1). Insider trading on private information about future earnings is reflected in a positive and significant coefficient. If higher religiosity reduces trading on private information, we expect the coefficient to be insignificant (or lower) in the high-religiosity subsample compared with the low-religiosity group.

Similarly to [Piotroski and Roulstone \(2008\)](#), we control for the next year’s and the current year’s 12-month size-and-book-to-market-adjusted buy-and-hold abnormal returns ($\text{BHAR}_{i,t+1}$ and $\text{BHAR}_{i,t}$, respectively), the firm’s size ($\text{LnMcap}_{i,t}$) defined as the market capitalization at the end of year t , and its book-to-market ra-

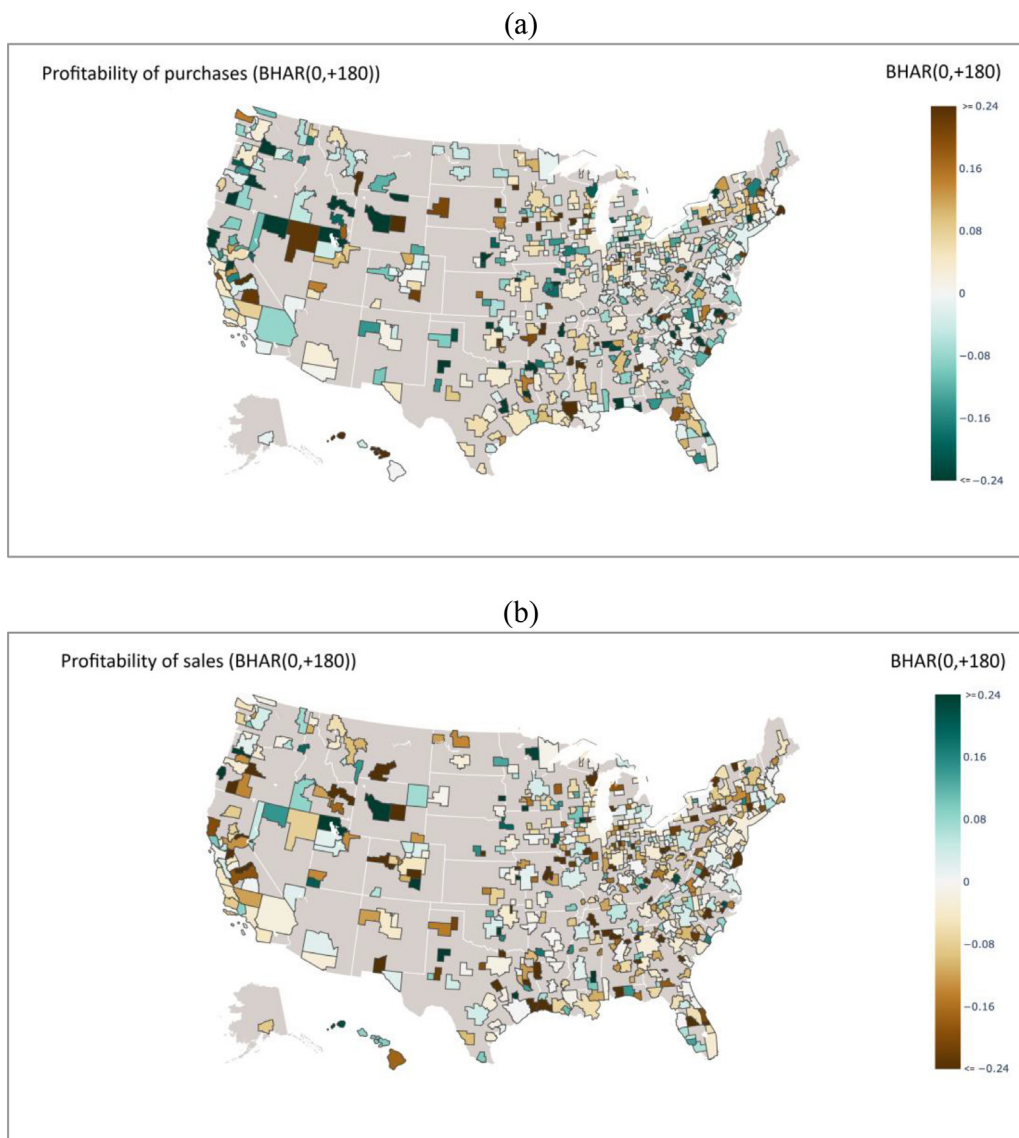


Fig. 3. Profitability of insider purchases and sales across the U.S. at Metropolitan level. This Figure presents geographical variation in insider trading profits across the U.S. at Metropolitan level. Figures 3(a) and 3(b) show the average post-trading abnormal returns (BHAR (0,+180)) for purchases and sales respectively.

tio measured at the end of year t . The model also includes year fixed effects (γ_t). The regressions are estimated using the conditional logit model which allows us to control for unobservable, time-invariant firm characteristics (α_i).¹²

Estimated coefficients of Model (5) in low- and high-religiosity groups are reported in Table 3. Consistent with our prediction and in line with our hypothesis, we find that insider trading is, all else constant, positively related in a statistically highly-significant way with future earnings news in the low-religiosity subsample but there is no link between insider trading and future news in the high-religiosity group.

The result confirms our interpretation of the main results on the negative link between religiosity and insider trading profits focused on lower propensity to trade on private information in highly religious areas. The earlier literature provides also alternative explanations for insider profits. In addition to trading on

private information, insiders trade against mispricing based on known pricing anomalies (Rozeff and Zaman, 1998; Jenter, 2005) and are better than other investors in trading on public information (Alldredge and Cicero, 2015; Ben-David et al., 2019). While we do not have any theoretical prediction on how (and why) religiosity might limit trading on anomalies or on public information, given the results in this section we can rule out the possibility that our main results are solely explained by those alternative arguments.

4.3. Opportunistic trading

In this section we provide an additional test of the impact of religiosity on opportunistic insider trading. We check if insider transactions in more religious areas are less likely to be classified as opportunistic, following the method proposed by Ali and Hirshleifer (2017).¹³

¹² The structure of data used to estimate Model (5) allows as to use firm fixed effects. We do not have them in any tests with *Religiosity* as the explanatory variable because religious adherence in an area is fairly stable over time and hence the religiosity variable has little within-firm variation.

¹³ An alternative method to classify trades as opportunistic is proposed by Cohen et al. (2012). However, Ali and Hirshleifer (2017) show that their method dominates the classification in Cohen et al. (2012).

Table 1
Descriptive Statistics.

	N	Mean	Std dev	Q1	Median	Q3
<i>Panel A. Purchases</i>						
BHAR (0,180)	217,230	0.028	0.414	-0.216	-0.015	0.205
Religiosity	217,230	0.517	0.102	0.446	0.528	0.581
Ln (Mcap)	217,230	5.467	1.783	4.172	5.225	6.562
Book-to-Market	217,230	0.776	0.604	0.394	0.627	0.968
Past return	217,230	-0.059	0.259	-0.214	-0.074	0.066
Trade size	217,230	0.056	0.158	0.005	0.016	0.048
CEO	217,230	0.105	0.306	0.000	0.000	0.000
CFO	217,230	0.045	0.207	0.000	0.000	0.000
Ownership	92,900	0.474	0.253	0.271	0.462	0.666
Accruals	92,900	0.026	0.141	-0.035	0.019	0.087
Amihud	92,900	0.004	0.016	0.000	0.000	0.002
Ln (Analysts)	92,900	1.480	0.925	0.762	1.466	2.179
Ln (Population)	92,324	14.660	1.281	13.973	14.860	15.416
Ln (Income)	92,324	10.360	0.299	10.144	10.351	10.575
Education	92,324	0.185	0.047	0.154	0.179	0.212
Minority ratio	92,324	0.203	0.091	0.129	0.212	0.263
Median age	92,324	34.152	2.287	33.000	34.000	36.000
<i>Panel B. Sales</i>						
BHAR (0,180)	777,437	0.000	0.384	-0.226	-0.035	0.170
Religiosity	777,437	0.508	0.103	0.438	0.520	0.578
Ln (Mcap)	777,437	6.696	1.791	5.480	6.582	7.834
Book-to-Market	777,437	0.403	0.336	0.187	0.324	0.522
Past return	777,437	0.122	0.307	-0.062	0.073	0.245
Trade size	777,437	0.069	0.178	0.007	0.022	0.062
CEO	777,437	0.110	0.312	0.000	0.000	0.000
CFO	777,437	0.054	0.227	0.000	0.000	0.000
Ownership	493,192	0.610	0.249	0.427	0.630	0.805
Accruals	493,192	0.038	0.149	-0.029	0.034	0.107
Amihud	493,192	0.001	0.007	0.000	0.000	0.000
Ln (Analysts)	493,192	1.882	0.893	1.299	1.934	2.571
Ln (Population)	491,377	14.816	1.165	14.298	14.966	15.458
Ln (Income)	491,377	10.487	0.304	10.275	10.510	10.696
Education	491,377	0.206	0.052	0.168	0.200	0.245
Minority ratio	491,377	0.220	0.095	0.141	0.228	0.301
Median Age	491,377	34.529	2.301	33.000	34.000	36.000

This table presents descriptive statistics of dependent and independent variables used in the main regressions. The sample includes open-market insider transactions in the period 1986–2010. All variables are defined in [Appendix A](#).

Opportunistic transactions are transactions executed by an insider classified as opportunistic based on the profitability of their past trading before quarterly earnings announcements (QEA). Specifically, insiders are classified every year on the basis of the average profitability of their prior trades in the pre-QEA period which runs from 21 days until 2 days before the earnings announcement. Profitability of pre-QEA trades is measured by 5-day market-adjusted returns centered at the earnings announcement date:

$$Profit = \sum_{j=-2}^{j=2} \frac{r_{i,t+j} - r_{m,t+j}}{5} \tag{6}$$

where t is the earnings announcement date (obtained from Compustat Quarterly files), r_i is the stock return and r_m is the return on the CRSP value-weighted index.

For each insider, the profits of their all prior pre-QEA trades, both purchases and sales, are averaged:

$$Average Profit = \frac{\sum^B Profit_{buy} - \sum^S Profit_{sale}}{B + S} \tag{7}$$

where B and S is the total numbers of past purchases and sales, respectively, in the pre-QEA period.

At the beginning of each year, all insiders are ranked on the basis of the *Average Profit*, and insiders in the top quintile of the profitability ranking are classified as opportunistic. Subsequently, all their trades in the ranking year are considered opportunistic. All other trades are considered non-opportunistic.

We then run the following logit model to check if higher religiosity reduces the probability of a trade being classified as oppor-

tunistic:

$$Prob(Opportunistic_i = 1) = \text{logit}(\beta_0 + \beta_1 Religiosity_i + \beta_2 LnMcap_i + \beta_3 BooktoMarket_i + \beta_4 PastReturn_i + \beta_5 TradeSize_i + \beta_6 CEO_i + \beta_7 CFO_i + \sum \gamma_l Year_l^i + \varepsilon_i) \tag{8}$$

The dependent variable, *Opportunistic_i*, is a dummy variable equal to 1 if the trade is classified as opportunistic, and it is equal to 0 otherwise. All other variables are defined as before. The model is estimated for trades in the period 1989–2010 as, following [Ali and Hirshleifer \(2017\)](#), we require at least three years of insider trading data to classify insiders.

Estimated coefficients of Model (8), in the sample of all trades (pooled purchases and sales) and separately for purchases and sales are presented in [Table 4](#). The coefficient of religiosity is significantly negative in all three specifications, confirming our prediction that insiders in the areas of higher religiosity are less likely to trade opportunistically.

5. The role of corporate governance

5.1. Firm-level voluntary insider trading restrictions

The firm-level voluntary insider trading restrictions regulate insider trading in their firm stock and ban insiders from trading around earnings announcements. The restrictions have a twofold role, it is a corporate governance mechanism that aims at protecting outside investors from insiders extracting rents based on

Table 2
Religiosity and Profitability of Insider Trading.

Dependent variable: BHAR (0,+180)						
	Purchases			Sales		
Religiosity	-0.052*	-0.119***	-0.127***	-0.039	-0.054	-0.023
	(0.030)	(0.033)	(0.038)	(0.031)	(0.038)	(0.037)
Ln (Mcap)	0.006	-0.024***	-0.024***	0.007	-0.008	-0.008
	(0.004)	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)
Book-to-Market	0.017*	0.042	0.043	-0.010	-0.030*	-0.027*
	(0.010)	(0.031)	(0.030)	(0.010)	(0.015)	(0.014)
Past return	0.140***	0.172***	0.172***	0.137***	0.136***	0.136***
	(0.022)	(0.024)	(0.024)	(0.028)	(0.034)	(0.034)
Trade size	0.004	0.012	0.009	0.005	0.024**	0.025**
	(0.011)	(0.018)	(0.018)	(0.011)	(0.009)	(0.009)
CEO	-0.001	-0.006	-0.007	-0.000	-0.002	-0.002
	(0.009)	(0.008)	(0.008)	(0.006)	(0.005)	(0.005)
CFO	0.031***	0.018**	0.017**	-0.011*	-0.011*	-0.011*
	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Ownership		0.110**	0.111**		0.120***	0.121***
		(0.044)	(0.044)		(0.035)	(0.035)
Accruals		0.076*	0.081*		0.041	0.045
		(0.041)	(0.041)		(0.050)	(0.049)
Amihud		-0.748**	-0.720**		0.758**	0.747**
		(0.308)	(0.304)		(0.303)	(0.305)
Ln (Analysts)		0.024*	0.023*		0.008	0.007
		(0.013)	(0.013)		(0.012)	(0.012)
Ln (Population)			0.005			-0.007**
			(0.006)			(0.003)
Ln (Income)			0.011			0.018
			(0.084)			(0.066)
Education			0.074			0.147
			(0.260)			(0.225)
Minority ratio			-0.099			-0.008
			(0.062)			(0.048)
Median age			-0.006**			-0.002
			(0.002)			(0.002)
Constant	0.017	0.155***	0.176	-0.039*	0.002	-0.069
	(0.027)	(0.041)	(0.768)	(0.022)	(0.031)	(0.594)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	217,230	92,900	92,324	777,437	493,192	491,377
R ²	0.028	0.032	0.050	0.031	0.043	0.043

This table presents regression results with the 180 trading days buy-and-hold abnormal returns (BHAR) following insider transactions as the dependent variable. All variables are defined in Appendix A. The regressions include industry fixed effects based on 2-digit SIC code classification. Standard errors reported in parentheses are adjusted for clustering within firms and year. *** and ** denote significance at the 10%, 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 1986–2010.

private information, and it plays an important role in shaping individual insider trading choices. Bettis et al. (2000) document lower trading activities in firms with internal insider trading regulations and lower profitability from trading during periods with bans. Lee et al. (2014) investigate trading on private information in firms with internal insider trading regulations and find that insiders still trade profitably on positive private information but avoid extracting rents from negative private information. In our setting, one would expect that local religiosity is more associated with curbing profitability of insider trading in the absence of internal trading bans.

We follow Lee et al. (2014) approach to identify firms with and without insider trading bans. The results are presented in Table 5, Panel A. We find that indeed there is a lower profitability of insider purchases in more religious areas in firms without trading bans. The effect of religiosity in the subsample of firms without internal insider trading restrictions is economically stronger than for full sample presented in the main results. For one standard deviation change in religiosity the profitability of purchases drops by -2.27% when controlling for transparency, information asymmetry and governance and -3.30% when additionally controlling for socioeconomic characteristics for firms with bans versus -1.21% and -1.30%, respectively in the main results. For sales, the results are

mixed, there is some evidence that insiders are better at avoiding losses after sale transactions in firms with no internal trading bans in areas with higher religiosity, however the effect disappears after controlling for socioeconomic characteristics. The results show the importance of social norms in the absence of firm-level insider trading restriction.

5.2. Co-opted directors

Firms located in more religious areas are more likely to have better corporate governance systems. There is clear evidence in the literature showing negative association between corporate governance and profitability of insider trading (Ravina and Sapienza, 2010; and Jagolinzer et al., 2011). One of the important functions of corporate governance is board monitoring, a control system over managers actions to protect shareholders who cannot monitor managers individually either due to cost or impracticality. As indicated by Coles et al. (2014) the effectiveness of board monitoring depends on whether directors are appointed before or after the CEO starts and whether they are independent. More directors appointed by the incumbent CEO reduces the board monitoring. To test whether better corporate governance mitigates or moderates the effect of religiosity on the profitability of insider

Table 3
Religiosity and Trading on Future News.

Dependent variable: Prob. (Purchase=1)		
	Low religiosity	High religiosity
$\Delta\text{Earnings}(t + 1)$	0.211*** ^b (0.051)	0.035 (0.057)
BHAR($t + 1$)	0.301*** (0.031)	0.235*** (0.037)
BHAR(t)	-0.163*** (0.035)	-0.113*** (0.028)
Ln (Mcap)	-0.112*** (0.021)	-0.051** (0.024)
Book-to-Market	0.548*** (0.045)	0.645*** (0.046)
Year dummies	Yes	Yes
N	46,742	42,914
Pseudo R ²	0.027	0.022

This table presents results of conditional (firm fixed-effect) logit regressions explaining the probability of insider net purchasing in a fiscal year. The dependent variable is equal to one if the total number of shares bought by the firm's insiders in the fiscal year is greater than the total number of shares sold, and the variable is equal to zero otherwise. Zeros also include firm-year observations without any insider trading. $\Delta\text{Earnings}(t + 1)$ is the difference between next fiscal year's earnings ($t + 1$) and the current fiscal year's earnings (t), scaled by the firm's total assets at the end of year t . $\text{BHAR}(t + 1)$ ($\text{BHAR}(t)$) is next (current) year's 12-month size-and-book-to-market-adjusted buy-and-hold abnormal return. All other variables are defined in Appendix A. The subsample of low religiosity (high religiosity) includes firm-years below (above) the annually calculated sample median of religiosity. Standard errors are reported in parentheses and are adjusted for clustering within firms. ** and *** denote significance at the 5% and 1% level, respectively, and b denotes significance at the 5% level in the differences in $\Delta\text{Earnings}(t + 1)$ coefficient between Low and High religiosity subsamples. The sample period is 1986–2010.

Table 4
Religiosity and Opportunistic Trading.

Dependent variable: Opportunistic trading			
	All trades	Purchases	Sales
Religiosity	-0.462*** (0.073)	-0.473*** (0.156)	-0.446*** (0.083)
Ln (Mcap)	0.002 (0.004)	-0.046*** (0.010)	0.010** (0.005)
Book-to-Market	-0.076*** (0.018)	-0.127*** (0.030)	-0.027 (0.025)
Past return	-0.182*** (0.026)	-0.171*** (0.062)	-0.180*** (0.030)
Trade size	-0.280*** (0.061)	0.167** (0.082)	-0.452*** (0.081)
CEO	0.609*** (0.019)	0.205*** (0.048)	0.692*** (0.021)
CFO	-0.028 (0.033)	-0.017 (0.077)	-0.033 (0.037)
Constant	-3.767*** (0.078)	-3.354*** (0.148)	-3.910*** (0.095)
Year dummies	Yes	Yes	Yes
N	967,018	207,345	759,673
Pseudo R ²	0.012	0.012	0.014

This table presents results of logit regressions explaining the probability of a trade being classified as opportunistic following the method proposed by Ali and Hirshleifer (2017). The trade is opportunistic if it is by an insider who is in the top quintile of the profitability ranking of past trades before earnings announcements. It is classified as non-opportunistic otherwise. All other variables are defined in Appendix A. Robust standard errors are reported in parentheses. ** and *** denote significance at the 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 1989–2010.

trading, we use a *Co-option Independence* measure provided by Coles et al. (2014).¹⁴ *Co-option Independence* is a ratio of indepen-

dent directors appointed by the incumbent CEO to the number of board members.

We divide our sample according to *Co-option Independence* ratio into terciles and re-run Models (2) and (3) for each tercile separately, with tercile 3 having the largest proportion of independent directors after the incumbent CEO assumed office. We expect Religiosity to have a negative impact on profitability of insider trading in firms with the highest proportion of co-opted independent directors, i.e. for tercile 3 where the board monitoring is the weakest. The results are presented in Table 5, Panel B. In line with our expectations, Religiosity coefficient is negative and statistically significant in tercile 3 subsample for purchases when we control for transparency, information asymmetry and governance, and negative but insignificant when we control for socioeconomic factors. For sale, the results are mixed and only weakly significant against our expectations. The data on co-option is available from 1996 to which is ten years less than our initial sample span and covers S&P 1500 rather than the entire population of US public firms. Due to the availability of the co-option data the number of observations for purchases drops from 92,900 to 22,317 and for sales from 493,192 to 170,837. Therefore, the results are indicative only and should be interpreted with caution.

6. Further tests

6.1. Mover insiders

Our main results show that religiosity in the area where the firm is located is associated with lower profitability of insider purchases and we argue that religiosity affects the community social norms which in turn determine individual behavior. There are two mechanisms that can explain how the community social norms work curbing profitability of insider trading. Religiosity creates social norms that regard self-interested profits as unacceptable (disapproval of self-interest) and individuals conform to the social norms as they are afraid of public disapproval, lost reputation or embarrassment (risk-aversion) in case of generating self-interested profits. However, one could argue that instead of social norms in the community, our main findings could be associated with insiders' individual level of religiosity, which determines an individual attitude towards self-interested profits and risk aversion. These are unobservable personal characteristics and that could explain profitability.

Relatedly, one could also argue that corporate insiders are very powerful, which allows them to pursue private profit maximization and rent extraction (e.g. Bebchuk and Fried, 2003). This gives them significant financial exposure to the firm, and as such the link between trading profits and local social norms is not warranted. Additionally, over years there has been a rise in the status of top managers, with some of them becoming celebrities, and narcissism among top management teams is widespread (Maccoby, 2000). Arguably, highly individualistic and strong-personality insiders are less susceptible to the impact of the community and less influenced by social constraints, achieving a great deal of discretion in their decision making (e.g. Crossland and Hambrick, 2011). Consequently, it is valid to question whether its local norms or individuals' characteristics that influence profitability of insider trading.

To mitigate this concern, we analyze the profitability of insiders who moved between firms. If an insider moves to a firm in a higher religiosity area and makes less profits, then it is very likely that the social norms related to religiosity form an important mechanism curbing profitability of insider trading regardless of individual beliefs and other unobservable individual characteristics. Our full sample includes all insiders regardless of whether they moved between different firms or not. To be able to ad-

¹⁴ The data is available from Lalitha Naveen's webpage <https://sites.temple.edu/lnaveen/data/>.

Table 5
Religiosity and Profitability of Insider Trading – Corporate Governance.

Dependent variable: BHAR(0,+180)						
Panel A. Firms with voluntary insider trading restrictions versus without						
	No Bans	Bans	No Bans	Bans		
<i>Panel A.1. Purchases</i>						
Religiosity	-0.261*** ^a (0.063)	-0.083 (0.053)	-0.324*** ^a -0.324*** ^a	-0.070 -0.324*** ^a		
Control variables – basic	Yes	Yes	Yes	Yes		
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes		
Control variables – socioeconomic			Yes	Yes		
N	23,398	53,072	23,235	52,788		
R ²	0.066	0.055	0.070	0.056		
<i>Panel A.2. Sales</i>						
Religiosity	-0.170** ^a (0.081)	-0.021 (0.033)	-0.097 (0.065)	-0.010 (0.034)		
Control variables – basic	Yes	Yes	Yes	Yes		
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes		
Control variables – socioeconomic			Yes	Yes		
N	120,728	307,334	120,342	306,113		
R ²	0.073	0.050	0.075	0.051		
Panel B. Co-opted directors						
	Co-option terciles					
	1	2	3	1	2	3
<i>Panel B.1. Purchases</i>						
Religiosity	0.028 (0.133)	-0.112 (0.107)	-0.261* ^a (0.145)	-0.046 (0.131)	-0.138 (0.141)	-0.202 (0.139)
Control variables – basic	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – socioeconomic				Yes	Yes	Yes
N	9,096	7,798	5,423	9,003	7,740	5,398
R ²	0.142	0.099	0.178	0.149	0.105	0.185
<i>Panel B.2. Sales</i>						
Religiosity	0.152* ^a (0.071)	-0.071 (0.077)	-0.116 (0.069)	0.184 (0.105)	-0.025 (0.077)	-0.117* (0.064)
Control variables – basic	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – socioeconomic				Yes	Yes	Yes
N	58,403	60,479	51,955	58,312	60,331	51,884
R ²	0.058	0.053	0.064	0.061	0.057	0.067

Panel A. presents regression results with the 180 trading days buy-and-hold abnormal returns (BHAR) following insider transactions as the dependent variable run separately in subsamples of firms with voluntary trading restrictions (Bans) and firms without voluntary trading restriction (No Bans). ^{a, b, c} denote significance at the 1%, 5% and 10% level, respectively in the differences in Religiosity coefficient between Bans and No Bans subsamples. Panel B. presents regression results with the 180 trading days buy-and-hold abnormal returns (BHAR) following insider transactions as the dependent variable run separately in subsamples of firms with various level of co-opted independent directors. Co-opted independent is the proportion of the board that consists of co-opted directors who are independent. Co-option is measured as a ratio of directors appointed after the appointment of CEO to the board size. We divide firms in our sample into terciles of co-option independent and run regression separately for each tercile. ^{a, b, c} denote significance at the 1%, 5% and 10% level, respectively in the differences in Religiosity coefficient between Tercile 1 and 3. Control variables - basic include *Ln(Mcap)*, *Book-to-Market*, *Past return*, *Trade size*, *CEO and CFO dummies*. Control variables – corporate governance and disclosure include *Ownership*, *Accruals*, *Amihud*, *Ln(Analysts)*. Control variables – socioeconomic include CBSA characteristics: *Ln(Population)*, *Ln(Income)*, *Education*, *Minority ratio*, and *Median age*. All variables are defined in Appendix A. The regressions include year fixed effects and industry fixed effects based on the 2-digit SIC code classification. Standard errors reported in parentheses are adjusted for clustering within firm and year. ** and *** denote significance at the 10%, 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 1986–2010.

dress whether it is community or individual religiosity associated with curbing profitability of insider trading, we focus on insiders who moved between firms and locations with different level of religiosity. For this test we follow the approach presented by Hillier et al. (2015) and keep in the sample only those insiders that moved between firms (*movers*). There are 6,151 insiders moving from low to high religiosity and 17,455 from high to low. We amend our main models by adding a dummy, *Low to High*, if an insider moved from a firm located in lower religiosity area to an area with higher religiosity and a cross-product between religiosity and the dummy, *Religiosity × Low to High*, to assess the sensitivity of insider trading profitability to insiders moving from firms located in less to those located in more religious area. Low religiosity (high religiosity) includes firm-years below (above) the annually calculated sample median of religiosity.

The results are presented in Table 6, Panel A. For purchases, the cross-product *Religiosity × Low to High* is negative and statistically significant showing that profitability of insider trading is more sensitive to insiders moving from lower to higher religiosity areas. The economic significance is strong, profitability of insider purchases is expected to be 30.6% (32.6%) lower for insiders who move from firms located in low to firms located in high religiosity areas when controlling for transparency, information asymmetry and governance (socioeconomic characteristics). For sales, the effect of moving from low to high religiosity area does not restrain avoided losses. The results show that insiders are expected to be better at avoiding losses. However, given sales are usually undertaken for liquidity and diversification reasons and on average generate insignificant returns (mean BHAR (0, 180) is 0.000 for our sample of sales), the results should be treated with caution. The

Table 6
Religiosity and Profitability of Insider Trading – Further Tests.

Dependent variable: BHAR(0,+180)				
Panel A. Movers – Low to High Religiosity				
	Purchases		Sales	
Religiosity	–0.062 (0.060)	–0.080 (0.081)	–0.036 (0.062)	0.005 (0.054)
Low to High	0.121 (0.074)	0.123 (0.082)	0.201** (0.088)	0.182** (0.075)
Religiosity × Low to High	–0.244* (0.126)	–0.246* (0.137)	–0.361** (0.158)	–0.327** (0.135)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic		Yes		Yes
N	30,586	30,384	89,931	89,671
R ²	0.052	0.054	0.072	0.073
Panel B. Local versus Geographically Dispersed Firms				
	Local	Dispersed	Local	Dispersed
<i>Panel B.1. Purchases</i>				
Religiosity	–0.182** ^a (0.063)	–0.045 (0.053)	–0.166** ^a (0.076)	–0.055 (0.054)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic			Yes	Yes
N	30,870	30,343	30,721	30,075
R ²	0.057	0.068	0.059	0.071
<i>Panel B.2. Sales</i>				
Religiosity	–0.095 (0.062)	–0.052 (0.068)	–0.026 (0.051)	–0.049 (0.076)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic			Yes	Yes
N	179,633	157,100	179,010	156,556
R ²	0.063	0.059	0.065	0.060
Panel C. Linked Insiders				
	Low Religiosity	High Religiosity	Low Religiosity	High Religiosity
<i>Panel C.1. Purchases</i>				
Linked	–0.007 (0.028)	–0.024 (0.030)	–0.008 (0.027)	–0.019 (0.032)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic			Yes	Yes
N	38,158	33,431	37,887	33,166
R ²	0.028	0.034	0.059	0.060
<i>Panel C.2 Sales</i>				
Linked	–0.046** ^a (0.012)	–0.034 (0.020)	–0.047** ^a (0.012)	–0.031 (0.019)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic			Yes	Yes
N	181,150	139,950	180,615	138,961
R ²	0.082	0.047	0.082	0.048
Panel D. Religious Denominations				
	Purchases		Sales	
Catholic	–0.077 (0.050)	–0.077 (0.062)	–0.058* (0.033)	–0.047 (0.044)
Protestant	–0.115** (0.043)	–0.121** (0.046)	–0.037 (0.045)	0.008 (0.047)
Other denominations	–0.108 (0.108)	–0.209 (0.273)	–0.031 (0.074)	0.056 (0.108)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic		Yes		Yes
N	92,900	92,324	493,192	491,377
R ²	0.048	0.049	0.042	0.043

(continued on next page)

Table 6
(continued)

Panel E. Dollar Profits				
	Purchases		Sales	
Religiosity	-48.402*	-52.741*	-124.524**	-118.131
	(24.839)	(28.724)	(56.060)	(79.735)
Control variables – basic	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables – socioeconomic		Yes		Yes
N	92,820	92,244	493,095	491,281
R ²	0.018	0.019	0.023	0.023

Panel A presents regression results with the 180 trading days buy-and-hold abnormal returns (BHAR) following insider transactions as the dependent variable controlling for insiders moving from a firm located in lower religiosity area to a firm located in higher religiosity area (*Low to High*). Low (High) includes firm-years below (above) the annually calculated sample median of religiosity. Panel B presents regression results with the 180 trading days buy-and-hold abnormal returns (BHAR) following insider transactions as the dependent variable run separately in subsamples of geographically focused (local) and dispersed firms. Local firms mention 6 or fewer states, and dispersed firms mention more than 6 states in their annual report. ^{a,b,c} denote significance at the 1%, 5% and 10% level, respectively in the differences in Religiosity coefficient between Local and Dispersed firms. Panel C presents results of alternative regressions to study the link between insider trading profits and religiosity in the area in which the firm is located and controls for insiders in firms with economically-linked public customers as in [Alldredge and Cicero \(2015\)](#). Profits are calculated as the size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR) over 180 trading days from the date of the trade. ^{a,b,c} denote significance at the 1%, 5% and 10% level, respectively in the differences in Linked coefficient between Low and High Religiosity subsamples. Panel D presents results of alternative regressions to study the link between insider trading profits and religiosity controlling for religious denomination in the area in which the firm is located. Profits are calculated as the size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR) over 180 trading days from the date of the trade. *Catholic (Protestant)* is calculated for each year as the sum of adherents across Catholic (Protestant) church in the core based statistical area (CBSA) in which the firm is located, divided by the CBSA's total population. Panel E presents results of regressions with insider trading dollar profits as dependent variable. Dollar profits are in thousands and calculated following [Cziraki and Gider \(2021\)](#) using the size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR) over 180 trading days from the date of the trade. Control variables - basic include *Ln(Mcap)*, *Book-to-Market*, *Past return*, *Trade size*, *CEO* and *CFO* dummies. Control variables – corporate governance and disclosure include *Ownership*, *Accruals*, *Amihud*, *Ln(Analysts)*. Control variables – socioeconomic include CBSA characteristics: *Ln(Population)*, *Ln(Income)*, *Education*, *Minority ratio*, and *Median age*. All variables are defined in [Appendix A](#). The regressions include year fixed effects and industry fixed effects based on the 2-digit SIC code classification. Standard errors reported in parentheses are adjusted for clustering within firm and year. ^{***} and ^{**} denote significance at the 10%, 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 1986–2010.

results for movers from high to low religiosity area (based on the insignificant coefficient for religiosity alone) show that profitability of purchases and sales does not change significantly when insiders move from high to low religiosity area. The results suggest that the effect of religiosity may not be symmetric. We conclude that although individual religiosity can be a mechanism through which religion reduces opportunistic trading, community religion is a significant factor in curbing the profitability of insider trading for purchases.

6.2. Geographic dispersion

To provide a further test of the impact of religion on insider trading profits, we look at subsamples of firms in which we expect the impact to differ. Because all arguments which underpin our main hypothesis focus on social norms associated with religiosity in the firm's local area, one can expect the effect to differ between geographically focused and geographically dispersed firms. Geographically focused (or local) firms are expected to have a stronger local identity, a higher percentage of their total workforce is local, and therefore the impact of local norms and the local social pressure on insiders are expected to matter more there, compared to geographically dispersed firms, where the impact of the local culture on the firm and hence insiders' behavior is likely to be weaker.

To measure geographic dispersion, we use the method proposed by [Garcia and Norli \(2012\)](#). Geographic dispersion is defined as the number of states mentioned in the firm's 10-K annual reports filed with the SEC. We use the state count data available from Diego Garcia's website and match this fiscal-year measure of geographic dispersion with insider trades in our sample. Availability of the dispersion data limits our sample period in this test to 1994–2008. We categorize firms as local versus dispersed based on the median across all trades in the sample. The value of the median is 6. Firm-trades with 6 or fewer states mentioned are classified as local, and firm-trades with the state count greater than 6 are classified as geographically dispersed. We then re-estimate the main specifications in these two subsamples.

The results are reported in [Table 6](#), Panel B.1. for purchases and Panel B.2. for sales. In line with our expectations, for purchases, the effect of religiosity on insider trading profits documented in the main tests is driven by trades in geographically focused firms. The religiosity coefficients are statistically and significantly different between the subsamples. The effect of religiosity is insignificant in geographically dispersed firms. Altogether, the result confirms that local social norms have a more pronounced effect on insiders in more local firms. As in the main tests, we find no link between religiosity and insider profits following sale transactions in any of the subsamples.

6.3. Linked insiders

Another potential explanation for our main results is that in a high religiosity area with low level of networking opportunities, profitability of insider trading maybe low because of lack of networking rather than religiosity. To address this alternative channel, we perform a test in which we use data on linked insiders available from [Alldredge and Cicero \(2015\)](#). They find that insiders' profits are higher for linked firms, especially for sales, and interpret this result as an indication that insiders' network matters. However, the data does not specify whether linked insiders are based in a less or a more religious area. Therefore, we split our sample into High and Low religiosity and control for *Linked* insiders in the main regression specification. If our main results are due to lack of networking rather than religiosity, for purchases we should observe a negative (positive) and statistically significant coefficient on *Linked* in the High (Low) religiosity subsample, and the opposite for sales.

The results presented in [Table 6](#), Panel C show that *Linked* is insignificant for purchases and significantly negative for sales, suggesting that networking does not play a role explaining insider profitability for purchases, in line with the evidence of [Alldredge and Cicero \(2015\)](#), but it does for sales. The results for sales show higher avoided losses for linked insiders in the lower religiosity subsample, where the effect of networking should be higher. This result is also in line with [Alldredge and Ci-](#)

zero (2015) and suggests that a dense network could be a factor in insiders' ability to avoid larger losses. We add to their evidence finding that this effect is concentrated in the low religiosity sample.

6.4. Religious denominations

In the US, there are two dominating religious denominations, Protestants and Catholics. Hilary and Hui (2009) show that both Protestants and Catholics contribute to the negative effect of religiosity on risky firm strategies. Kumar et al. (2011), who are interested in the impact of religiosity on gambling, shows that areas dominated by Catholics show more risky attitudes. In our additional analysis, we control for Catholics and Protestants to better understand the contribution of each of the denominations to our overall results and present the evidence in Table 6, Panel D. We find that lower profitability of insider purchases is linked to Protestants, and that Catholics are better at avoiding higher losses after sale transactions. Our results are in line with Kumar et al. (2014) findings that Protestants exhibit more risk aversion than Catholics.

6.5. Dollar profits

As an additional robustness test, apart from the ones mentioned in Section 4.1, we replace insider trading profitability, defined as 180-day BHAR, with constant dollar profits calculated as in Cziraki and Gider (2021) for the 180-day window and find that our main results hold. As Table 6 Panel E shows, we find a negative association between religiosity and profitability of insider purchases denominated in dollars. To provide a sense of the economic magnitude, we find that a 1% increase in the religiosity level is linked with \$52,741 lower dollar profit for purchases in the 180-day window (\$74,716 annually) even after controlling for governance, disclosure environment and socioeconomic characteristics of the area where the firm is located. The results for sales confirm our main results of no link between religiosity and profitability when all control variables are included but show a positive association when corporate governance and disclosure characteristics are controlled for and socioeconomic characteristics are not.

6.6. Probability and intensity of trading

Our results reported so far are based on observed insider transactions for which we document lower profitability in more religious areas. In this subsection we ask a supplementary question: do the probability and intensity of insider trading differ across firms located in areas with a different level of local religiosity? If insiders in firms located in more religious areas are less likely to opportunistically trade on private information, we could also observe less insider trading overall in high-religiosity firms. Alternatively, insiders can alter timing of their trades to avoid trading in periods when their private information is more valuable but trade in periods of lower information advantage, reducing the average profitability of trades but not changing the average probability or volume of trading.

To address this issue, we first develop a regression test in which we compare firms with insider transactions with firms without insider trading in a quarter. Specifically, we define a calendar quarter as the period between two consecutive earnings announcements (EA_0 and EA_1) and in each quarter we analyze trading by all insiders in the firm. We group firm-quarters into four categories: observations without any insider trading (No IT), observations with both buys and sells (Mix), observations with buys only (Buys) and observations with sells only (Sells). On the basis of this classification we run a multinomial logistic regression to analyze the impact of

religiosity on the probability of each outcome:

$$\begin{aligned}
 \text{Prob}\left(\frac{Y_{i,t} = \text{Mix, Buys, Sells}}{Y_{i,t} = \text{No IT}}\right) &= \text{logit}(\beta_0 + \beta_1 \text{Religiosity}_{i,t} \\
 &+ \beta_2 \text{BHAR}_{i,t} + \beta_3 \text{BHAR}_{i,t-1} + \beta_4 \text{LnMcap}_{i,t} + \beta_5 \text{BooktoMarket}_{i,t} \\
 &+ \sum \gamma_l \text{Year}_t^l + \varepsilon_{i,t}) \tag{9}
 \end{aligned}$$

$\text{BHAR}_{i,t}$ ($\text{BHAR}_{i,t-1}$) is the firm i 's size-and-book-to-market-adjusted buy-and-hold abnormal return over the window (2,60) ((-60,-2)) relative to the beginning-of-quarter earnings announcement day (EA_0). All other variables are defined as before.

The results are reported in Panel A of Table 7. We treat no insider trading (No IT) quarters as the reference category and report three sets of regression coefficients: for firm-quarters with both buys and sells, with buys only and with sells only, which should all be interpreted relatively to firm-quarters with no insider trading. We find clear evidence that religiosity affects insiders' decisions to trade. Religiosity reduces the probability of all combinations of insider trading relative to the no-trading base scenario.

Next, to test whether religiosity also affects the intensity of insider trading, we analyze the volume of trading using the same setup as above. We compute the relative number of shares traded by insiders in a given quarter as the total volume of insider trading scaled by the number of shares outstanding, separately for all transactions (buys and sells), for buys only and for sells only. Then, we run a set of regressions following the specification:

$$\begin{aligned}
 \text{Relative shares traded}_{i,t}^{(\text{All, Buys, Sells})} &= \beta_0 + \beta_1 \text{Religiosity}_{i,t} \\
 &+ \beta_2 \text{BHAR}_{i,t} + \beta_3 \text{BHAR}_{i,t-1} + \beta_4 \text{LnMcap}_{i,t} + \beta_5 \text{BooktoMarket}_{i,t} \\
 &+ \sum \alpha_m \text{Industry}_t^m + \sum \gamma_l \text{Year}_t^l + \varepsilon_{i,t} \tag{10}
 \end{aligned}$$

All independent variables are defined as before.

The results are reported in Panel B of Table 7. We find that insiders trade overall less in firms located in more religious areas when we control for governance and information environment but disappear when we add socioeconomic measures to our model. In both specifications, however, the results show lower selling intensity in more religious areas. The coefficient for purchases, although negative, is insignificant. The inconclusive results for purchases indicate that insiders are likely to adjust the timing of buying, which reduces the average profitability, as documented above, but they do not trade significantly less overall.

7. Identification and endogeneity

7.1. Propensity score matching

If firms endogenously choose where to locate, local religiosity is not exogenous to the firm. In this section, we provide an alternative test to alleviate this concern. We compare insider trades in firms located in high religiosity areas with trades in firms which have a comparable propensity of locating in a high religiosity area but are in a metropolitan area with a low level of religiosity. We estimate the propensity based on firm fundamentals and local socioeconomic characteristics other than religiosity.

To perform this test, we annually rank firms with insider trades (separately purchases and sales) based on religiosity and classify firm-years in the top quintile as a high-religiosity sample ($\text{High religiosity} = 1$) and those in the bottom quintile as a low-religiosity sample ($\text{High religiosity} = 0$). Then, we run a logistic regression with High religiosity as the dependent variable and firm size, book-to-market ratio, past returns, 2-digit SIC code and local area characteristics such as population, income, education, minority ratio and age as independent variables. We run the logistic regression separately for purchase and sale samples.

Table 7
Religiosity and Probability and Intensity of Insider Trading in a Calendar Quarter.

Panel A. Probability of trading – multinomial logit						
	Both buys and sells	Only buys	Only sells	Both buys and sells	Only buys	Only sells
Religiosity	−0.652*** (0.098)	−0.300*** (0.093)	−0.610*** (0.071)	−0.422*** (0.108)	−0.233** (0.102)	−0.340*** (0.080)
Control variables - basic	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – socioeconomic				Yes	Yes	Yes
N	123,976	123,976	123,976	113,461	113,461	113,461
Chi ²	19,876	19,876	19,876	18,128	18,128	18,128
Pseudo R ²	0.071	0.071	0.071	0.068	0.068	0.068

Panel B. Intensity of trading – OLS						
	Total trading	Buying	Selling	Total trading	Buying	Selling
Religiosity	−0.113** (0.051)	−0.003 (0.007)	−0.113** (0.050)	−0.091 (0.053)	−0.002 (0.008)	−0.096* (0.052)
Control variables - basic	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – corporate governance and disclosure	Yes	Yes	Yes	Yes	Yes	Yes
Control variables – socioeconomic				Yes	Yes	Yes
N	123,886	123,886	123,886	113,438	113,438	113,438
R ²	0.078	0.050	0.081	0.085	0.059	0.086

Panel A presents results of a multinomial logistic regression explaining the probability of insider trading in a given quarter. The dependent variable takes four values: (i) no insider trading, (ii) a mix of both insider purchases and sales, (iii) only purchases, and (iv) only sales. The coefficients should be interpreted relative to the base category of no insider trading. Standard errors reported in parentheses are adjusted for clustering within firms. The regressions include year fixed effects. Panel B presents OLS regression results with the insider trading volume in a quarter, scaled by the number of shares outstanding, as the dependent variable. A quarter is defined as the period between two consecutive earnings announcements. The regressions include industry fixed effects based on the 2-digit SIC code classification. Standard errors reported in parentheses are adjusted for clustering within firm and year. Control variables – basic include $BHAR_t$, $BHAR_{t-1}$, $\ln(Mcap)$, $Book-to-Market$. Control variables – corporate governance and disclosure include $Ownership$, $Accruals$, $Amihud$, $\ln(Analysts)$. Control variables – socioeconomic include CBSA characteristics: $\ln(Population)$, $\ln(Income)$, $Education$, $Minority\ ratio$, and $Median\ age$. All variables are defined in Appendix A. *** denotes significance at the 1% level. The sample includes firm-quarter observations in the period 1986–2010.

We then match without replacement each high religiosity observation ($High\ religiosity = 1$) with a unique control ($High\ religiosity = 0$) using the closest propensity score. We use a caliper of 0.001 for all firm-years to find the closest match, where caliper refers to the difference in the predicted propensity scores between the treatment and the match. Based on this procedure, we identify 5,010 high-religiosity firm-year observations with respective uniquely matched low religiosity firm-years in the sample of purchases, and 4,981 matched observations in the sales sample. Finally, we take these firm-year pairs into our trade level sample and run regressions explaining insider trading profits.

Panel A of Table 8 shows a comparison of the means of firm level and socioeconomic variables for the high religiosity and matched control samples. There are no statistical differences for most of the variables, except for education and minority ratio for purchases and minority ratio for sales, but the differences in the means for those variables are economically very small. Even though we do not get perfectly matched samples, we conclude we still have a reasonably close match. Nevertheless, to alleviate further concerns we control for all the variables used in the propensity matching procedure in insider profit regressions which are presented in Panel B of Table 8. The results confirm our main findings of lower insider profits for purchase transactions in more religious areas. As in other tests, the effect is insignificant for sales.

7.2. Difference-in-difference estimation

In further tests we complement the correlational evidence of the main results and attempt to verify the causal impact of religiosity on insider trading profits using exogenous variation in religious participation. We use the child sex abuse scandals in the Catholic church in Boston, Massachusetts, uncovered by an investigation in The Boston Globe in early 2002 as an exogenous shock to religious participation in certain areas. Bottan and Perez-Truglia (2015) document that the child abuse scandals have a long-

lasting effect on religious participation in the zip codes where they occurred. In the context of our study, if religiosity matters for insider trading profits, we should observe a rise in insider trading profits after the scandal in the affected areas.

We perform a difference-in-difference analysis where the treated group are firms located in metropolitan areas within the Catholic Archdiocese of Boston with reported child abuse cases during 2002. The list of cases is based on the records published by Bishop Accountability, a non-governmental organization that compiles a public list of Catholic clergy who have faced sexual abuse allegations (Bottan and Perez-Truglia, 2015). The control group are firms located elsewhere, matched with the treated group based on the following metrics as of 2001: religiosity level, buy and hold abnormal returns (separately for purchases and sales), market capitalization, book-to-market ratio, past returns, 2-digit SIC code and all socioeconomic variables defined in Appendix A. We use a caliper of 0.001 to find the closest match.

Panel A in Table 9 displays three graphs, one with the average religiosity level for the treated and control groups, and two with average profitability of insider trading separately for purchases and sales around the publication of child sex abuse cases in The Boston Globe. The vertical dashed line marks the publication date of the religious scandals, solid blue line is the level of religiosity and insider trading abnormal returns for the treated group, and the dashed red line is the level of religiosity and insider trading abnormal returns for the control group.

Religiosity is similar for both treated and control groups around the years of the press release in The Boston Globe and the differences are statistically insignificant. Also, while religiosity declines for both groups before 2002, the trend continues for the treated group only after the scandals. Profitability of purchases are similar for both treated and control groups before 2002 but they divert afterwards. In line with our conjecture, post-trading abnormal returns increase after 2002 for the treated group and are larger than for the control group, suggesting disproportionately higher prof-

Table 8
Religiosity and Profitability of Insider Trading – Propensity Score Matched Sample.

Panel A. Firm and metropolitan area attributes across subsamples									
	Purchases				Sales				
	High religiosity	Low religiosity	Difference	t-stat	High religiosity	Low religiosity	Difference	t-stat	
N firm-years	5010	5010			4981	4981			
Industry (SIC)	40.48	40.45	-0.03	-0.08	40.57	40.26	-0.30	-0.82	
Ln (Mcap)	4.93	4.92	-0.01	-0.29	5.55	5.52	-0.03	-0.78	
Book-to-Market	0.76	0.78	0.02	1.17	0.57	0.59	0.02	1.64	
Past return	-0.08	-0.07	0.01	1.50	0.11	0.10	-0.01	-1.03	
Ln (Population)	14.03	14.01	-0.02	-0.74	13.98	13.98	0.01	0.19	
Ln (Income)	10.28	10.27	-0.01	-1.57	10.31	10.31	-0.01	-0.89	
Education	0.18	0.17	0.00	-2.24**	0.18	0.18	0.00	-0.83	
Minority ratio	0.14	0.16	0.01	6.77***	0.14	0.16	0.01	7.81***	
Median age	34.69	34.63	-0.06	-1.01	34.78	34.88	0.10	1.60	

Panel B. Regression results				
Dependent variable: BHAR(0,+180)	Purchases		Sales	
High religiosity	-0.039*	-0.078**	0.002	-0.005
	(0.024)	(0.035)	(0.014)	(0.019)
Control variables: basic	Yes	Yes	Yes	Yes
Control variables: corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables: socioeconomic		Yes		Yes
Year FE	Yes	Yes	Yes	Yes
N	19,310	8,000	95,962	61,418
R ²	0.034	0.099	0.027	0.040

Panel A presents descriptive statistics for high-low religiosity matched firm-years. The pairs are generated using the propensity score matching method. Each year, all firms with insider trades (purchases and sales separately) are ranked according to religiosity in the core based statistical area (CBSA) in which they are headquartered, and we generate a *High religiosity* dummy equal to one for firms in the top quintile of the religiosity distribution, and equal to zero for firms in the bottom quintile ('*Low religiosity*'). Propensity scores are generated from a logistic regression with *High religiosity* as the dependent variable and the following firm-level and CBSA-level variables as independent variables: firm market capitalization, book-to-market ratio, past return, 2-digit SIC code, and CBSA population, average income, education, minority ratio and median age. We then match without replacement each treatment observation (*High religiosity* = 1) with a unique control (*High religiosity* = 0) using the closest propensity score. We use a caliper of 0.001 to find the closest match, where caliper refers to the difference in the predicted propensity scores between the treatment and the match. Panel B presents regression results for insider trades in firm-years matched in the propensity score matching procedure. The dependent variable is the size-and-book-to-market-adjusted buy-and-hold abnormal return (BHAR) over 180 trading days from the date of the trade. Control variables include *Ln(Mcap)*, *Book-to-Market*, *Past return*, *Trade size*, *CEO* and *CFO* dummies, *Ownership*, *Accruals*, *Amihud*, *Ln(Analysts)*, and CBSA characteristics: *Ln(Population)*, *Ln(Income)*, *Education*, *Minority ratio*, and *Median age*. All variables are defined in Appendix A. The regressions include firm fixed effects. Standard errors reported in parentheses are adjusted for clustering within firms. ** and *** denote significance at the 10%, 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 1986–2010.

itability of purchases in comparison with the control group. For profitability of sales, the trends are not as clear as for purchases which can be explained by the fact that on average the sales are undertaken mainly for liquidity and diversification reasons and on average do not result in significant profitability.

Then, we run the following regression, separately for buy and sell transactions:

$$BHAR_{i,j,t} = \beta_0 + \beta_1 Treated_{j,t} + \beta_2 Post_{j,t} + \beta_3 Treated_{j,i} \times Post_{j,t} + \sum \delta_n Basic\ Controls_{i,j,t}^n + \sum \theta_k Transparency\ and\ Governance\ Controls_{i,j,t}^k + \sum \alpha_m Industry_{i,t}^m + \varepsilon_i \quad (11)$$

$$BHAR_{i,j,t} = \beta_0 + \beta_1 Treated_{j,t} + \beta_2 Post_{j,t} + \beta_3 Treated_{j,i} \times Post_{j,t} + \sum \delta_n Basic\ Controls_{i,j,t}^n + \sum \theta_k Transparency\ and\ Governance\ Controls_{i,j,t}^k + \sum \varphi_s SocioEconomic\ Controls_{i,j,t}^s + \sum \alpha_m Industry_{i,t}^m + \varepsilon_i \quad (12)$$

Treated is an indicator variable equal to one for transactions in firms located in metropolitan areas with reported child abuse, and it is equal to zero for trades in firms in the control group. *Post* equals to one for the period between 2003 and 2005, and it equals to zero for trades in 2001 and 2002, our benchmark pre-scandal period. All other variables are defined as before.

To test our hypothesis, we focus on the coefficient of *Treated* × *Post* (β_3). We expect the coefficient to be positive for purchases indicating higher profits in the treated sample compared to the matched sample after the scandals were revealed, and neg-

ative for sale transactions, indicating avoided higher losses in the treated sample.

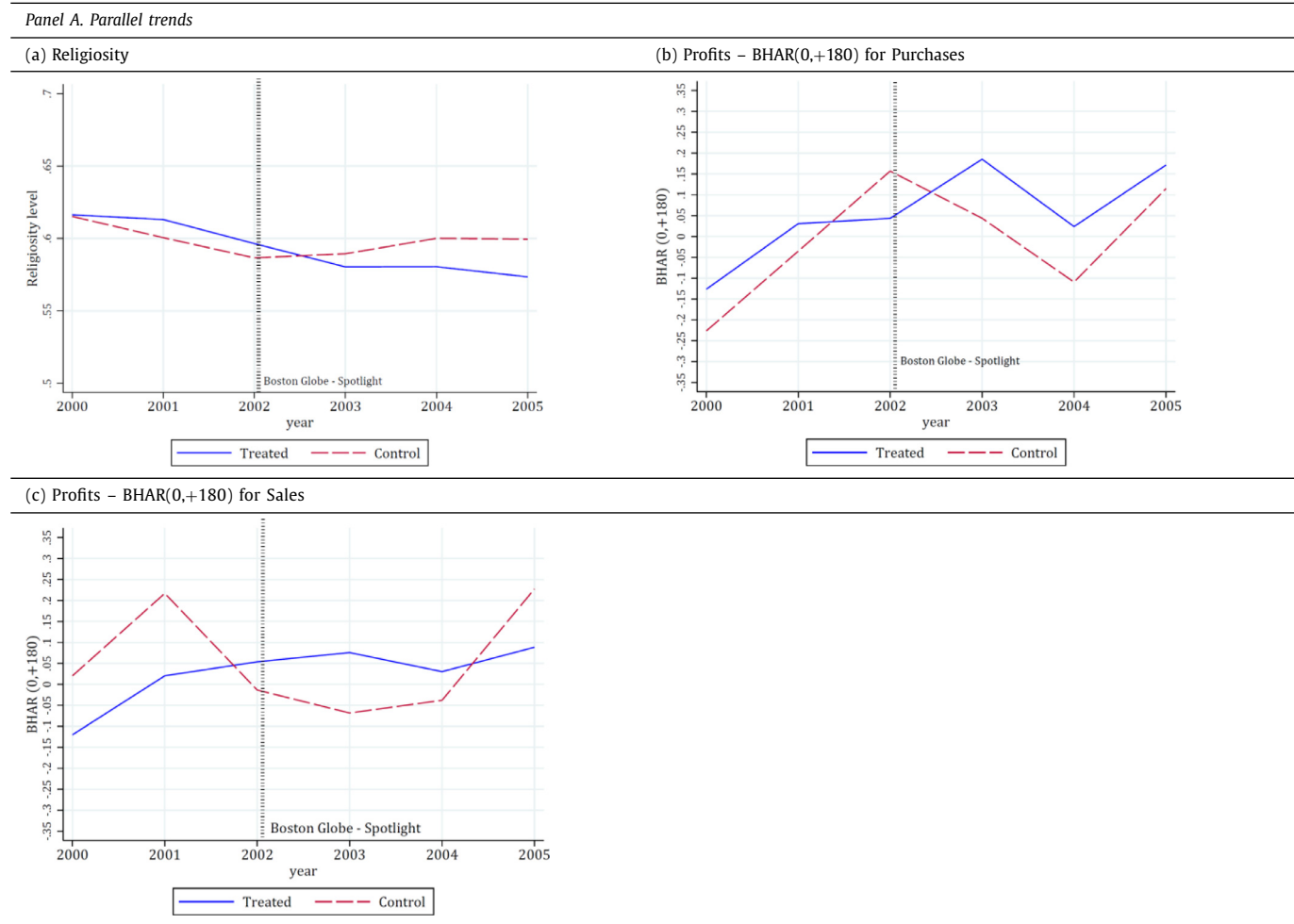
The results of the difference-in-difference regressions are reported in Table 9, Panel B. For purchase transactions the results are in line with our expectations as we observe a statistically significant increase in insider trading profits in the areas affected by the scandals compared to the matched control group, as indicated by positive and significant coefficients of *Treated* × *Post*. There are no statistically significant changes in sales profits after the scandals.

The results of this supplementary analysis should be treated as indicative and are subject to some caveats. A critical assumption of the test is that social norms evolve fast with religious participation which may not be the case. Bontan and Perez-Truglia (2015) show that some pro-social attitudes such as charitable giving changed sharply after the church sex abuse scandals but other attitudes and beliefs did not. Additionally, the tests are done in a small sample. While we make first attempts in the literature to directly identify the causal link between religiosity and economic outcomes, we acknowledge that these results should be treated with some caution.

8. Conclusions

In this paper we are interested to understand if social norms and moral attitudes associated with religiosity in the local area reduce self-interested and opportunistic share trading by corporate insiders. We analyze insider profits and consistent with our prediction we find that they are lower in firms located in more religious metropolitan areas. Corporate insiders obtain private information about their firms, and our results show that in more religious areas they are less likely to use that information to benefit personally

Table 9
Religiosity and Profitability of Insider Trading – Difference-in-Difference.



Panel B. Regression results

Dependent variable: BHAR(0,+180)	Purchases		Sales	
Treated	-0.062 (0.101)	0.055 (0.102)	-0.102 (0.102)	-0.086 (0.108)
Post	-0.073 (0.068)	-0.130 (0.079)	0.145 (0.149)	0.085 (0.131)
Treated × Post	0.159* (0.093)	0.176** (0.085)	-0.083 (0.155)	-0.071 (0.135)
Control variables: basic	Yes	Yes	Yes	Yes
Control variables: corporate governance and disclosure	Yes	Yes	Yes	Yes
Control variables: socioeconomic		Yes		Yes
Year FE	No	No	No	No
Industry FE	Yes	Yes	Yes	Yes
N	1,009	1,009	11,191	13,917
R ²	0.204	0.222	0.198	0.184

This table presents results of difference-in-difference tests. Panel A displays graphs on the average religiosity level, and buy and hold abnormal returns (BHAR) for insider trading, separated by purchases and sales, around the publication of child sex abuse cases in the Catholic church of Boston in *The Boston Globe*. Vertical dashed line represents the publication of the religious scandals in *The Boston Globe*. Solid blue line exhibits the level of religiosity and insider trading abnormal returns for firms located in metropolitan areas within the Catholic Archdiocese of Boston with reported child abuse cases during 2002. Dashed red line displays the level of religiosity and insider trading abnormal returns for the control group, which includes firms located elsewhere matched with the treated group based on the following metrics as of 2001: religiosity level, buy and hold abnormal returns (separately for purchases and sales), market capitalization, book-to-market ratio, past returns, 2-digit SIC code and all sociodemographic variables defined in Appendix A. We use caliper 0.001 to find the closest match. Panel B presents regression results for the difference-in-difference specifications. The dependent variable is the buy-and-hold abnormal return (BHAR) following insider transactions, calculated as the size-and-book-to-market-adjusted buy-and-hold abnormal return over 180 trading days from the date of the trade. *Treated* is a dummy variable equal to one for transactions in firms in metropolitan areas within the Catholic Archdiocese of Boston with reported child sex abuse cases in 2002 or 2003, and it is equal to 0 for trades in the control group. The control group contains trades in firms matched with the treated group on the basis of 2000 and 2001 firm-level characteristics and CBSA characteristics as described above. *Post* is a dummy variable equal to one for trades between 2003 and 2005 and zero for trades in 2001 and 2002. Control variables include $\ln(Mcap)$, *Book-to-Market*, *Past return*, *Trade size*, *CEO* and *CFO* dummies, *Ownership*, *Accruals*, *Amihud*, $\ln(Analysts)$, and CBSA characteristics: $\ln(Population)$, $\ln(Income)$, *Education*, *Minority ratio*, and *Median age*. All variables are defined in Appendix A. The regressions include industry fixed effects based on the 2-digit SIC code classification. Standard errors reported in parentheses are adjusted for clustering within firms. *** and ** denote significance at the 10%, 5% and 1% level, respectively. The sample includes open-market insider transactions in the period 2001–2005.

at the expense of less-informed outside investors. To substantiate our claim, we show that insiders in more religious areas are less likely to trade on foreknowledge of earnings information, and their trades are less likely to be classified as opportunistic. Religiosity is an important source of social norms in community and its effect holds across different levels of disclosure environments and is more pronounced in firms with weaker corporate governance, firms without firm-level voluntary insider trading restrictions and in firms with higher number of co-opted independent directors. We also show evidence that the profitability drops when insiders move from firms located in less to firms located in more religious areas, and the effect of local religiosity is driven by trades in more geographically focused (i.e. local) firms. We also document less insider trading overall in firms headquartered in more religious areas.

Our findings have important implications beyond insider trading. Overall, they shed new light on factors which determine individual financial decision making and managerial behavior. First, they contribute to the social finance literature (Hirshleifer, 2015, 2020) by exploring how the broader social and cultural context affects personal investment decisions. Second, they show that decision by corporate insiders are not driven by purely egoistic reasons, as the traditional agency theory would suggest, but are also

determined by social norms and ethical and moral considerations (e.g. Carlin and Gervais, 2009). Taken together, the new insights we offer help further our understanding of individual behaviors which are likely to translate into other decision domains in financial markets and in corporations.

CRedit authorship contribution statement

Harold Contreras: Conceptualization, Methodology, Data Curation, Formal analysis, Investigation, Visualization, Writing - Review & Editing; **Adriana Korczak:** Conceptualization, Investigation, Methodology, Visualization, Writing - Review & Editing, Supervision and Project administration for the revised drafts; **Piotr Korczak:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft, Supervision and Project administration for the first draft.

Data availability

Data will be made available on request.

Appendix A. Variable definitions

Variable	Definition	Source
Religiosity	Religiosity is calculated for each year as the sum of adherents across all churches and religious groups in the Core Based Statistical Area (CBSA) in which the firm is located, divided by the CBSA's total population	ARDA
BHAR (0; +τ)	Size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR) over 30, 60, 90 and 180 trading days from the date of the trade	CRSP, French's website
Ln(Mcap)	Natural logarithm of the firm's market capitalization (in USD millions) on the transaction day	COMPUSTAT
Book-to-Market	Firm's book value of common equity at the end of the most recent fiscal quarter, divided by its market capitalization on the trading day	COMPUSTAT
Past return	Stock's size-and-book-to-market-adjusted buy-and-hold abnormal return over 90 trading days preceding the transaction day	CRSP, French's website
Trade size	Number of shares traded divided by the number of shares outstanding on the transaction day, and multiplied by 100	Thomson Financial (Insiders)
CEO (CFO)	Dummy variable equals to one if the trade is executed by the CEO (CFO), and zero otherwise	Thomson Financial (Insiders)
Ownership	Institutional Ownership and corresponding to the percentage of shares owned by Institutions in a firm for a given year	Thomson Financial (13-F)
Amihud	Average Amihud liquidity level 180 days prior to the insider transaction date. The Amihud (2002) liquidity measure is computed as the daily ratio of the absolute stock return over the dollar trading volume of the stock	CRSP
Ln(Analysts)	Natural logarithm of the average number of analysts following a firm in a given year	IBES
Accruals	Residuals of the modified-Jones model, which we estimate as a cross-sectional specification by year and two-digit SIC code: $TA_{i,t} = \beta_0 + \beta_1 \left(\frac{1}{Assets_{i,t-1}}\right) + \beta_2 (\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_3 PPE_{i,t} + \varepsilon_{i,t}$ Where TA is Total Accruals calculated as income before extraordinary items minus cash flow from operations divided by total assets. 1/Assets is the inverse of Total assets. ΔREV corresponds to changes in revenues and ΔREC to changes in receivables, and the difference between the two is scaled by Total Assets. PPE corresponds to the amount of Gross Property, Plant and Equipment scaled by Total Assets.	COMPUSTAT
Ln(Population)	Natural logarithm of the total population in the firm's CBSA	U.S. Bureau of Economic Analysis
Ln(Income)	Natural logarithm of the average income per capita in the CBSA	U.S. Bureau of Economic Analysis
Education	Percentage of the CBSA's population with a bachelor's degree or higher	Economic Research Service of the U.S. Department of Agriculture
Minority ratio	Percentage of non-white population in the CBSA	NBER website
Median Age	Median age of the CBSA population	U.S. Bureau of Economic Analysis
Trading Bans (No bans)	Group of firms classified as <i>restricted (unrestricted)</i> according to Lee et al. (2014) methodology. A restricted company is a firm in which the majority of the management transactions (75% of them)	Thomson Financial, COMPUSTAT

	occur 21 days after the publication of earnings (green period to trade). We classify a firm as <i>Ban</i> if it is <i>restricted</i> , and the rest is classified as <i>No Bans</i>	
Co-opted independent	Ratio of co-opted independent directors as in Coles et al. (2014) for a given year. It is calculated as the number of co-opted independent directors scaled by the board size. Co-option is the number of directors (and independent directors) elected after CEO takes office	Coles et al. (2014) .
Movers	Insiders with trades in multiple firms	Thomson Financial (insiders)
Linked	Insiders in firms with economically-linked public customers as in Alldredge and Cicero (2015)	Alldredge and Cicero (2015) .
Dollar profits	Inflation-adjusted dollar value of a trade, expressed in 2010 US dollar, multiplied by the abnormal return over 180 trading days from the date of the trade. Abnormal returns correspond to the Size-and-book-to-market-adjusted buy-and-hold abnormal returns (BHAR).	Thomson Financial (insiders), CRSP, French's website
Prob. (Purchase=1)	Purchase is a dummy variable equal to 1 if insiders in firm <i>i</i> in year <i>t</i> are net buyers, that is the total number of shares bought by the firm's insiders is greater than the total number of shares sold, and the variable is equal to zero otherwise. Zeros also include firm-year observations without any insider trading.	Thomson Financial (insiders)
Opportunistic trading	Dummy variable equals to 1 if a trade is classified as opportunistic, and it is equal to 0 otherwise. Trades are classified as opportunistic following the method proposed by Ali and Hirshleifer (2017) . Insiders are opportunistic if they trade in the period of 20 days before the publication of earnings and their profits are in the top quintile distribution of profits. More details are in Section 5.2	Thomson Financial (insiders), CRSP and COMPUSTAT
Low to High	Dummy variable equals to 1 for a trade made by an insider moving from a firm located in lower religiosity area to a firm located in higher religiosity area. Low religiosity (high religiosity) includes firm-years below (above) the annually calculated sample median of religiosity.	Thomson Financial (insiders)
Local (Dispersed)	Number of states mentioned in the firm's 10-K annual reports filed with the SEC. We use the state count data available from Diego Garcia's website and match this fiscal-year measure of geographic dispersion with insider trades in our sample. Local firms mention 6 or fewer states, and dispersed firms mention more than 6 states in their annual report.	Garcia and Norli (2012)

Appendix B. Fifteen Most and Least Religious Areas and the Largest Company with at Least One Insider Trading

CBSA code	CBSA name, state	Average Religiosity level	Average Population	Company name	Average Market cap (in USD millions)	Cumulated number of insider trades	Cumulated number of purchases	Cumulated number of sales
<i>Panel A. Most religious areas</i>								
39,340	Provo-Orem, UT	0.862	322,003	Novell inc	5148	493	74	419
35,580	New Ulm, MN	0.862	50,621	Hector communications corp	42	12	5	7
14,500	Boulder, CO	0.862	295,120	Crocs inc	2327	1097	14	1083
21,860	Fairmont, MN	0.860	50,621	Weigh tronix inc	43	22	7	15
30,860	Logan, UT-ID	0.860	94,982	Electrostar inc	81	2	2	-
26,780	Hutchinson, MN	0.856	50,621	Hutchinson technology inc	373	521	70	451
37,420	Pampa, TX	0.850	50,621	Service fracturing co	23	33	6	27
39,860	Red Wing, MN	0.811	50,621	Interfund corp	9	2	2	-
27,780	Johnstown, PA	0.800	155,226	Promistar financial corp	263	171	163	8
31,820	Manitowoc, WI	0.794	81,164	Manitowoc co inc	1662	270	54	216
11,540	Appleton, WI	0.790	212,694	School specialty inc	556	70	23	47
16,260	Cedar City, UT	0.782	50,621	American pacific corp	92	252	122	130
29,180	Lafayette, LA	0.780	447,460	Bois d arc energy inc	1233	77	-	77
36,260	Ogden-Clearfield, UT	0.779	496,382	Computerized thermal imaging inc	247	2	-	2
34,420	Mount Pleasant, TX	0.772	50,621	Guaranty bancshares inc tx	38	15	9	6
<i>Panel B. Least religious areas</i>								
36,500	Olympia-Lacey-Tumwater, WA	0.277	211,398	Illuminet holdings inc	894	49	2	47
27,060	Ithaca, NY	0.276	99,683	Tompkins financial corp	364	271	59	212
39,020	Portsmouth, OH	0.275	81,330	Retailing corp of america	16	4	4	-
46,020	Truckee-Grass Valley, CA	0.271	89,426	Sierrawest bancorp	72	55	9	46
24,060	Glenwood Springs, CO	0.262	50,621	Aspen bancshares inc	57	7	2	5
39,900	Reno, NV	0.261	351,188	Pdl biopharma inc	1835	1290	36	1254

CBSA code	CBSA name, state	Average Religiosity level	Average Population	Company name	Average Market cap (in USD millions)	Cumulated number of insider trades	Cumulated number of purchases	Cumulated number of sales
36,020	Oak Harbor, WA	0.259	79,952	Washington banking co	117	131	86	45
13,460	Bend, OR	0.256	130,703	Advanced power technology inc	86	28	14	14
21,660	Eugene-Springfield, OR	0.253	331,284	Pw eagle inc	238	420	71	349
39,820	Redding, CA	0.251	178,382	Bank of commerce holdings	76	49	39	10
23,820	Gardnerville Ranchos, NV	0.250	50,621	Virnetx holding corp	575	6	-	6
41,760	Sandpoint, ID	0.248	50,621	Coldwater creek inc	1293	1449	293	1156
18,300	Coos Bay, OR	0.248	62,499	Independent financial network inc	24	8	7	1
11,900	Athens, OH	0.242	63,152	Rocky brands inc	74	90	76	14
19,740	Denver-Aurora-Lakewood, CO	0.239	2060,090	Mediaone group inc	44,780	5	4	1

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