Piety, Politics, and Portfolio Selection

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Abstract

We examine the impact of piety, a psychological trait that can influence economic behavior, on investor and corporate decision-making and performance. Turkey's dominant religion is Islam, but investors and corporations present varying degrees of religiosity. Across 25,000 individual investors, we measure religiosity by choice of brokerage house, extent of holdings in an index of religiously-compliant firms, and voting patterns in the investor's place of residence. Across almost 500 corporations listed on the Istanbul stock exchange, we measure piety with inclusion in religiously-compliant indexes, managerial membership of executive clubs (one secular, the other religious), or use of Islamic financial instruments. We characterize associations between investor religiosity and behavioral biases, associations between corporate religious and political positioning and performance, and the motivation and consequences of changes in corporate positioning.

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1. Introduction

Exploring investor behavior is increasingly important in the finance literature. Even though conventional finance theory assumes that people act rationally, numerous experiments and empirical studies document biases in investor decisions. The biases uncovered in these studies are driven by psychological and belief-based factors. In particular, some studies demonstrate that certain religious attitudes have a substantial impact on economic decision-making.

This paper studies the relationship between religious leanings and financial decisions of investors and the corporations they invest in. Using the unique economic, cultural, and political setting of the Republic of Turkey, we focus on "Islamic" investors among individuals participating in the Istanbul stock market. These investors are interesting for a number of reasons. In the last decade, financial institutions and products that operate by Islamic principles have become increasingly popular.[1] In the wake of the global financial crisis, there is growing interest in Islamic financial institutions and products because their structure is believed to reduce default risk arising from weak economic conditions. At the same time, Islamic finance principles can impose constraints on investors and financial institutions. They can forbid interest-bearing bank accounts, conventional bonds, and ownership of shares in banks, which are often among the most liquid in developing economies. Thus, Islamic investors can be disadvantaged since they access fewer investment products than conventional investors.

Turkey is an interesting setting for a study of investor behavior. Attitudes toward religion as well as political orientation are likely to exert more influence on portfolio decisions than in typical developed countries. When the Justice and Development Party (Adalet ve Kalkınma Partisi, abbreviated "AKP") came to power with the general election of 3rd November 2002, socially conservative people, who were historically excluded from many aspects of public activity, gained a stronger foothold in politics, economics, and finance. AKP has emphasized the conservative, religious values of its supporters, exacerbating the polarization of Turkish society

[1] For example, Standard & Poor's Rating Services "Islamic Finance Outlook 2015" reports over half a trillion dollars in Sharia-compliant "sukuk" bond issues from 2002 to 2013. For 2012, the World Bank estimates between one and one-and-a-half billion dollars in Islamic banking assets worldwide (http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTGLOBALFINREPORT/0,,contentMDK:23492074~pagePK:64168182~piPK:64168060~theSitePK:8816097,00.html). A handful of Islamic finance courses of study have been developed at universities in western countries. See, for example, http://www.masterstudies.com/MSc-Islamic-Finance/UK/DUBS/.

in recent years. This was compounded by the policy record of its main competitor, the Republican People's Party (Cumhuriyet Halk Partisi, abbreviated "CHP"), which historically excluded the socially conservative. The divide between the supporters of these two parties correlates with the country's geography. Figure 1 shows voting patterns in 2011, with CHP votes concentrated around Istanbul and nearby coastal areas while AKP predominates in more conservative Anatolia.

Thus, the Turkish population divides on observable religious, political, and geographic characteristics. Furthermore, the extent of these divisions can vary as the political power of the AKP has varied across recent elections. We hypothesize that both the psychological and social effects of religion influence individual investor decision making. We also predict that firms rearrange their alignment with political forces over time. With data from the Turkish stock market (Borsa Istanbul), we can measure differences in the investment decisions and performance of Islamic and conventional investors. Thus, we can study the impact of piety, an important facet of psychology, on decision making. We can also study differences in apparent piety across the listed companies that Turkish investors choose from, and differences in performance and other operating characteristics of those companies. When combined with our understanding of Islamic and conventional portfolio selection, we can assess the costs of following Islamic investing principles and detect any clientele effects or catering by the listed companies. We also examine the effect of the social and political environment in Turkey on individual investors and corporations with event studies of decisive moments in the country's recent history. Aside from our primary goal of detecting behavioral biases related to religiosity in a novel setting, our work sheds light on the workings of Islamic finance and the costs and benefits of portfolio strategies such as so-called socially responsible investing.[2]

2. Literature review and empirical predictions

The interplay between economic decision making and characteristics like religiosity and political attitudes activity has been investigated in the economics and finance literatures from several aspects. Guiso, Sapienza, and Zingales (2006) report that religiosity is associated with good economic outcomes (higher GDP per capita and growth) but is also correlated with lower

[2] See, for example, Teoh, Welch, and Wazzan (1999).

participation in the workforce by women. Stulz and Williamson (2003) report associations between religion and the legal rights of financial claimants. In particular, the predominant religion in a country is correlated with the nature and enforcement of creditor rights. Grinblatt and Keloharju (2001) document how language and culture influence the investment choices of individual investors in Finland, where individuals and corporate managers can be classified on their Finnish or Swedish language and culture. In contrast, Bhattacharya and Groznik (2008) find few associations between portfolio investment choices and the national origins of US immigrants. Morse and Shive (2011) find that patriotic sentiments are correlated with home bias in portfolios. Hong and Kostovetsky (2012) find that the extent to which mutual fund managers select socially responsible stocks is related to political preferences as expressed by political donations.

There are only a few papers that consider how religion can influence the decisions of individual investors. Renneboog and Spaenjers (2012) show that religious households consider themselves more trusting, have a longer planning horizon, and have a higher propensity to save. Using an experimental survey from Germany, Noussair, Trautmann, van de Kuilen, and Vellekoop (2012) show that risk aversion of individuals increases with their degree of religiosity. These findings suggest that religion restrains risk-taking behavior. However, Kumar, Page, and Spalt (2011) find that the use of lotteries and investment in risky "lottery-type" stocks varies with religious characteristics of US states. Furthermore, Iannaccone (1998) reports that individuals with more education exhibit less religiosity. If education in general correlates with financial sophistication, it can subsume the apparently positive effect of religiosity on financial decision-making.

We can also imagine reasons why religiosity can adversely affect investment performance. First, religious investors tend to avoid "sin stocks", which can prevent them from maximizing return (Hong and Kacperczyk, 2009). Second, as Peifer (2013) asserts, religion can stimulate investor loyalty and increase willingness to hold a religiously-acceptable investment in spite of its poor performance.

Given the goals of our work and the literature, we offer several predictions regarding what the data might reveal. We begin with a simple null hypothesis:

> H0: There are no measurable differences in the behavior or performance of Islamic versus conventional investors.

Next, we expect to find higher risk-aversion among religious investors:[3]

> H1: Religious investors exhibit higher risk aversion in their trading behavior than conventional investors.

A classic association between piety and risk-aversion is known as "Pascal's wager" after the seventeenth century French philosopher who devised it. The idea is that the expected benefit from believing in a religion surpasses any harm since belief insures against eternal punishment in case God exists. More generally, religion can reflect a risk management strategy with which religious people find refuge from the uncertainties of life (Miller and Hoffman, 1995). Holloway (1979) shows that risk-averse people tend to use more traditional methods for dealing with uncertainty whereas risk takers seek more innovative methods. Thus, religion can be a traditional method for dealing with uncertainty, at least for the majority of its adherents. We also expect such risk-averse behavior in the investment decisions of religious people.

A second, related hypothesis predicts "loyalty" in the stock holdings of religious investors relative to other investors:

> H2: Religious investors display lower turnover of their stock holdings, particularly for stocks of apparently religious companies.

A religious investor can be more optimistic about the prospects of apparently religious firms, underestimate its downside potential, and retain a position for a relatively long time. A religious investor can finance an apparently pious company even if it may not be economically advantageous. Given the presumed correlation between conservativeness and piety, we similarly predict that religious investors display more local bias (Grinblatt and Keloharju, 2001), prefer high dividend yield stocks (Graham and Kumar, 2006), avoid lottery-type stocks (Kumar, 2009), and display other biases that are consistent with a cautious or conservative style of decision-making.

[3] See Noussair, Trautmann, van de Kuilen, and Vellekoope (2012) for experimental work.

We also offer competing predictions about associations between religiosity and individual investor performance:

H3a: Religious investors display enhanced risk-adjusted performance relative to conventional investors because their conservative investment strategies avoid overconfidence and other aggressive and suboptimal investing styles.

H3b: Religious investors experience inferior risk-adjusted performance because they limit the range of securities that are acceptable for their portfolios and take overly cautious decisions.

Related to aggressive versus cautious investment styles, we also have a specific prediction about the extent to which different types of investors trade in what Kumar (2009) describes as "lottery-type stocks:

H4: Religious investors avoid lottery-type stocks, and this contributes positively to their portfolio performance.

Since gambling is prohibited in Islam, some among the pious will avoid gambling or investment vehicles that, in effect, emulate gambling. Thus, we predict less participation into lottery-type stocks among pious investors and less gambling-related portfolio underperformance. We detail below how we identify lottery-type stocks and characterize the extent to which a particular sample investor deals in them. These competing performance hypotheses parallel some established but conflicting facts in the empirical behavioral finance literature. Odean (1999) and Barber and Odean (2000) present evidence that aggressive trading strategies typically result in underperformance. On the other hand, Bailey, Kumar, and Ng (2011) find that some conservative uses of mutual funds by older or local-biased investors can underperform.

We also offer competing predictions concerning the performance and behavior of Turkish corporations based on their apparent religiosity:

H5a: Corporations that score high on religiosity enjoy superior valuation and performance as they are managed carefully.

H5b: Corporations that score high on religiosity experience relatively weak valuation and performance since they cannot take full advantage of all investing and financing options.

Paralleling the individual investor literature, we can imagine that conservative values can either enhance or detract from corporate performance.

Finally, we consider how corporations respond to the characteristics of their investor clientele:

H6: Corporations abuse the trust of religious investors by feigning religiosity and managing corporate assets and policies against the interests of outside shareholders.

H6 hypothesizes a link between the religiosity of individual investors, their investment choices, and the choices and performances of listed companies.

3. Experimental design

3.1 Data sources

The key to our experiment is individual investor data recorded and stored by the Central Securities Depository Institution (MKK) of Borsa Istanbul, Turkey's stock market. A random sample of approximately twenty-five thousand individual investors trading in the stock market includes daily trades from 2008 to 2012 plus other investor characteristics. Specifically, we have daily trades and positions from 2008 through 2012 for 24,993 individual investors buying, selling, or holding shares of 417 Turkish firms listed on Borsa Istanbul. The stock exchange data also includes individual investor characteristics data such as age, gender, and city of residence. Stock price information on the listed firms comes from Datastream, or if unavailable, from Bloomberg. Furthermore, information on bank loan, bond, and equity financing of listed firms comes from Dealscan, Thomson One, and SDC. The bank loan and bond data allow us to characterize one dimension of the "Islamic-ness" of listed companies because each debt instrument's data includes descriptive fields to suggest whether the style of the financing is

conventional or Islamic. Other sources that we detail later are used to characterize other dimensions of corporate decision-making, performance, and religious and political positioning. Additional sources such as voting records are used to categorize each individual investor as "Islamic" or "conventional" using several alternative schemes.

3.2 Construction of investor and corporate characteristics

Disposition effect is defined as an investor's relative willingness to sell winners rather than losers (Shefrin and Statman, 1985; Odean. 1998). A winning stock is one whose current price is higher than its purchase price. Similarly, a losing stock is one whose price is lower than its purchase price. Simply looking for the number of winning stocks the investor sells will not give us a reliable estimate of disposition effect if, for example, the stock market is in an upward trend. Therefore, we need to check the frequency with which an investor sells winners and losers relative to her opportunity to sell each. This leads us to the concept of paper gains and losses versus realized gains and losses (Odean, 1998). We observe a paper gain if a stock appreciates but an investor does not pocket the gain by selling the stock. In contrast, a realized gain occurs when the stock appreciates and an investor sells the stock. Similar definitions apply for paper and realized losses.

We define the Proportion of Gains Realized (PGR) as realized gains divided by the sum of realized gains and paper gains. Similarly, the Proportion of Losses Realized (PLR) equals realized losses divided by the sum of realized losses and paper losses. PGR measures the propensity to realize a profit opportunity that arises while PLR measures the propensity to realize a loss. We then define the disposition effect as PGR minus PLR. Odean (1998) notes that, to compute the disposition effect, we can compare the current price to the average purchase price, the highest purchase price, the first purchase price, or the most recent purchase price. We use the most recent purchase price.

Narrow framing is defined as an investor's inability to frame her investment decisions broadly. It is shown in the psychology literature that people tend to consider each decision unique, often isolating the current choice from their other choices (Kahneman and Lovallo, 1993; Kahneman 2003). In financial investing, this corresponds to an investor making decisions separately from each other, thus ignoring the portfolio context. We measure narrow framing with the lack of trade clustering (Kumar and Lim 2008). Put another way, the more clustered in time

an investor's trades are, the more likely the investor thinks about the interaction between trades and her existing portfolio and hence the less narrowly framed are her trades. Trade clustering (TC) equals one minus the ratio of the number of days an investor trades stock to the number of stock trades. For example, if an investor makes only a single trade every trading day, the number of trades equals the number of trading days and the trade clustering measure is zero, indicating this investor displays severe narrow framing. If another investor makes ten trades in different stocks every trading day, this second investor's trade clustering measure is 0.9, indicating much lower narrow framing. As this investor makes multiple trades on different stocks every day, she presumably better calculates the interaction between her trades and her other holdings.

Overconfidence. Overconfident investors overestimate the precision of their knowledge about the value of a security (Odean, 1998). Barber and Odean (2001) find that investors who trade frequently typically display poor performance. We follow Bailey, Kumar, and Ng (2011) and define overconfident investors as those with the most frequent trading and the worst performance. In particular, an investor in the first quintile of trading frequency and the last quintile of return performance is categorized as overconfident.

Gender. A number of papers have shown that men are more overconfident than women especially in stereotypically masculine domains such as knowledge of sports figures and politics (Deaux and Emswiller, 1974; Beyer and Bowden, 1997). A test of gender and overconfidence in investment decisions has been carried out by Barber and Odean (2001). Therefore, we use gender as an explanatory variable in our tests.

Lottery stock preference. Kumar (2009) shows that the investment decisions of some people resemble their lottery purchases. Furthermore, he describes socioeconomic factors that induce both greater expenditure on lotteries and greater investment in lottery-type stocks. Kumar (2009) identifies lottery-type stocks based on three characteristics. First, lottery tickets can be bought quite cheaply so lottery-type stocks should have low nominal prices. Second, lottery holders hit the jackpot with a miniscule probability, so lottery-type stocks should have outsized returns with a very low probability. Stocks with a history of a few large positive return outliers will display high idiosyncratic skewness. Third, a lottery-type stock should have high idiosyncratic volatility. A stock that has yielded a very large return in the past but that normally has little variation in returns might appear to investors as unlikely to repeat its past bounty. For its large returns in the past to appear replicable to investors, it should have high idiosyncratic

volatility. Following Kumar (2009), we define idiosyncratic volatility as the standard deviation of the residual from a Fama-French four-factor model implemented with market, SMB, HML, and WML factors local to Borsa Istanbul. Idiosyncratic skewness is defined as the skewness of the residual obtained by fitting a two-factor model with market return and squared market return terms. At the end of month t, both idiosyncratic volatility and skewness are computed using the previous 6 months of daily data. A lottery-type stock has below median price and above median idiosyncratic volatility and idiosyncratic skewness in a given month. Lottery-stock preference is then a measure of an investor's appetite for lottery-type stocks in her aggregate holdings. Specifically, we compute the ratio of the value of lottery-type stocks in an investor's portfolio to the value of the entire portfolio at the end of a given month. We then set lottery-stock preference for a given investor to the median of that ratio over all months that the investor is in the sample.

Local bias. Previous authors show that some investors tend to invest in companies that are geographically close to them, perhaps due to familiarity or an informational advantage. For each investor and month, we identify whether each company in the investor's portfolio is headquartered in the city of residence of the investor. We then compute the monthly ratio of the number of locally-headquartered companies the investor holds to the total number of companies. We then define the investor's local bias as the mean of this ratio over the investment period for each investor to find the investor's local bias. For a robustness check, we exclude the city of Istanbul from local bias calculations as more than half the companies in Borsa Istanbul are headquartered there. These companies usually have operations nationwide so investors in these companies may be less locally-minded.

Individual investor religiosity. To label an individual investor as "Islamic" or "conventional", we use three alternative approaches. First, we have proprietary data on individual investor codes that indicate whether each transaction is executed through an Islamic-oriented brokerage house. Since "participation" (that is, Islamic) banks use this broker exclusively and other banks avoid it, one measure of whether an investor can be thought of as Islamic is a dummy variable set to one for investors who use this particular brokerage house and zero otherwise. Second, we make use of the Katilim (Participation) 50 index and measure the extent to which each investor holds index component stocks. The Katilim index consists of listed

Turkish firms that are deemed compliant with Islamic ways of doing commerce.[4] For one categorization, we label an investor Islamic if every trade of that investor is in a firm on the Katilim 50 index. As an alternative categorization, we label an investor Islamic if his average percent holding of Katilim 50 components is more than two standard deviations above the average for all investors. For a sense of the popularity of Katilim 50 index stocks among our sample investors, the mean (median) percentage of Katilim 50 index stock holdings to total holdings is 14.6% (2.9%) with a standard deviation of 23.6%. For this draft of the paper, we take a snapshot of the index in the first quarter of 2012.

Third, we infer the likely political leanings of each investor using the city-level vote share for the ruling conservative AKP (Justice and Development Party) in the 2011 general election. Political preference is a good proxy for piety in Turkey. AKP has always branded itself as conservative, where in the context of Turkey, conservatism is usually defined in social-religious terms. For example, the party has fought to permit the wearing of headscarves by women, an Islamic symbol, in universities during a 2008 action in Turkey's Constitutional Court.

Using records of general election votes, we sort cities based on their vote share for AKP. We compute two categorizations. Our first scheme labels an investor religious if she is from a city that has a higher percentage vote for AKP than Istanbul.[5] Our second scheme labels an investor as religious if she lives in a city which has a higher percentage AKP vote share than the 90th percentile city, Ordu. A secular investor then lives in a city with a lower percentage AKP vote share than the 10th percentile city, Izmir. Unfortunately, this political leaning approach cannot capture differences in piety within cities.

Corporate religiosity. To label a listed corporation as "Islamic" or "conventional", we use several alternative approaches. First, we study each listed firm's balance sheet for evidence that the firm employs any Islamic bank loans or bond issues. Sources of this data are the descriptions in SDC, Thomson One, and Dealscan. We find eleven publicly listed firms that use

[4] See the Appendix for details of the Katilim index.

[5] Istanbul is not the median city in terms of AKP vote share but it is close: 36 cities have lower AKP vote shares and 44 cities have higher AKP vote shares. Furthermore, there are so many investors from Istanbul that, when investors are sorted by their city's AKP vote share, Istanbul's AKP vote share becomes the median.

Islamic financing and construct a dummy variable to capture this characteristic.[6] In this draft of the paper, we employ a simple dummy variable which is set to one if there is any Islamic style finance among the securities and bank loans on the liability side of the firm's balance sheet. In subsequent drafts, we will also take an event study approach, with the event being the first appearance of any sort of Islamic style financing on a firm's balance sheet. If there are sufficient numbers of firms that use Islamic finance and sufficient cross sectional variability in the extent of that use, we can also measure the fraction of the book value of liabilities that is Islamic for a measure of "dosage" rather than "treatment".

Second, we categorize each listed corporation based on the social connections of its CEO. Specifically, there are two competing clubs for top corporate managers in Turkey. The Turkish Industrialists' and Businessmen's Association (TUSIAD) is traditionally aligned with secular thought and politicians while the Independent Industrialists' and Businessmen's Association (MUSIAD) is associated with conservative views and the AKP. In future drafts, we will also compute additional alternative measures of corporate religiosity and political affiliation including: headquarters in Anatolia rather than Istanbul, inclusion in the Katilim index, extent of government contracts, and board members from government or military officials. We are in the process of collecting available records on manager membership in such clubs and will use this data for an additional classification of firms in the next draft.[7]

Third, for those tests in which individual investors are not classified according to their holdings of Katilim 50 component stocks, we categorize listed companies as Katilim 50 components or others, where membership to the Katilim index acts as a proxy for corporate religiosity. Given that the composition of the Katilim index is revised every six months, we can measure the extent to which investors respond to changes in inclusion in the index. We are in

[6] Two are Islamic banks, Bank Asya and Albaraka Turk. The other two Islamic banks in Turkey are privately owned. There are three non-financial institutions: Boyner (surprising because chairman, Cem Boyner, is an outspoken critic of AKP leader Erdogan), Ulker (expected, as the founding family is regarded as conservative), and Turkcell (a large telecoms firm not regarded as conservative). There are also six non-Islamic financial institutions: Is REIT, Is Leasing (considered secular because it was founded by Ataturk and the secular opposition party, CHP, has a large stake), TSKB (oldest Turkish development bank), Finans Leasing (part of Finans Bank founded by a secular banker), and Yapi Kredi Bank (owned by the Koc Family and Italian investors).

[7] TUSIAD lists its entire membership in its annual report (http://www.tusiad.org.tr/bilgi-merkezi/tusiad-faaliyet-raporlari/) and we intend to collect this information for all years in our sample where possible. We have not yet found a comparable source of membership for MUSIAD.

the process of compiling data on the composition of this index and will use this for an additional classification of firms in the next draft. Finally, we will apply well-established Islamic screening rules to go beyond the large-cap components of the Katilim index and identify all Islamic firms, and changes in their Islamic status, among companies listed in Istanbul.

3.3. Empirical specifications

We employ our data with fairly standard tests based on summary statistics or regressions. For some experiments, we will conduct event studies around firm specific, political, and macroeconomic events. As stated above, we will study the first use of Islamic style financing or the change in CEO political leaning as signaled by membership in one of the executive clubs. We will also examine the timing, frequency, and performance of initial public offerings of pious versus secular corporations.

Furthermore, while we view much of our work as exploratory and descriptive, it will be useful for us to state and implement a more formal identification strategy. Therefore, some of our tests we will be centered on events which can support difference-in-difference analysis or other approaches to defining an identification strategy. These events should have implications for the strength of our empirical predictions yet should be exogenous, that is, should not have been designed to manipulate the individual investor and corporate decisions and characteristics that we study.

We have tentatively identified a number of such events for further consideration and possible use in difference-in-difference analysis for further identification of our predictions. Major earthquakes that occurred during our sample period include a 6.1 magnitude event in Elâzığ Province on 8 March 2010, a 5.8 magnitude event in Kütahya Province on 19 March 2011, and a 7.2 magnitude event in Van Province on 23 October 2011. As natural disasters, these events are truly exogenous to our experiment but can affect the portfolio decisions of investors and the characteristics of corporations in the affected region. Political events that strengthen or weaken the appeal of the AKP for voters, investors, and corporations can affect the strength of the relationships outlined in our testable hypotheses. For example, the Gezi Park protests (27 May 2013), and the onset of corruption allegations against key AKP figures (13 December 2013) reduced the credibility and likely tenure of the AKP government. The AKP electoral victory of 12 June 2011 and resignation of key military leaders on 29 July 2011 increased the credibility

and likely tenure of the AKP government. Finally, events in nearby countries can cause Turkish investors and corporations to re-evaluate the effectiveness, desirability, and likely tenure of the conservative AKP government. For example, the resignation of Tunisia's president on 14 January 2011 and the election of a moderate Islamist government on 23 October 2011 validate the effectiveness of the AKP's democratic and moderately Islamist model.

4. Preliminary results

The majority of our investors are male (75.8%). The average age of investors is 46.0. The average female investor is about 2 years older than the average male investor. The mean (median) daily return of investors is 0.02607% (0.04429%) with a standard deviation of 0.16814%. The annualized values for the mean (median) are roughly 6.52% (11.07%).

Table 1 displays correlations between each pair of behavioral bias proxies. In each cell of the table, the top number is the correlation coefficient and the bottom number is the p-value. All six proxies and age are typically significantly pairwise correlated with each other. For example, echoing earlier work in the behavioral finance literature, the gender dummy (indicating a male investor) is significantly correlated with the overconfidence dummy. Interestingly, with age, investors tend to become less prone to behavioral biases except narrow framing and local bias.

Next, we summarize the bias proxies for Islamic and conventional investors separately. Table 2 categorizes investors as Islamic or conventional based on use of an account at an Islamic-oriented brokerage house. Comparing the type categories of investors, we see that overconfidence, disposition effect, narrow framing, and lottery-stock preference are lower for Islamic investors whereas local bias is higher. Differences in overconfidence and narrow framing across the two types are quite strong and statistically significant at the 1% level while the difference for disposition effect is only marginally significant. Differences in lottery-stock preference and local bias are not statistically significant. There is a significantly higher proportion of male investors among those categorized as Islamic. Islamic investors are about 1.5 years younger on average than others, and this difference is strongly statistically significant. Although daily portfolio returns of Islamic investors are about one basis point per month higher than those of other investors, the difference is not statistically significant. For both categories of investors, daily portfolio returns are significantly positive.

Tables 3 and 4 report similar summary statistics in which investors are classified based on their holdings of Katilim 50 index component stocks. In Table 3, an investor is classified as Islamic if her entire holdings are composed solely of Katilim 50 index component stocks. In Table 4, an investor is classified as Islamic if her percent Katilim 50 index component stock holdings are 2 standard deviations or more above the sample average.

In Table 3, the number of investors classified as Islamic is very low and, among those 480, only 116 have enough data to compute the disposition effect bias. Beyond the limitations on observing the disposition effect, other differences between Islamic and other investors are highly statistically significant. The signs of relationships are the same as in Table 2 except for narrow framing: Islamic investors now have higher narrow framing. This can be explained by the identification of these investors who only deal with the fifty Katilim index component stocks. This relatively small number of stocks may allow these investors to follow each individually, but at the cost of portfolio diversification.

There are a number of contrasts between the findings of Table 3 and what was previously reported in Table 2. Interestingly, the investors who follow the "Katilim 50 only" strategy are proportionally more female, and about four years older, than other investors. Furthermore, there is now a statistically significant difference in average daily portfolio returns across the two investor groups. The "Katilim 50 only" investors underperform relative to other investors, and their returns are not statistically different from zero. With the Islamic investor category defined less restrictively, Table 4, portfolio returns across the two groups are positive and not statistically different.

Table 5 reports similar tests for which Islamic versus conventional is identified using city-level AKP vote shares. We first briefly summarize city-level vote shares. Across 81 cities, AKP wins, on average, slightly more than half the votes, 50.85%. This is a large number given that Turkish politics are not dominated by only two major parties. However, there is a good deal of dispersion in AKP voting share across cities, with a standard deviation of 13.19%, a minimum of only 15.75%, and a maximum of 69.63%. This sizeable variation in AKP vote share across cities suggests substantial differences in political leaning and piety across cities.

As explained previously, Table 5 uses two classification schemes, one based on cities above versus below median city-level AKP vote share and another comparing top decile AKP voting share cities to bottom decile cities. Both schemes find statistically significant differences

in Islamic and other investors in the gender dummy, local bias, and age characteristics. Cities with higher AKP vote share have a proportionally more male investor base. Similar to the previous two categorizations, Islamic investors display higher local bias. Put another way, in cities that vote heavily for AKP, investors typically favor the local firms more than other investors do. Similar to the brokerage house categorization, Islamic investors are typically a few years younger than other investors. It may be the case that stock market participation is a relatively recent phenomenon among religious people, with early adopters being a bit younger.

Next, we examine monthly portfolio performance of Islamic versus conventional investors in greater detail with cross sectional averages of raw returns, Sharpe ratios, single factor alpha, and Fama-French 4-factor alpha. Both alphas are computed with local stock market factors. In Table 6, "conventional" investors are defined as those that are not classified as Islamic by any of our three categorization schemes. There do not appear to be a consistent systematic difference between the mean raw monthly portfolio returns of Islamic and conventional investors. Although the performance of Islamic investors identified through holdings of Katilim index components seems relatively low, the performance of Islamic investors identified using the other two characterization schemes is statistically indistinguishable from the performance of conventional investors. These findings suggest that the performance of Katilim component stocks is relatively weak, an issue we will address later in the paper in the context of testable prediction H6.

Table 6 presents similar findings for performance measured with Sharpe ratios and alphas. Interestingly, the average Sharpe ratio of Katilim Index investors is not only lower than that of conventional investors but it is also negative, indicating poor performance in an absolute sense. However, monthly alphas suggest that the performance of Katilim Index focused investors is not distinguishable from that of Islamic investors identified by other characterization schemes. This suggests that Katilim stocks have relatively low loadings on market wide systematic risk factors. Put another way, Katilim component stocks may be less risky in several dimensions. Nonetheless, Islamic investors identified by brokerage house display the lowest alphas from both one- and four-factor models. Intriguingly, four-factor alphas of every investor group, Islamic and conventional, are negative. This suggests that Turkish retail investors are typically unable to assess systematic risk versus return regardless of their degree of piety.

Next, we assess the effect of piety on each behavioral bias while simultaneously accounting for controls such as investor age, gender, city of residence, wealth, and stock market experience. Our proxy for investor wealth is median total portfolio value over the sample period. Our proxy for stock market experience is the number of days from opening a brokerage account until the beginning of 2008, the start of our sample trading period. In Tables 7 through 11, each column corresponds to one of our three proxies for piety.

Table 7 studies individual investor disposition effect and is strongly consistent with earlier findings that pious investors are less prone to display the disposition effect. Age and stock market experience also strongly dampen the disposition effect while wealth does not seem to have much of an effect. Male investors are typically more prone to display this particular bias.[8]

Table 8 studies overconfidence and confirms that pious investors are typically less overconfident. As with disposition effect, age and stock market experience attenuate overconfidence. Men are more overconfident than women, supporting Barber and Odean (2001) and confirming their results for the Turkish stock market. Wealthier investors seem less affected by overconfidence.

Table 9 studies narrow framing. It reports no clear association between narrow framing and piety. The brokerage house measure of piety indicates a positive correlation while Katilim index holdings indicate negative correlation. The positive coefficient under the brokerage piety proxy means that Islamic investors have higher trade clustering, that is, they tend to take into account the diversification effect of their trades and cluster them, suggesting lower narrow framing. The strength of the coefficient under the Katilim component criterion suggests that Islamic investors focus individually on the small number of Katilim component stocks so their trades are more stock-specific and less clustered. Age appears to aggravate the symptoms of narrow framing while wealth and stock market experience reduce narrow framing. Men appear less prone to narrow framing bias.

Table 10 studies lottery-stock preference. The sign of the association with piety varies with the piety measure. Specifically, it is positive with AKP vote share, suggesting that the proportion of lottery-type stocks in an investor's portfolio is larger in areas where the religious conservative party is particularly popular. It is possible that this reflects heterogeneity in the

[8] Note that city dummies are not included in regressions where the piety proxy is the AKP vote share since such dummies would subsume a city-based measure of piety by construction.

population of Islamic investors if, for example, Islamic investors from Anatolia (captured by the AKP vote share proxy) like gambling in the stock market, while those from Istanbul (ignored by the AKP vote share proxy) avoid gambling behavior even in the stock market. However, the sign of the relationship between piety and lottery stock preference reverses for other categorizations of investors. Age and stock market experience are found to reduce investment in lottery-type stocks, while men have a tendency to overinvest in such stocks.

Table 11 studies local bias. Panel A includes all investors while Panel B excludes investors from Istanbul (the residence of most of our sample of investors) for a robustness check. Furthermore, as suggested earlier, firms headquartered in Istanbul often operate nationwide and may not be perceived as local in Istanbul or anywhere. Both panels of Table 11 indicate a positive relationship between piety and local bias. The relationship is particularly strong for the AKP vote share piety proxy, which implies that pious investors from Anatolia have even higher local bias. Older investors also display relatively more local bias while more experienced investors are more likely to diversify geographically.

The final section of this preliminary draft compares secular and apparently religious firms. We characterize a firm as apparently religious if the firm has either raised Islamic financing or the firm is domiciled in a city that has an AKP voting share higher than Istanbul in the 2011 legislative elections.

Table 12 summarizes differences in corporate characteristics measures across secular and Islamic firm-months. We classify a firm-month as Islamic if the firm in question has any Islamic loans or bonds outstanding in that month. The sample period is 2008 through 2012 to match our data on individual investor brokerage accounts. Secular and Islamic firms seem to differ on every corporate characteristic examined. Firms raising Islamic-style finance are typically larger in terms of total assets, market capitalization, and sales. As a measure of overall profitability, ROA is lower for Islamic firms. Islamic firm-months are associated with higher previous one-year asset growth while valuation (Tobin's q and price-earnings ratio), is higher for secular firms. Interestingly, total leverage is higher for Islamic firms. Although this seems to conflict with the undesirability of interest-bearing instruments in Islamic finance, the presence of Islamic banks within Islamic firm-months can inflate that category's leverage due to industry effects. The prevalence of large firms in Islamic firm-months suggests that these firms are taking advantage of their size to raise Islamic financing, mostly through overseas banks.

Table 13 summarizes corporate characteristics where perceived corporate piety is characterized with the firm's city of domicile. In particular, firms from cities with AKP vote share above Istanbul's are categorized as Islamic. We present two sets of results, one that excludes Istanbul firms and another that assumes all Istanbul firms are secular. With Istanbul firms excluded, the only difference between the two groups of firms is higher average price-earnings ratios for firms categorized as pious. This can be consistent with the notion that religious firms enjoy higher valuation because of the loyalty of religious investors. When Istanbul firms are included in the secular group, the pious group is smaller and less profitable but still enjoys higher valuation.

Some of our hypotheses, H5a and H5b, relate to apparent religiosity and stock market performance. Therefore, subsequent drafts will make greater use of more precise measures of performance such as one and four factor alphas, in addition to the raw returns and Tobin's q reported in the current tables. We also intend to acquire additional firm characteristics such as the extent of insider ownership or family control, the extent to which the board of directors includes women, and other governance measures that can interact with the firm's positioning on religiosity and its investor clientele.

5. Preliminary summary and conclusions

Our findings thus far suggest that Islamic investors are less prone to overconfidence and disposition effect, and more prone to local bias. There is mixed evidence on narrow framing, lottery-stock preference and gender, although the bulk of the evidence suggests that Islamic investors have higher narrow framing, lower lottery-stock preference, and are more likely to be male. Older, wealthier, female, and less frequent traders are less prone to every bias except local bias. There is no clear evidence on whether individual portfolio returns are higher or lower for Islamic investors, although there is a weak evidence that monthly alpha is higher for conventional investors.

Comparisons of firms based on religiosity produce substantially different results depending on the method of identifying pious versus other firms. Firms with Islamic financing on their balance sheets tend to be large while firms headquartered in more electorally religious cities tend to be small. When categorized based on the fraction of votes going to the conservative

AKP, the headquarters city findings suggest that apparently religious firms enjoy higher valuation due to investor loyalty.

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Table 1. Cross correlations of behavioral bias proxies

This table shows pairwise correlations for the six behavioral bias proxies as well as age. Each cell contains the correlation coefficient with its p-value beneath. Disposition, Clustering, Lottery, and Local are disposition effect, trade clustering, lottery-stock preference, and local bias respectively. Higher trade clustering indicates lower narrow framing bias. The sample contains 24,996 investors. Missing values reduce the number of observations for some cells.

	Overconfidence	Disposition	Clustering	Gender	Lottery	Local
Disposition	0.2206					
	0.0000					
Clustering	0.1546	0.1969				
	0.0000	0.0000				
Gender	0.0674	0.0295	0.0855			
	0.0000	-0.0001	0.0000			
Lottery	0.0412	0.0159	0.0021	0.0358		
	0.0000	-0.0343	-0.7416	0.0000		
Local	-0.0162	-0.0241	-0.0517	-0.0041	0.0043	
	-0.0168	-0.0028	0.0000	-0.5443	-0.5263	
Age	-0.1028	-0.0583	-0.1002	-0.0694	-0.0841	0.0107
	0.0000	0.0000	0.0000	0.0000	0.0000	-0.1150

Table 2. Summary statistics on investor characteristics and daily portfolio performance with individuals categorized by use of Islamic brokerage firm

Investors are classified as "Islamic" or "Conventional" depending on account kept at an Islamic brokerage house. Disposition, Clustering, Lottery, and Local are disposition effect, trade clustering, lottery-stock preference, and local bias respectively. Higher trade clustering indicates lower narrow framing bias. The first p-test tests whether the difference in mean of Islamic versus other investors is statistically significant. . The second p-test tests whether the mean daily return is significantly different from zero. '***' denotes statistically significantly different from zero at the 1% level. [a] and [c] indicate the mean is statistically significantly higher than the mean for the other group at the 1% and 10% levels respectively.

	Mean	Standard deviation	Minimum	Maximum	Observations	p-test difference in means	p-test returns
Islamic Investors							
Overconfidence	0.043609	0.204377	0	1	665	0.004206	
Disposition	0.030091	0.050279	-0.08624	0.5	614	0.0522	
Clustering	0.341848[a]	0.226481	0	0.930379	665	4.98E-10	
Gender	0.866165[a]	0.340731	0	1	665	4.02E-11	
Lottery	0.033459	0.077721	0	0.659697	665	0.163213	
Local	0.059383	0.175976	-0.65707	0.992806	571	0.354246	
Age	44.48571	11.76643	23	85	665	0.001231	
Daily Return	0.000354***	0.000767	-0.00582	0.003945	665	0.145893	9.03E-30
Conventional Investors							
Overconfidence	0.072669[a]	0.259598	0	1	24302		
Disposition	0.035902[c]	0.073536	-1	1	17131		
Clustering	0.281575	0.246966	0	0.971994	24282		
Gender	0.755045	0.430069	0	1	24331		
Lottery	0.041784	0.153415	0	1	24281		
Local	0.050363	0.230854	-0.65707	0.997602	21125		
Age	46.0367[a]	12.22094	18	101	24331		
Daily Return	0.000258***	0.001699	-0.03177	0.028221	24302		1.5E-122

Table 3. Summary statistics on investor characteristics and daily portfolio performance with individuals categorized by holdings of component stocks of an Islamic-compliant index

Investors are classified as "Islamic" rather than "Conventional" if all holdings are component shares of the Katilim 50 index of Islamic-compliant companies. Disposition, Clustering, Lottery, and Local are disposition effect, trade clustering, lottery-stock preference, and local bias respectively. Higher trade clustering indicates lower narrow framing bias. The first p-test tests whether the difference in mean of Islamic versus other investors is statistically significant. The second p-test tests whether the mean daily return is significantly different from zero. '***' denotes statistically significantly different from zero at the 1% level. [a] and [c] indicate the mean is statistically significantly higher than the mean for the other group at the 1% and 10% levels respectively.

	Mean	Standard deviation	Minimum	Maximum	Observations	p-test difference in means	p-test returns
Islamic Investors							
Overconfidence	0.029167	0.168449	0	1	480	0.000253	
Disposition	0.01101	0.033192	-0.06061	0.151061	116	0.00025	
Clustering	0.025127	0.094888	0	0.666667	480	8.4E-120	
Gender	0.6875	0.463996	0	1	480	0.000271	
Lottery	0.01881	0.13578	0	1	480	0.00092	
Local	0.129664[a]	0.392178	-0.65707	0.997602	427	6.41E-13	
Age	49.68125[a]	14.15204	21	97	480	2.39E-11	
Daily return	-3.3E-05	0.002576	-0.016	0.020653	480	0.000114	0.781455
Conventional Investors							
Overconfidence	0.072732[a]	0.259702	0	1	24487		
Disposition	0.035863[a]	0.073025	-1	1	17629		
Clustering	0.288244[a]	0.24599	0	0.971994	24467		
Gender	0.759382[a]	0.427468	0	1	24516		
Lottery	0.042008[a]	0.15216	0	1	24466		
Local	0.049013	0.224847	-0.65707	0.997602	21269		
Age	45.92327	12.1595	18	101	24516		
Daily return	0.000266***,[a]	0.001659	-0.03177	0.028221	24487		1.1E-137

Table 4. Summary statistics on investor characteristics and daily portfolio performance with individuals categorized by holdings of component stocks of an Islamic-compliant index (alternative specification)

Investors are classified as "Islamic" (rather than "Conventional") if percent holdings of component shares of the Katilim 50 index of Islamic-compliant are two standard deviations or greater above the sample average. Disposition, Clustering, Lottery, and Local are disposition effect, trade clustering, lottery-stock preference, and local bias respectively. Higher trade clustering indicates lower narrow framing bias. The first p-test tests whether the difference in mean of Islamic versus other investors is statistically significant. The second p-test tests whether the mean daily return is significantly different from zero. '***' denotes statistically significantly different from zero at the 1% level. [a] and [c] indicate the mean is statistically significantly higher than the mean for the other group at the 1% and 10% levels respectively.

	Mean	Standard deviation	Minimum	Maximum	Observations	p-test difference in means	p-test returns
Islamic Investors							
Overconfidence	0.035913	0.186131	0	1	1615	7.0467E-09	
Disposition	0.020424	0.067952	-0.66667	0.666666	974	1.64052E-11	
Clustering	0.187316	0.214152	0	0.899999	1614	6.02383E-59	
Gender	0.740557	0.438464	0	1	1615	0.090582819	
Lottery	0.012976	0.100594	0	1	1615	5.06777E-15	
Local	0.073311[a]	0.295733	-0.65707	0.997601	1440	0.000102114	
Age	47.23963[a]	12.91259	20	97	1615	2.2932E-05	
Daily return	0.000273***	0.001810	-0.01664	0.020653	1615	0.757432081	1.67056E-09
Conventional Investors							
Overconfidence	0.074383[a]	0.262399	0	1	23352		
Disposition	0.036588[a]	0.073041	-1	1	16771		
Clustering	0.289813[a]	0.247352	0	0.971993	23333		
Gender	0.759206[c]	0.427574	0	1	23381		
Lottery	0.043541[a]	0.154621	0	1	23331		
Local	0.048986	0.224055	-0.65707	0.997601	20256		
Age	45.9095	12.15705	18	101	23381		
Daily return	0.00026***	0.001672	-0.03177	0.0282212 37	23352		3.6157E-123

Table 5. Summary statistics on investor characteristics and daily portfolio performance with individuals categorized by AKP Party vote share of city of residence

Investors are classified as "Islamic" ("Conventional") if living in cities with above (below) median or top (bottom) decile AKP vote share. Disposition, Clustering, Lottery, and Local are disposition effect, trade clustering, lottery-stock preference, and local bias respectively. Higher trade clustering indicates lower narrow framing bias. The p-test tests whether the difference in mean of Islamic versus other investors is statistically significant. [a], [b], and [c] denote statistically significantly higher than the mean for the other group at the 1%, 5%, or 10% levels respectively.

	Islamic		Conventional		p-test difference in means
	Mean	Observations	Mean	Observations	
Median cutoff					
Overconfidence	0.073901	5548	0.076051	10756	0.622115
Disposition	0.034609	4025	0.037147[c]	7560	0.06496
Clustering	0.2809	5545	0.275816	10746	0.207884
Gender	0.826494[a]	5556	0.762259	10768	2.96E-21
Lottery	0.052187[a]	5543	0.040913	10746	1.41E-05
Local	0.089499[a]	3684	0.013095	9340	9.88E-98
Age	44.81605	5556	46.57355[a]	10768	1.75E-19
Daily Return	0.000275	5548	0.000253	10756	0.432228
Decile cutoff					
Overconfidence	0.085411	2447	0.088235	1700	0.750454
Disposition	0.038632	1798	0.038727	1215	0.971591
Clustering	0.301569[a]	2445	0.277724	1701	0.002351
Gender	0.852593[a]	2449	0.795655	1703	1.58E-06
Lottery	0.048859	2444	0.048737	1700	0.980588
Local	0.017304[b]	929	0.00629	977	0.02479
Age	44.13842	2449	45.06753[a]	1703	0.009406
Daily Return	0.000242	2447	0.000221	1700	0.74105

Table 6. Summary statistics on monthly portfolio returns, Sharpe ratios, and alphas for Islamic and Conventional Investors

This table summarizes monthly unadjusted returns, Sharpe ratios, and one and four-factor alphas for Islamic and conventional investors. Islamic investors are identified by account at an Islamic brokerage house, holdings in component stocks of the Katilim index, or AKP vote share in city of residence. Conventional investors are those that are non-Islamic on all dimensions. T-statistics are shown in parentheses. Number of observations is shown in square brackets. '***' and '**' denote statistical significance at the 1% and 5% level, respectively. [a] denotes the number in question is statistically significantly different from the number for conventional investors at the 1% level.

	Islamic investors			Conventional investors
	Brokerage house	Katilim index	AKP vote share	
Monthly raw return	0.014209***	0.006164**,[a]	0.012308***	0.011872***
	(13.83)	(2.44)	(20.95)	(42.44)
	[665]	[470]	[5513]	[18449]
Sharpe ratio	0.035436***	-0.03609**,[a]	0.016348***	0.019153***
	(6.07)	(-2.45)	(5.35)	(10.05)
	[665]	[457]	[5469]	[18334]
1-factor alpha	0.000337[a]	0.003276***	0.003413***	0.003099***
	(0.43)	(3.72)	(10.95)	(20.25)
	[665]	[470]	[5513]	[18449]
4-factor alpha	-0.00814***,[a]	-0.00661***	-0.00608***	-0.00496***
	(-9.91)	(-7.13)	(-18.57)	(-30.79)
	[665]	[470]	[5513]	[18449]

Table 7. Regressions to explain individual investor disposition effect

This table presents regressions to explain individual estimated disposition effect with measures of piety and controls. T-statistics are shown in parentheses. *** and ** denote statistical significance at the 1% and 5% levels respectively. The Piety dummy is set to one for an investor classified as Islamic and zero otherwise.

Dependent variable: Disposition effect			
	Brokerage house	Katilim index	AKP vote share
Piety	-0.00613**	-0.02651***	-0.00336**
	(-2.05)	(-3.91)	(-2.44)
Age	-0.00027***	-0.00027***	-0.00023***
	(-5.49)	(-5.45)	(-3.71)
Gender	0.005511***	0.005272***	0.006498***
	(4.00)	(3.83)	(3.77)
Wealth ($x10^{-6}$)	-0.00057	-0.0005	-0.00039
	(-0.57)	(-0.51)	(-0.31)
Stock Market Experience ($x10^{-3}$)	-0.02597***	-0.02646***	-0.02733***
	(-8.01)	(-8.16)	(-7.00)
City fixed effects	Yes	Yes	No
Number of observations	17,745	17,745	11,585

Table 8. Regressions to explain individual investor overconfidence

This table presents regressions to explain individual estimated overconfidence with measures of piety and controls. T-statistics are shown in parentheses. *** and ** denote statistical significance at the 1% and 5% levels respectively.

Dependent variable: Overconfidence			
	Brokerage house	Katilim index	AKP vote share
Piety	-0.03592***	-0.04717***	-0.00849**
	(-3.57)	(-3.99)	(-1.96)
Age	-0.00161***	-0.00157***	-0.0017***
	(-11.79)	(-11.50)	(-9.56)
Gender	0.038496***	0.037678***	0.036795***
	(10.09)	(9.88)	(7.37)
Wealth (x10-6)	-0.0056*	-0.00593*	-0.00409
	(-1.66)	(-1.76)	(-0.90)
Stock Market Experience (x10-3)	-0.15608***	-0.15902***	-0.14976***
	(-16.07)	(-16.33)	(-12.23)
City fixed effects	Yes	Yes	No
Number of observations	24,967	24,967	16,304

Table 9. Regressions to explain individual investor narrow framing

This table presents regressions to explain individual estimated trade clustering (a proxy for the narrow framing effect) with measures of piety and controls. T-statistics are shown in parentheses. *** and ** denote statistical significance at the 1% and 5% levels respectively.

Dependent variable: Trade clustering			
	Brokerage house	Katilim index	AKP vote share
Piety	0.047528***	-0.24984***	-0.00237
	(4.94)	(-22.32)	(-0.59)
Age	-0.00208***	-0.00193***	-0.00251***
	(-15.96)	(-14.98)	(-15.31)
Gender	0.044746***	0.043876***	0.057461***
	(12.27)	(12.15)	(12.46)
Wealth (x10-6)	0.014086***	0.015776***	0.011399***
	(4.38)	(4.95)	(2.73)
Stock Market Experience (x10-3)	0.081465***	0.066313***	0.0814***
	(8.79)	(7.20)	(7.21)
City fixed effects	Yes	Yes	No
Number of observations	24,947	24,947	16,291

Table 10. Regressions to explain individual investor lottery stock preference

This table presents regressions to explain individual estimated lottery stock preference with measures of piety and controls. T-statistics are shown in parentheses. *** and ** denote statistical significance at the 1% and 5% levels respectively.

Dependent variable: Lottery stock preference			
	Brokerage house	Katilim index	AKP vote share
Piety	-0.01143*	-0.02093***	0.008767***
	(-1.92)	(-2.99)	(3.38)
Age	-0.00091***	-0.00089***	-0.00098***
	(-11.25)	(-11.04)	(-9.23)
Gender	0.009168***	0.008871***	0.008362***
	(4.06)	(3.93)	(2.80)
Wealth (x10-6)	-0.00216	-0.00224	-0.00137
	(-1.08)	(-1.12)	(-0.51)
Stock Market Experience (x10-3)	-0.03212***	-0.03342***	-0.03731***
	(-5.59)	(-5.80)	(-5.09)
City fixed effects	Yes	Yes	No
Number of observations	24,946	24,946	16,289

Table 11. Regressions to explain individual investor local bias

This table presents regressions to explain individual estimated local bias with measures of piety and controls. T-statistics are shown in parentheses. *** and ** denote statistical significance at the 1% and 5% levels respectively.

Dependent variable: Local bias			
	Brokerage house	Katilim index	AKP vote share
All investors			
Piety	0.010528	0.086109***	0.077384***
	(1.13)	(8.01)	(21.36)
Age	0.00034***	0.000281**	0.000692***
	(2.75)	(2.27)	(4.97)
Gender	-0.00374	-0.00301	0.00254
	(-1.09)	(-0.88)	(0.65)
Wealth (x10-6)	0.002783	0.00256	0.004985
	(0.95)	(0.87)	(1.51)
Stock Market Experience (x10-3)	-0.03287***	-0.0271***	-0.02355**
	(-3.62)	(-2.98)	(-2.36)
City fixed effects	Yes	Yes	No
Number of observations	21,696	21,696	13,024
Excluding Istanbul			
Piety	-0.00041	0.125997***	0.077384***
	(-0.04)	(12.34)	(21.36)
Age	0.000564***	0.000449***	0.000692***
	(4.45)	(3.56)	(4.97)
Gender	-0.00169	-0.00063	0.00254
	(-0.48)	(-0.18)	(0.65)
Wealth (x10-6)	0.005963**	0.006174**	0.004985
	(1.99)	(2.08)	(1.51)
Stock Market Experience (x10-3)	-0.0293***	-0.01978**	-0.02355**
	(-3.24)	(-2.19)	(-2.36)
City fixed effects	Yes	Yes	No
Number of observations	13,024	13,024	13,024

Table 12. Summary statistics on Islamic and secular firm-months identified by Islamic financing on the balance sheet

This table presents medians of corporate characteristics across Islamic and secular firm-months. A firm-month is characterized as Islamic if the firm has any Islamic loans or bonds outstanding in the given month. The number of firm-months is given in parentheses. A non-parametric equality of medians test is conducted for each corporate measure. ***, **, and * denote a statistical significant difference between medians at the 1%, 5%, and 10% levels respectively.

	Islamic Firm-Months	Secular Firm-Months	p-value for test of equality of medians
Total assets	7920.323	239.9409	3.15E-11***
	[55]	[5585]	
Sales	1364.269	199.6128	7.78E-12***
	[54]	[4963]	
Market capitalization	1044	154	5.59E-09***
	[55]	[5438]	
Return on assets	1.9706	2.5846	0.072675*
	[53]	[5143]	
Return on equity	15.5362	7.5502	1.34E-06***
	[53]	[4951]	
Asset growth	22.4593	9.0126	8.59E-11***
	[53]	[5234]	
Leverage	0.847604	0.463674	3.12E-11***
	[55]	[5584]	
Tobin's q	1.009203	1.07049	0.010067**
	[55]	[5438]	
Price-earnings ratio	9.6311	11.3217	0.088017*
	[50]	[3965]	

Table 13. Summary statistics on apparently religious and secular firms identified by AKP vote share in headquarters city

This table presents medians of corporate characteristics across apparently religious and secular firms. A firm is identified as apparently religious if the firm is domiciled in a city that has higher AKP vote share than Istanbul in the 2011 legislative elections. Secular firms are those domiciled in cities with AKP vote share below Istanbul's AKP vote share. Some columns include or exclude firms from Istanbul, the city with the largest number of firms and many firms with a national presence. A non-parametric equality of medians test is conducted for each corporate measure across apparently religious and secular firms. **, and * denote a statistical significant difference between medians at the 5% and 10% levels respectively.

	Apparently Religious	Secular	Istanbul	Secular plus Istanbul	p-value for test of equality of medians	
					Apparently religious versus secular	Apparently religious versus secular plus Istanbul
Total assets	150.646125	172.4801	266.0516	229.596125	0.780516117	0.041003698**
Sales	118.4812317	125.9079	232.7823	181.0552979	1	0.039810892**
Market Capitalization	102.6421	93.81	159.3	135.71	1	0.769960784
Return on assets	1.8323	2.158825	2.3276	2.3276	1	0.760493448
Return on equity	2.682575	5.5333	7.56125	7.264175	0.49928722	0.032613034**
Asset growth	7.142375	6.99635	10.00875	9.6964	1	0.374750515
Leverage	0.416503698	0.464776	0.459593	0.460666984	0.524709857	0.242923735
Tobin's q	1.143948674	1.200912	1.048896	1.07270503	0.473289465	0.558646976
P/E	17.25075	12.54973	11.8073	11.99215	0.06190578*	0.014154089**
Monthly raw return	0.008982734	0.007487	0.009553	0.008655177	0.39408782	0.889386794
1-factor alpha	0.001837593	0.001633	0.001731	0.001632836	0.864659787	0.889386794
4-factor alpha	-0.007094698	-0.00891	-0.00465	-0.005747357	0.864659787	0.210671335
Number of firms	61	79	260	339		

Appendix: The Katilim 50 Index

The Katilim ("Participation") 50 Index is is an index of 50 publicly listed Turkish firms that are deemed sharia compliant. The governing board consists of representatives from the four members of the "Association of Participation Banks", Bizim Securities Inc. (this is the brokerage firm whose customers we characterize as Islamic), and Turkey's four Islamic banks. Bizim partners with four Islamic banks exclusively (http://www.bmd.com.tr/) and is the single Turkish brokerage considered Islamic. The index excludes certain industries regarded non-compliant such as financials (they involve interest income), alcohol, gambling, pork-based food, media, advertising, tourism, tobacco, defense, and futures (gold, silver, and currency trades). Index components must have limited interest-bearing liabilities (for example, interest bearing loans cannot exceed 30% of market capitalization), interest-bearing assets, and interest income. The index is composed of 50 largest firms by market cap that meet these criteria. Hence, index components are typically well known firms. The index is updated quarterly and changes are announced at http://www.katilimendeksi.org.

Appendix Table A1: Description of behavioral bias proxies and other investor characteristics

Variable	Description	References	Calculation
Disposition Effect	Investor's propensity to sell winners too early and hold losers too long. Measured by the proportion of gains realized minus proportion of losses realized.	Shefrin and Statman (1985), Odean (1998), and Kumar and Lim (2008).	Proportion of gains realized (PGR) = realized gains/(realized gains+paper gains). Proportion of losses realized (PLR) = realized losses/(realized losses+paper losses).
Narrow Framing	Investor's propensity to select investments individually instead of considering the broad impact on her portfolio.	Kahneman and Lovallo (1993), Kahneman (2003), and Kumar and Lim (2008).	Trade clustering = 1 – (number of trades/number of trading days).
Overconfidence	Investor's propensity to trade frequently but unsuccessfully. Measured with a dummy variable.	Barber and Odean (2001), and Bailey, Kumar, and Ng (2011).	Dummy variable equal to one for investors in the highest portfolio turnover quintile and lowest performance quintile for their individual common stock trading and zero otherwise.
Local Bias	Investor's propensity to select stocks with headquarters in their city of residence.	Coval and Moskowitz (1999), Bailey, Kumar, and Ng (2011).	Difference in ratios between the share of local firms in an investor's holdings and the share of Borsa Istanbul firms that are local to the investor.
Lottery Stock Preference	Investor's propensity to select stocks with lottery-like features (low price, volatile returns, and skewed returns).	Kumar (2009).	Investor's mean portfolio weight (relative to the weight in the market portfolio) assigned to stocks that have bottom quintile prices, top quintile idiosyncratic volatility, and top quintile idiosyncratic skewness.
Pious City Dummy	Indicates piety of city as proxied by AKP vote	New in this paper.	Dummy variable equal to one for investors from

	share in 2011 general elections.		cities that have higher votes for AKP than the median-vote city, Istanbul. Zero for investors from cities with below Istanbul AKP votes. Undefined for investors from Istanbul.
Gender	Investor's gender	Self-reported.	Dummy variable equal to one if the investor is male.
Age	Age of the investor.	Self-reported.	Age of the investor.
Wealth	Proxy for the wealth of investor.	Based on investment record.	Investor's median total asset value through sampling period.
Stock Market Experience	Proxy for investment experience of investor.	Based on investment record.	The mean number of trades per day for the investor.
Daily Performance	Raw daily return of investor's portfolio.	Based on investment record.	Raw mean daily value-weighted return of investor's portfolio.
Monthly Raw Performance	Raw monthly return of investor's portfolio.	Based on investment record.	Raw mean monthly value-weighted return of investor's portfolio.
Stock Portfolio Alpha	Risk-adjusted excess return of investor's stock portfolio.	Based on investment record.	The intercept, alpha, from FF-4 Factor regression with the monthly common stock portfolio return as dependent variable.
Stock Portfolio Market Factor (Beta) Exposure	The beta of the investor's stock portfolio.	Based on investment record.	The loading of the stock portfolio on the market factor in a four-factor regression model with size, value, and momentum factors. Factors are local and constructed from scratch.
Stock Portfolio SMB	The loading of the stock	Based on investment	The loading of the stock

Factor (Size) Exposure	portfolio on the small-minus-big factor (SMB) in a four-factor model regression.	record.	portfolio on the size (SMB) factor in a four-factor regression model.
Stock Portfolio HML Factor (Value) Exposure	The loading of the stock portfolio on the high-minus-low book-to-market factor (HML) in a four-factor model regression.	Based on investment record.	The loading of the stock portfolio on the value (HML) factor in a four-factor regression model.
Stock Portfolio UMD Factor (Momentum) Exposure	The loading of the stock portfolio on the up-minus-down factor (UMD) in a four-factor model regression.	Based on investment record.	The loading of the stock portfolio on the momentum (UMD) factor in a four-factor regression model.

Figure 1: Recent voting patterns in Turkey

The map summarizes the results of the general election of 12th June 2011. See http://www.electoralgeography.com/new/en/countries/t/turkey/turkey-legislative-election-2011.html .