Left-Digit Bias, Investor Attention and Trading Behavior

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Abstract

We show evidence of left-digit bias in the stock selling decisions of individual investors. The probability of an investor selling a stock increases discontinuously with a change in the left-digit. The probability of sale increases when stocks change left-digit due to price movements both from below and from *above*. This effect is not due to limit orders, but is instead consistent with models in which salient features – here the leftmost digit of a stock price – attract individual attention. The degree of left-digit bias varies across investors. Left-digit bias is stronger among investors with short account tenures, lower-value portfolios and fewer stocks in their portfolios.

Keywords: left-digit bias, investor behavior, behavioural finance

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1 Introduction

A large literature in finance focusing on the disposition effect (e.g., Weber and Camerer, 1998; Frazzini, 2006; Barberis and Xiong, 2009; Ben-David and Hirshleifer, 2012; Li and Yang, 2013) – the distaste for selling stocks at a nominal loss – addresses the question of when people *don't* like to sell stocks. However, beyond this strong regularity, there is very little research focusing on when, exactly, investors *do* sell stocks. Are there specific events that trigger or suppress the sale of a stock? Recent research, which finds that the buy decisions of professional traders are quite sensible – the stocks they buy are more likely to rise in value than those they don't buy – but that their sell decisions are worse than random, further highlights the need for a better understanding of when stock sales occur (Akepanidtaworn et al., 2019).

In this paper we investigate how individual investors respond to changes in stock prices, in particular, changes in the left-digit of a stock price. While movements in prices associated with a change in left-digits – e.g., between \$5.99 and \$6.01 – are materially identical to same-magnitude movements in prices that do not change left-digits – e.g. between \$5.76 and \$5.78 – we find large effects of changes in left-digits on the probability of an investor selling a stock: Investors are significantly – 70% – more likely to sell stocks when their price crosses a round-number price threshold from below. By the same token, we find that investors are also more likely – 40% – to sell stocks immediately after they cross a round number threshold from *above*. Hence movements in prices that change left-digits, both from below and from above, lead to increases in the probability that a stock is sold by retail investors.

We document these interrelated patterns using a data set of transactions made by online retail investors. We draw from our sample of investor trading records samples in which investors hold stocks through periods of rising prices, specifically episodes in which a stock price rises through left-digit changes and, separately, samples in which investors hold stocks through periods of falling prices, in which a stock price falls through left-digit changes. We construct these samples such that we know the investor had a high probability of seeing the change in left-digit, doing so by defining our samples using prices matched to login events. Importantly, we only observe an effect of left-digit changes on investor behaviour in samples defined by login events, implying that seeing the left-digit change is the driver of the subsequent increased probability of sale. We demonstrate the robustness of our findings across different empirical inspections, and rule out limit orders as an alternative explanation. We also show that the the left-digit effect is stronger among less experienced investors and those with smaller portfolios (fewer stocks and lower portfolio values).

We interpret the large increase in probability of sale when a stock price crosses a left-digit as arising due to the salience of left-digits in displayed prices. A change in the left-digit is more salient compared with the following digits, and, as a more salient feature of the price, is more likely to attract investor attention (as in the models of Bordalo et al., 2012; 2013, Kőszegi and Szeidl, 2013, and Bushong et al., 2015). People naturally focus attention on attributes that are more salient, as has been shown using responses to sales taxes (Chetty et al., 2009; Finkelstein, 2009). Previous studies also show that the salience of other aspects of stock prices within an investors portfolio matters for trading decisions. For example Hartzmark (2015) shows that individuals are more likely to sell the extreme winning and extreme losing positions in their portfolio, a form of rank effect.

Our study uses individual-level investor trading records provided by Barclays Stockbroking, an online execution-only brokerage service operating in the United Kingdom. The data provided covers a four-year period and includes records of portfolio holding and trades at the daily level. The data also provide daily dummy variables for whether the investor made a login to the account. These allow us to measure prices observed by the investor with high probability - prices on days on which the investor made a login to the account - compared to prices on days on which the investor did not make a login to the account, when they would be less likely to observe a price shifting over a round number threshold.

Our research design focuses on holding periods in which the investor observed a change in the left-digit of the stock. We select samples of holding periods over quarters in which the investor held a stock which began the quarter below (above) a left-digit change, and then increased (decreased) through a left-digit change.[1] This sample selection allows us to restrict to observed changes in left-digits. In this sample, we observe large effects of changes in left-digits.

Our main estimates are robust to tests to account for limit orders. An increased probability

[1] Our results are unchanged when using a calendar month, or year, as the holding period in the sample selection.

of sale when a stock crosses a left-digit could arise, not due to individuals responding to a change in the left-digit, but instead due to individuals placing a limit order with a strike price at the change in left-digit. However, we rule out limit orders as the mechanism driving our results using a variety of tests, including the method suggested by Linnainmaa (2010) to identify and exclude limit order trades from the data.

In further analysis, we examine heterogeneity in the left-digit effect on stock sales across investor characteristics and portfolio characteristics. We find little heterogeneity in responses to left-digit changes across investors by age and gender, but large differences across investors by portfolio value, number of stocks held in the portfolio and account tenure. Investors with short tenures, few stocks and smaller portfolios exhibit a stronger response to changes in the left-digit of the stock price, both from below and from above.

In addition to providing new insights into investor sell decisions, our paper contributes to the diverse literature on left-digit bias, which is the tendency to pay more attention, and give greater weight in decision making, to the leftmost digit of a number relative to other digits (Poltrock and Schwartz, 1984).[2]

Several papers have documented economic consequences of the left digit bias. Lacetera et al. (2012), for example, find left-digit bias in the processing of odometer values, leading to discontinuous drops in sale prices at 10,000-mile odometer thresholds. Shlain (2018) structurally estimates the magnitude of left-digit bias using retail pricing data, finding that consumers respond to a 1-cent increase from a 99-ending price as if it were a 15-25 cent increase.[3] And research on physician decision making (Olenski et al., 2020) find that patients hospitalized with acute myocardial infarction 2 weeks after, as compared with 2 weeks before, their 80th birthday are significantly less likely to undergo coronary-artery bypass graft surgery.

Other strands in the literature on left-digit bias examine how round numbers act as reference points. For example, Allen et al. (2016) show that round numbers act a reference points for marathon finishing times. Pope and Simonsohn (2011) show how round numbers

[2] Other forms of bias in processing number values have also been shown in the literature, including the tendency of individuals to process small numbers on a linear scale while processing large numbers on a logarithmic scale (Roger et al., 2018) and to exhibit exponential growth bias (Stango and Zinman, 2009).

[3] Relatedly, laboratory studies have found that prices ending in a nine unit are perceived to be disproportionately smaller than prices ending in the following zero unit, e.g., 99 cents compared with $1 (Thomas and Morwitz, 2005; Manning and Sprott, 2009).

act as goals in a variety of settings, such as professional baseball players who modify their behavior as the season is about to end to finish with a batting average just above rather than below .300, and high school students, who are more likely to retake the SAT after obtaining a score just below rather than above a round number. Pope et al. (2015) show that heaping of agreed house sales prices at $50,000 units can be explained by round numbers acting as focal points in sale negotiations. Bhattacharya et al. (2012) find that stock traders focus on round numbers as cognitive reference points for value, evidenced by excess buying (selling) by liquidity demanders at all price points one penny below (above) round numbers.[4]

Our study also contributes to the broader behavioral literature on individual investor behaviour. Investors typically hold only a few stocks and exhibit biases such as over-trading (Barber and Odean, 2000), sensitivity to gains compared with losses (Odean, 1998) and rank effects (Hartzmark, 2015). For review of the behavioral finance literature see Hirshleifer (2015) and Barberis (2018), and the review of investor behavior of Barber and Odean (2013).

The selling behavior of individual investors around left-digit changes in stock prices in our sample also echoes previous studies of the behaviour of stock prices around left-digit thresholds. Using the Trade and Quote data set from the New York Stock Exchange, Bhattacharya et al. (2012) study the behaviour of bid and ask orders placed by securities traders, finding excess buying by liquidity demanders at all price points one penny below round numbers, and excess selling by liquidity suppliers at one penny above round numbers. These patterns are partially due to limit order clustering, as shown by Bourghelle and Cellier (2009) and Chiao and Wang (2009). There is evidence that individual investors who place limit orders at round numbers exhibit lower cognitive ability and worse portfolio performance (Kuo et al., 2015). In contrast to these studies, we focus on left-digit bias as arising from an immediate response when investors observe prices crossing left-digits rather than as a mechanical response due to the preference to set limit orders at round numbers.

The paper proceeds as follows. Section 2 describes the data we use in the analysis, the steps

[4] A further strand in the literature focuses on whether some left-digit values are more prominent in individuals choices compared with others. Albers and Albers (1983) presents a theory of the prominence of numbers in the decimal system in which a subset of round numbers are particularly prominent and hence more likely to be chosen. We find evidence in our credit card payments data consistent with the idea that some round numbers are more prominent than others.

in sample selection and presents summary statistics. Section 3 presents the main results, together with robustness tests and sensitivity checks. Section 4 presents results on the heterogeneity in left–digit effect across investor characteristics and portfolio characteristics.

2 Data

Data were provided by Barclays Stockbroking, an execution-online brokerage service operating in the United Kingdom. The data cover the period April 2012 to March 2016 and include daily-level records of trades and quarterly-level records of portfolio positions.[5] The data also include a dummy variable, at daily frequency, denoting whether the investor made a login to their account each day. The daily-level login dummy variable covers all days, including days on which the market is closed such as Sundays and public holidays, which we use later in our analysis. We combine the daily-level records of trades with the quarterly-level records of portfolio positions, together with stock price data from Datastream, to calculate the value of each stock position in an investor's portfolio on each day of the sample period.

2.1 Sample Selection

As a first step, we apply a series of data cleaning sample restrictions which restrict the data to active accounts with trading histories during the data period for which we can match price and demographic data. Details of this first stage of data cleaning are shown in Table 1. The unrestricted sample as received from Barclays contains 155,300 accounts. In this version of the paper we draw a 60% random sample of accounts for analysis.

The unit of observation in the data is an account × stock × day, i.e. an observation per investor per stock holding per day. We focus our analysis on two subsets of this universe of account × days, specifically login-days and sell-days. We define a login-day as an observation which is paired with a login, and a sell-day as an observation which is paired with a sale event on the day from the portfolio (of any stock, whether it crossed a round number or not). The sample of accounts together provides a total of approximately 135 million login-days and

[5] During the data period the brokerage operated only through an online interface. Barclays have subsequently introduced a mobile phone trading app.

approximately 100,000 sell-days.

We then apply six data cleaning restrictions, applied to the data at the account level unless otherwise noted, to obtain a baseline sample. We apply these restrictions to limit the sample to the minimum variables required for analysis. First, we drop observations for which the account is inactive, defined as a one-year period in which the investor makes fewer than two logins or two transactions. Where an account does not meet this restriction, we drop all observations for the relevant year.[6] Second, we remove observations where a matched price is not available from Datastream. Third, we remove observations for all account × days in which there are fewer than two stocks within the portfolio. Fourth, we remove all observations for accounts for which demographic data is missing (i.e., we drop all investor × stock × days for that account from the sample). Fifth, we remove the days in which the investor *purchased* the stocks (starting position days) as speculative day trading is rare among retail investors. Finally, we remove accounts with extremely high portfolio values (average portfolio value during the sample period above the 99th percentile).

Table 1 reports the effects of these steps in sample selection. The table reports the number of accounts dropped due to each step in the sample restrictions, together with the number of login events and sell events (account × stock × days) dropped at each step. From the starting sample of approximately 92,000 accounts, the largest drop of accounts is due to dropping approximately 29,000 inactive accounts (31.6% of accounts). After applying all six sample restrictions the resulting baseline sample retains 58% of accounts from the unrestricted sample. Our sample restrictions tend to drop accounts with below-average logins and sales (due to the largest drop being the drop of inactive accounts), hence the baseline sample retains 63% of login-days and 69% of sell-days.

As a second step, we restrict to a sample for analysis. Two motivations drive our sample selection. First, responses to changes in left-digits are only detectable in a sample of observations for an investor in which the left-digit changes. A key element in our analysis therefore is to draw a "price increasing sample" and a "price decreasing sample", which we define below. Moreover, we show that the response of changes in left-digit is very different depending upon

[6] In cases where the account satisfies this sample restriction in other years, we keep those years of observations in the data set.

when the stock is increasing in value or decreasing in value over time, in particular, selling activity occurs when prices cross left-digits from below and from above.

Second, responses to changes in left-digits are contingent upon the investor observing the change in left-digit. For example, a stock that changes left-digit over a holding period in which the investor does not make a login to the account is much less likely to be noticed compared with a change in left-digit which occurs between login days within a holding period. We therefore apply sample restrictions in order to obtain a series of observations in which the price crosses the left-digit between login-days.

We define the price increasing sample and the price decreasing sample as follows. First, using the example of the price increasing sample, we identify the first day in each calendar quarter on which an investor made a login to their account.[7] We then define the price increasing sample as the set of login days within the quarter for which the prices on subsequent login days were always above the price on the first day and the left-digit had changed within the quarter on at least one subsequent login-day. This sample therefore provides a series of login-days through the quarter in which the price of the stock had broached a left-digit change on at least one of the login-days.

We define the price decreasing sample using parallel sample restrictions applied to decreasing prices. Hence the price decreasing sample is defined as the set of login days within the quarter for which the prices on subsequent login days were always below the price on the first day and the left-digit had changed within the quarter on at least one subsequent login-day. Our samples are based on quarters and individual × login days during the quarter.

2.2 Summary Statistics

Table 2 provides summary statistics for account holder characteristics and account characteristics in the baseline sample. Approximately 81% of account holders are male and the average age of an account holder is 55 years. Account holders have held their accounts with Barclays for, on average, five years, and 25% of account holders have held their account for over seven years. The average portfolio value is approximately £71,000 (median £19,000), with accounts containing

[7] We show later that results are unchanged when we modify the period that defines a sample to either a month, or a year, instead of a quarter.

an average of 6 stocks (median 4 stocks). Investors in the baseline sample overwhelmingly hold positions in a few common stocks. Holdings of mutual funds account for only 8% of the average investor's portfolio. Investors in the sample log in approximately once per five days, but trade much less frequently, approximately once every thirty days.

Table 3 describes the price data for the baseline sample, price increasing sample and price decreasing sample. The baseline sample provides approximately 84.6 million login-day observations (the bottom row of Table 1). Panel A summarises prices of all observations paired with login-days and sell-days in the first two rows, together with price of stocks sold in the third row. The mean price of a stock in the sample of login-days is approximately £87, with a median of £3.

Panels B and C summarise prices for stocks from observations in the price increasing sample and observations in the price decreasing sample. Note, there are four units of left-digits in the data, pennies, tens of pennies, pounds and tens of pounds (there are only a few cases of hundreds of pounds). So, the left-digit changes of interest are pence to tens of pence, tens of pence to pounds, and pounds to tens of pounds (plus a few cases of tens of pounds to hundreds of pounds). The most common price range for observations in both the price increasing sample and the price decreasing sample is the £1.1 to £10.1 range, which accounts for 54.8% of observations in the price increasing sample and 43.7% of observations in the price decreasing sample. [8]

3 Results

3.1 Main Results

Our main result is shown in Figure 1, which shows the probability of selling a stock by the leftmost price digit of the stock. The left-side plots in panels A and B take the samples of observations from the price increasing sample and price decreasing sample and stack observations (investor × stock × login days) by the leftmost two digits of the observation, centred on the change in left digit between some integer X and the next $Y = X + 1$. For example, an investor

[8] Most stocks in the samples are prices in the range £1.10 to £10.10. A histogram of prices for all investor × login days is shown in Figure A1.

holds a stock and, in the price increasing sample, sees prices on login-days of 18p, 22p and 26p. These observations stack onto the x-axis at $X8$, $Y2$ and $Y6$, centring on the change in left-digit from 1 to 2 with $X = 1, Y = 2$. Another investor holds a stock, in the price increasing sample, sees prices on login days of 361p, 389p and 430p. These observations stack onto the x-axis at $X6, X8$ and $Y3$, centring on the change in left-digit from 3 to 4, with $X = 3, Y = 4$.[9] One stock $\times$ day can contribute to multiple observations, if more than one investor makes a login to their account on the day. By way of contrast, a stock $\times$ day might contribute no observations if no investor makes a login to their account on the day.

The first clear pattern in the left-side plots is that the probability of sale jumps upwards when the stock crosses a left-digit from below in the price increasing sample, and the probability of sale jumps downwards when the stock crosses a left-digit from above in the price-decreasing sample. In the price increasing sample, the increase is from approximately 0.008 to 0.0014, a 75% increase, whereas in the price decreasing sample, the increase is from approximately 0.008 to 0.0012, a 50% increase.[10]

A second clear pattern in the left-side plot is that the probability of sale jumps upwards when the price crosses the left-digit, and remains elevated for the next adjoining units, in the price increasing sample $Y1, Y2, Y3, \ldots$, in the price decreasing sample $X9, X8, X7, \ldots$. One explanation for this pattern is that the investor's response to a change in left-digit does not necessarily occur when the price crosses $Y0$, as the investor may not observe the stock at price $Y0$ if they do not make a login at that point in time. Instead, the investor may only observe the change in left-digit at the point at which they log in, and by that point in time the stock have have reached $Y1, Y2, Y3, \ldots$ in the price increasing sample, for example.

The right-side plots in each panel illustrate the probability of sale across the full range of leftmost two digits of prices in the sample, unstacking the data from the left-side plot by leftmost two digits. In the example above, the series of prices 18p, 22p and 26p enter into the x-axis bins for 18, 20 and 26; while the series of prices 361p, 389p and 430p enter into the ex-axis bins for 36, 38 and 43. In both panels, each bin in which the right-digit of the leftmost two

[9] Stocks that cross multiple left-digits in the quarter contribute observations centred around each left-digit change.

[10] The probability of sale is higher in the price increasing sample compared with the price decreasing sample, indicating that investors are more likely to sell stocks when prices increase compared with when prices decrease.

digits ends 9 is colored blue, with each bin in which the right-digit of the leftmost two digits ends 0 is colored red.

The clear pattern in the right-side plots is that the probability of sale jumps when the price crosses a leftmost digit from below in Panel A, and from above in Panel B. This is seen across the broad range of leftmost two digits of prices. The plot also makes clear the "ladder" pattern whereby the elevated probability of sale at each crossing of the leftmost digit steps down as the price moves further upwards (in Panel A) or downwards (in Panel B), with the probability jumping again at the next change in leftmost digit.

This pattern in the probability of sale when a stock price crosses a leftmost digit is *not* seen when one pools all observations. Pooling all observations of login-days from the baseline sample (approximately 84 million observations). Figure A2 reproduces the figures from Figure 1. The left-side plot shows no discontinuity in the probability of sale when price crosses the leftmost digit. In the figure, the probability of sale is slightly higher at lower prices, but the difference in probability across the x-axis very small (in the range 0.0079 to 0.0085), compared with the jump in probability at the crossing of the left-digit of 0.006 in the price increasing sample and 0.004 in the price decreasing sample. The right-side plot also shows no difference in the probability of sale between the red bars and blue bars.

We estimate the size of the left-digit effect in Table 4 and Table 5, which show regression estimates for the price increasing sample and price decreasing samples respectively. The dependent variable in each regression is a dummy variable for whether the observation is a sale (either partial or total sale). The specification in Column 1 includes only a dummy for whether the stock price is $Y0$ or above. The coefficient on the dummy variable is 0.0044 in the price increasing sample. This implies an increase in the probability of sale when the stock price crosses the left-digit from below, evaluated against the constant term, of 52%. The coefficient on the dummy variable is -0.0024 in the price decreasing sample. This implies an increase in the probability of sale when the stock price crosses the left-digit from above, evaluated against the constant term, of 24%.

Additional columns in both tables add further controls to the econometric specification. The specification in Column 2 of each table adds slope terms for the range $Y0 - Y5$ and $X6 - X9$.

Subsequent Columns add a series of fixed effects: day fixed effects, industry fixed effects (using industry classifications based on Datastream Industry Classification Benchmark (ICB)), account fixed effects and finally stock fixed effects. The specification in Column 5 therefore exploits within-investor, within-stock variation in the probability of sale, conditioning on day differences in the likelihood of sale. In this richest specification, the coefficients on the dummy variable of 0.0061 and -0.0040 imply an increase in the probability of sale when the stock price crosses the left-digit from below of 71% and an increase in the probability of sale when the stock prices crosses the left-digit from above of 40%.[11]

The main results in Figure 1 pool over leftmost digits in pence, pounds and tens of pounds.[12]. In further analysis, we reproduce the figures show in Figure 1 and regression estimates in Table 4 and Table 5 for separate samples in which stock prices are in pence, pounds and tens of pounds. Figure 2 and Figure 3 each show three panels with the sample split into observations with prices in the range £0.11 to £1.01 in Panel A, £1.01 to £10.1 in Panel B, and £11 to £101 in Panel C of each figure. The number of observations is uneven distributed across these subsample, with approximately 50% of observations from the main samples in Panel B of each figure and only 7% of observations from the main sample in Panel C of each figure. The jump in probability of sale when the price crosses the leftmost digit from below, or when the price crosses the leftmost digit from above, is seen in each sub-sample.[13] Table A1 and Table A2 report regressions for the subsamples by pennies, pounds and tens of pounds. Estimates from these models show very similar results to the main regression estimates.

3.2 Robustness Tests

3.2.1 Limit Orders

Why do we observe the jump in probability of sale when the price crosses a left-digit? One potential explanation for the pattern seen in the price increasing sample is that investors set

[11] These percentage increases in the probability of sale are calculated from the coefficient on the constant term in Column 1 of each table.

[12] There are very few observations of stock prices in which the leftmost digit is in hundreds of pounds.

[13] The jump in probability of sale when the leftmost digit crosses zero is less clear in Panel C of each plot, which contains the highest priced stocks in each sample, and contributed the smallest percentage of observations in each main sample.

limit orders with strike prices at round numbers (e.g., base-10 or base-100 numbers). Two observations of the patterns seen in Figure 1 suggest this is unlikely to explain the pattern we observe in full. First, while the use of limit orders might contribute to the pattern observed in Panel A, it would not explain the pattern observed in Panel B. Second, in liquid markets we would expect limit order to be executed at the strike price which, if a round number, would cause a spike in the probability of sale only at $Y0$ in the illustrations, not an elevated probability of sale at $Y1, Y2, Y3, \ldots$. There are, however, two counter-arguments to this. First, if individuals place limit order outside of trading hours, the price may have risen further above Y0 by the time the brokerage executes the order (overnight orders form a queue on the broker's order book, and orders appearing later in the queue may execute at a price further away from the strike price). Second, if the stock is illiquid the brokerage may only be able to execute the order once the price has risen further above Y0 (again, due to queueing).

As a first set of robustness tests, we therefore exclude observations of sales which have a higher probability of being placed as a limit order. For example, the share of limit orders in the sample of orders placed out-of-hours is likely to be higher than the share of limit orders in the sample of orders placed during market hours. We exclude two sets of observations. First, observations of sales where the order is completed by the broker outside UK market hours (8am to 4.30pm). Second, observations of sales where the investor may a login to their account on the previous day and may have placed a sell order using a limit order[14]. Panels A and B of Figure 4 show the impact of implementing these exclusions. The pattern seen in the main analysis, of a jump in the probability of sale when the price crosses the leftmost digit from below in the price increasing sample, is seen in both panels.

Second, we restrict the sample to only the most liquid stocks, focusing on stocks in the FTSE100 only. In this sample, the likelihood of round-number limit orders executing at their strike price is higher compared with less liquid stocks in the FTSE250 or FTSE All-Share indices. If limit orders fulfilling at round number strike prices are responsible for the jump in probability of sale when the leftmost digit crosses zero from below, we should therefore see a sharp "spike" in sales at $Y0$ in the sample. Panel C, which restricts to FTSE100 stocks only, shows an elevated

[14] Likewise, we also exclude observations of sales executed on Mondays when the investor log in during the weekend

probability of sales at prices $Y1, Y2, Y3, \ldots$ in the same way as seen in the main results. This again suggests that the pattern we see in the main results is not explained by investors using limit orders.

Third, we follow an approach to identifying limit order trades suggested by Linnainmaa (2010). Linnaimaa (2010) explores the role of limit orders as a potential explanation for the existence of the disposition effect, arguing that the disposition effect (among other features of individual investor trading behavior) can be explained by investors' use of limit orders. The paper proposes a method for identifying trades more likely to have been executed via limit orders.

The approach proceeds as follows. We first take all observations of buys and sell events for each investor in the price increasing sample. We then regress a buy-versus-sell indicator (a dependent variable that takes the value of one when an investor sells a stock and the value of zero when an investor purchases a stock) against the daily return of an stock, for each investor. Following Linnaimaa, we included investors with at least 10 trades. According to Linnaimaa's method, the same-day return coefficient is significantly positive for limit-order trades, but significantly negative for market-order trades (because individuals who are net buyers when the stock price falls, and net sellers when the stock price rises, are likely to be limit-order traders; while individuals who submit market orders often trade in the direction of the same-day return, and hence against limit order traders). Using this method, we are able to exclude from the sample investors for whom a positive coefficient is estimated from the analysis (839 investors corresponding to 316,132 observations and 6,144 sell events, 11% of the total number of account $\times$ stock $\times$ sell days). [15]

We show the effect of excluding limit order investors on our main results in Panel D of Figure 4. The pattern seen is the main sample is unchanged in this further restricted sample, with a clear increase in the probability of sale when the price increases through a change in the leftmost digit. We show regression estimates using each of the samples in Figure 4 in Table A4 and Table A4. The regression results show the same patterns as those using the main sample.

[15] Using trading records of all investors in Finland for the period 1995-2002, Linnaimaa shows that the fraction of actual limit-order trades in the sample of investors with positive coefficient, following this approach, is 65%

3.3 Simulation

The main results are shown using samples of stocks which increase, or decrease, in price, crossing a left-digit within the period of observations (a calendar quarter). This sample selection therefore contains a large proportion of observations with prices at or just above $Y0$ in the price increasing sample, or at or just below $Y0$ in the price decreasing sample, as this is the minimum criteria for inclusion in the price increasing sample, or price decreasing sample, respectively. Hence, a large share of the total number of observations of sales in each sample is clustered around $Y0$.

This sample selection should not mechanistically create a higher *probability* of selling a stock at $Y0$ compared with other leftmost two digit prices in the range $X6 - Y5$ used in the analysis. However, to test for this we conduct a simulation analysis in which we assign sales randomly to investor $\times$ stock $\times$ days based on the average probability to sell observed in the data. If our main results are due to sample selection, we should see the jumps in probability of sale when sells are randomly assigned across observations. Figure A3 shows that with randomly allocated sales we see no evidence of discontinuity in the probability of sale when the leftmost digit changes. This suggests that our main result does not arise mechanistically due to the sample selection.

3.4 Sensitivity Tests

3.4.1 Variation in Time Period

We test the sensitivity of our main estimates to the time period over which changes in the leftmost digit are calculated in the price increasing sample and the price decreasing sample. In our main analysis this time period is a calendar quarter, with observations restricted to the set of login days within the quarter for which the prices on subsequent days were always above the price on the first day and the left-digit had changed within the quarter at least once on a subsequent login-day.

We show the sensitivity of our results to shortening the time period for this sample restrict to either one month, or extending the sample restriction to one year in Figure A4 and as a year in Figure A5. The patterns seen in these figures are very similar to those seen in the main analysis. Table A5 reports for summary statistics for the stock prices in the monthly and yearly samples, with Table A6 and Table A7 showing regression estimates.

3.4.2 Sell-Day Sample

We also test the sensitivity of the main results to restricting the sample to sell-days instead of login-days. One could conduct the analysis of all days, login-days, sell-days or some other restriction to types of days. In our main analysis we use login-days as these are days on which the probability of an investor paying attention to the prices of stocks in their portfolio is higher, because they make a login to the account. We further restrict to sell-days as on sell-days we might be expect an even higher probability that the investor pays attention to the prices of stocks in the portfolio, given that they make a sale.

We show results when restricting the baseline sample to sell-days in Figure A6. The same pattern is seen as in the main analysis, of a jump in the probability of sale when the price crosses the leftmost digit from below in the price increasing sample, and a jump in the probability of sale when the prices crosses the leftmost digit from above in the price decreasing sample. Regression estimates are shown in Table A8 and Table A9. We also show results from this analysis in sub-samples by pennies, pounds and tens of pounds in Figure A7 and Figure A8, with regression analysis for these sub-samples shown in Table A10 and Table A11.

4 Who Exhibits Left-Digit Bias?

In this section we explore heterogeneity in left-digit bias across investor characteristics and investor portfolio characteristics. First, we consider heterogeneity by investor gender and age. Previous studies show gender and age differences in trading behavior. Previous studies show gender and age differences in trading behavior (?; Agnew et al., 2003; Dorn and Huberman, 2005; Mitchell, Mottola, Utkus, and Yamaguchi, Mitchell et al.). To investigate, we split the sample by investor gender and also, separately, by investor age (splitting the sample at the age of the median investor). We then estimate our main models on both samples separately, for both the price increasing sample and the price decreasing sample. This approach allows the coefficients on all variables (not just the left-digit change dummy) to vary across samples.

4.1 Individual Characteristics

Results for investor sub-samples by age and gender are shown in Table 6 and Table 7. Results in Table 6 reveal a stronger left-digit effect among younger investors compared with older investors in the price increasing sample, with no difference by age group in the price decreasing sample. While Table 7 indicates no differences in left-digit effects by gender in either the price increasing sample or the price decreasing sample. Hence, there appears to be little variation in lef-digit sensitivity across investors by age and gender.

4.2 Portfolio Characteristics

Results for sub-sample by portfolio characteristics reveal a higher degree of heterogeneity. Table 8 - Table 10 show results by sub-samples according to median splits of portfolio value, account tenure and number of stocks held in the portfolio. Results in Table 8 show that the left-digit coefficient is larger among lower-value accounts. The coefficient on the left-digit dummy is approximately three times as large for investors with below-median portfolio values in the price increasing sample compared with investors with above-median portfolio values; and approximately two-thirds larger among investors with below-median portfolio values in the price decreasing sample compared with investors with above-median portfolio values.

Further, results in Table 9 show that the left-digit coefficient is also larger among younger accounts. The coefficient on the left-digit dummy is approximately two-fifths as large for investors with below-median account tenure in the price increasing sample compared with investors with above-median account tenure; and approximately one half larger among investors with below-median tenure in the price decreasing sample compared with investors with above-median tenure. This result is consistent with previous studies which suggest that the disposition effect declines with trading experience (Feng and Seasholes, 2005; Seru et al., 2010). Finally, Table 10 shows model estimates for sample split by the number of stocks held in the portfolio, with coefficients larger among the sub-samples with fewer stocks in the portfolio. The coefficient on the left-digit dummy is more that twice as large for investors with below-median number of stocks in the price increasing sample compared with investors with above-median number of stocks; and approximately two thirds larger among investors with below-median number of stocks in the price decreasing sample compared with investors with above-median number of stocks.

4.3 Individual Estimates of Left-Digit Bias

In this section we estimate left-digit bias at the individual level. While the previous analysis focused on subsamples of investors by investor characteristics and portfolio characteristics, in this section we estimate a left-digit bias coefficient for each investor. To do so, we aggregate the increasing price samples (including the monthly, quarterly and annual samples) and, identically, the decreasing price samples. We then estimate a left-digit bias coefficient for each investor in the increasing price sample and, separately, a left-digit bias coefficient for each investor in the decreasing price sample.[16]. We restrict this analysis to investors who place at least five trades (sells) in the aggregate samples. We then regress the sell dummy on the *'Above Y0=1'* dummy (or left digit bias) as in Column 1 of Table 4 for every investor in the samples.

Figure 5 displays the distribution of left-digit bias coefficients for the price increasing samples (left panel) and the price decreasing samples (right panel). Dashed lines indicate the mean coefficient value in each panel.[17] The plots show evident right and left skewed distributions: investors are clearly more likely to sell a stock after crossing a leftmost digit from below (left panel with positive coefficients), or from above (right panel with negative coefficients). There is, however, a large degree of heterogeneity in the individual behaviour.

Table A12 summarises the distribution of coefficients. The left-digit bias coefficient in the aggregate prices increasing samples range from -0.051 to 0.111; while in the aggregate price decreasing samples, from -0.112 to 0.06. Despite the individual heterogeneity, distributions appear to mirror each other. Table A12 shows that the median coefficient in the cross-section of investors in the price increasing samples is 0.006. This coefficient implies that the median investor in our data is 0.6 percentage point more likely to sell a stock whose price has cross a left digit from below. Similarly, the median coefficient in the cross-section of investors in the price decreasing samples is -0.003. Again, this coefficient implies that the median investor in our data is 0.3 percentage points more likely to sell a stock whose price has cross a left digit

[16] In cases where an investor enters only one of the samples we estimate only one left-digit bias coefficient.
[17] Outliers below the 5 percentile and above the 95 percentile are excluded from the plot.

from above. These pattern of estimates is consistent with or main results in Table 4 and Table 5.

To obtain indicative evidence of how individual characteristics vary with different degrees of left-digit bias, we split the data by quartiles of the left-digit bias coefficient. Table A13 examine the demographic characteristics for investors in the price increasing samples and Table A14, in the price decreasing samples. Looking at Table A13, it is clear that investors prone to the left digit bias (i.e., with positive coefficients, belonging to quartiles 2 to 4) are less experienced and hold smaller portfolios: investors in the top quartile of the left-digit bias coefficient are younger and with few years of account tenure, hold a few number of stocks, hold smaller portfolio sizes, and trade less frequently. A parallel pattern is observed in Table A14 for the set of investors prone to the left-digit bias when prices decrease (i.e., with negative coefficients, belonging to quartiles 1 to 3). Our estimates suggest that the heterogeneity in the size of the left-digit bias is in part driven by investors experience.

5 Conclusion

In this paper, we use detailed daily-level data from an online stockbroking service to show that investors are significantly more likely to sell stocks following a change in the left-digit of the stock price. This increased probability of sale occurs both for stock crossing a left-digit from below, as the stock price increases, and for stocks crossing a left-digit from above, as the stock price falls.

Our results are consistent with investors focusing their attention on the leftmost digit of the stock price and paying less attention to the following digits. The behaviour we observe results from investors' responses to changes in left-digits as not due to investors choosing round number values as strike prices for limit orders. When we control for limit orders, removing trades from the sample that are most likely to be placed with limit orders, our main results are unchanged.

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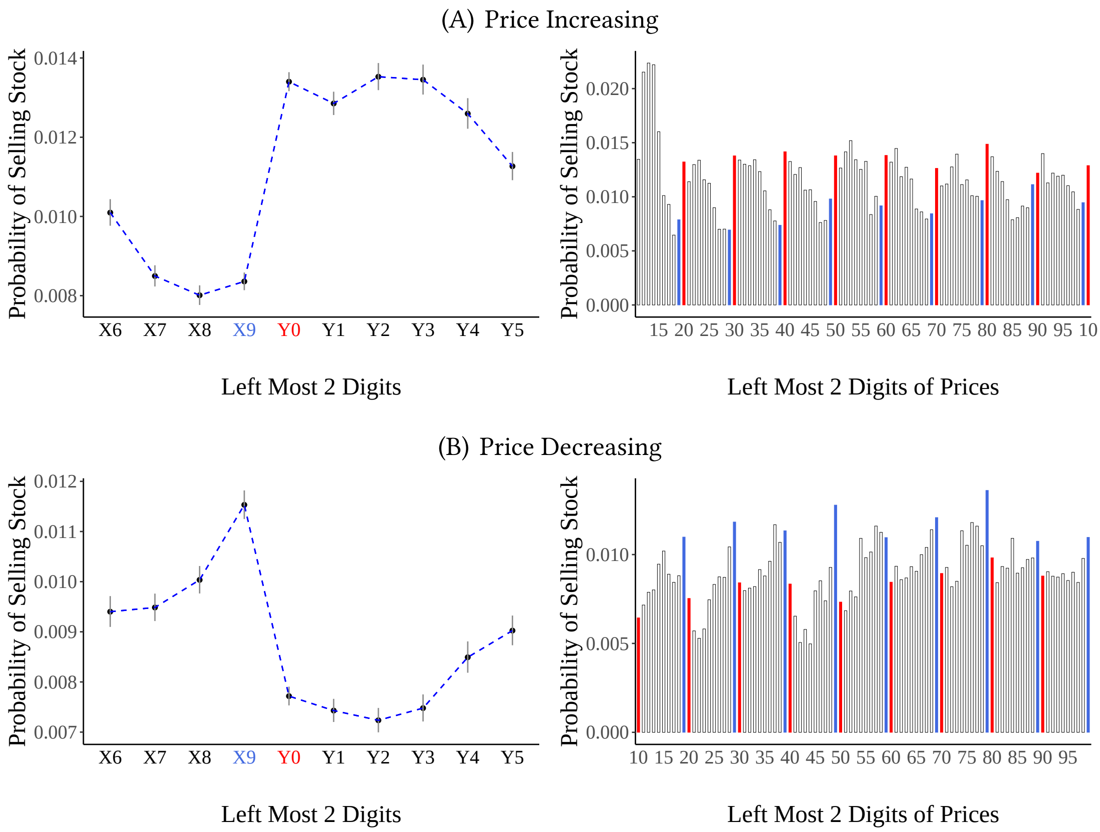
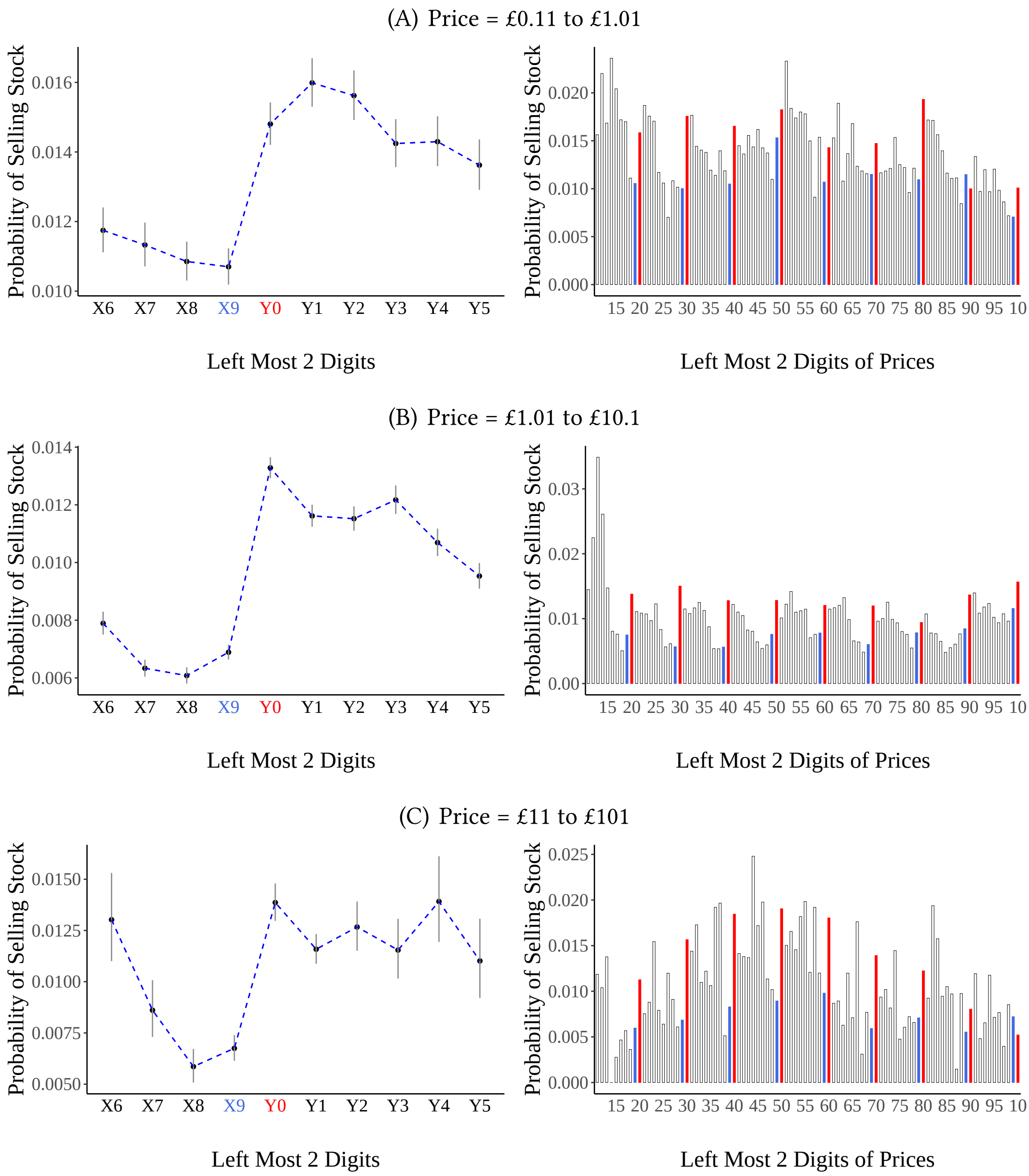
Figure 1: Leftmost Stock Price Digit and Probability of Sale, Quarterly Sample



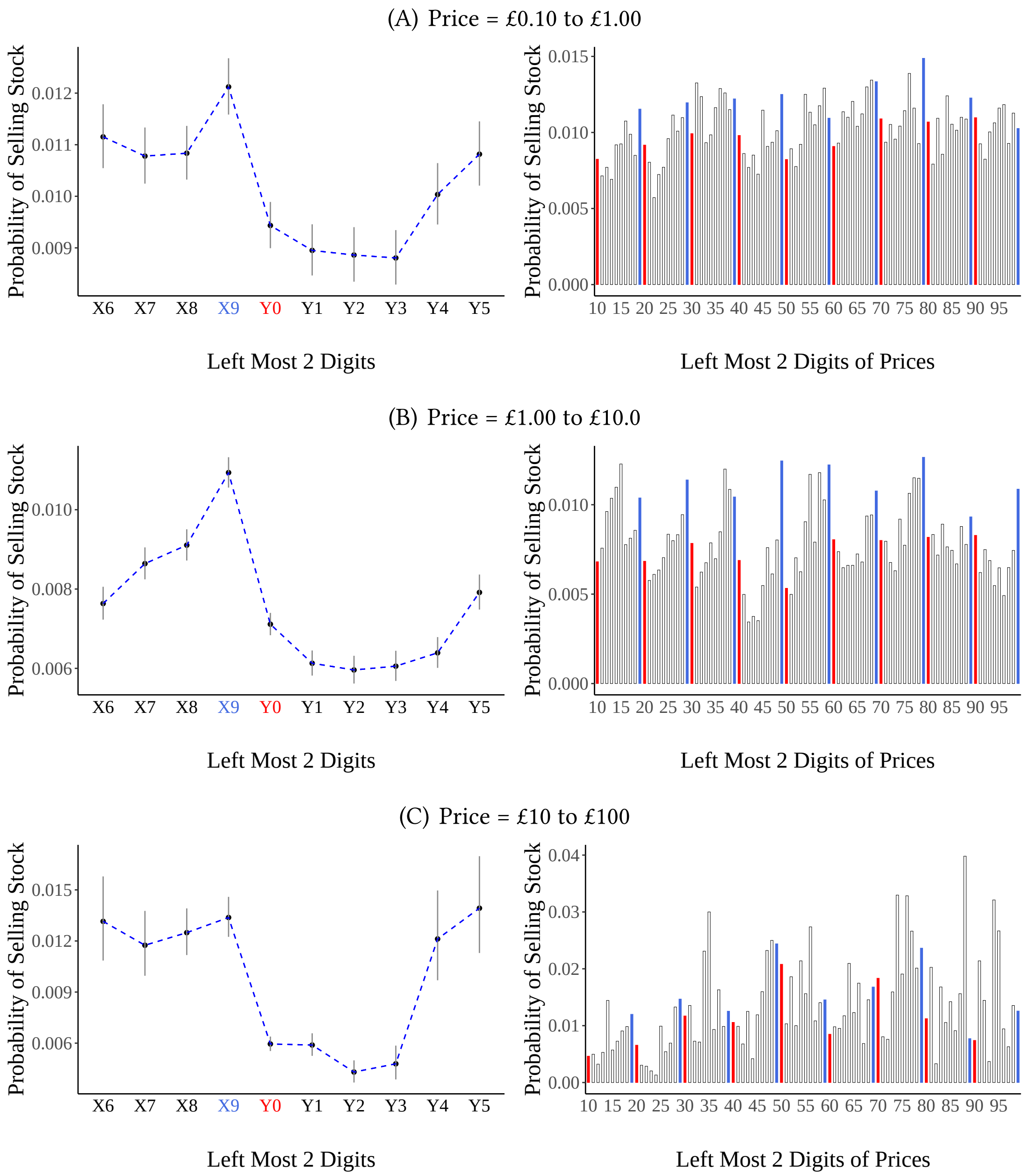
Note: £Y in the X-axes is equivalent to £$X+1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.).

Figure 2: Leftmost Stock Price Digit and Probability of Sale
Prices Increasing Sample by Price Range



Note: $£Y$ in the X-axes is equivalent to $£X+1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). Panels A, B and C show equal size bins of 1p, 10p and £1, respectively. Panel A corresponds to 25% of the observations in the prices increasing sample; Panel B, to 55%; and Panel C, to 7%.

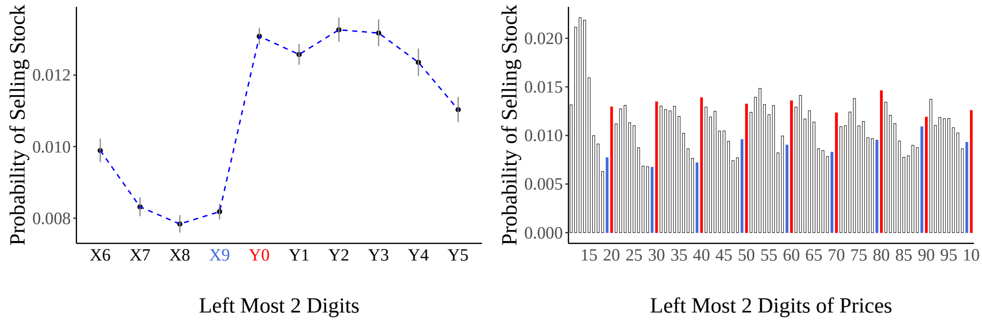
Figure 3: Leftmost Stock Price Digit and Probability of Sale
Prices Decreasing Sample by Price Range



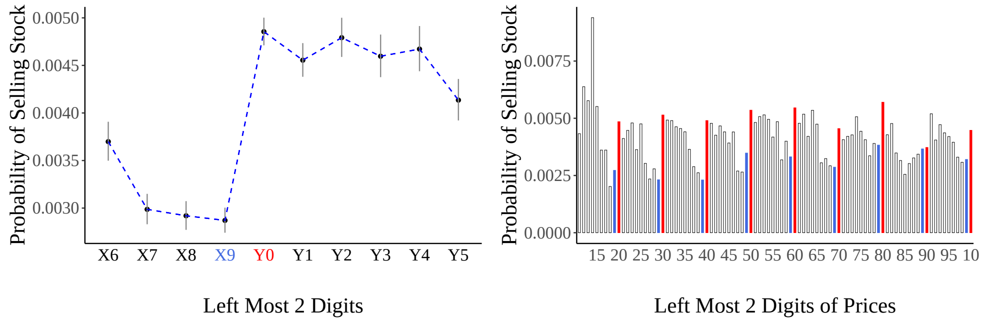
Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). Panels A, B and C show equal size bins of 1p, 10p and £1, respectively. Panel A corresponds to 27% of the observations in the prices decreasing sample; Panel B, to 44%; and Panel C, to 7%.

Figure 4: Leftmost Stock Price Digit and Probability of Sale,
Prices Increasing Sample Limit Order Robustness Tests

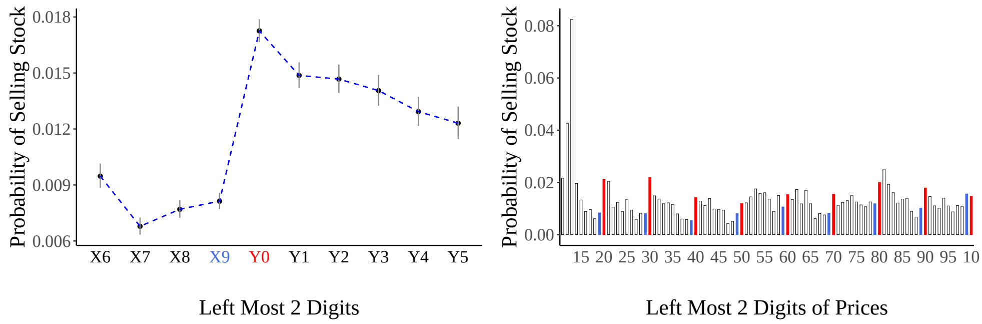
(A) Excluding Pre-Market and After-Hours Sells (Outside 8am to 4:30pm)



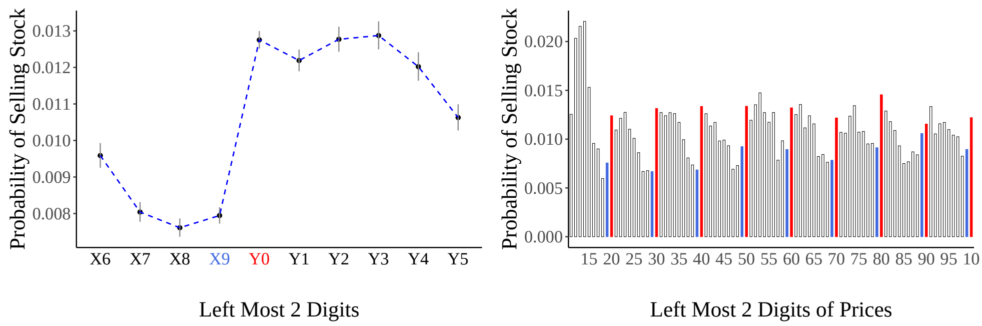
(B) Excluding Sells with Login the Day Before or Weekend Logins for Monday Sells



(C) Including Only FTSE100 Stocks

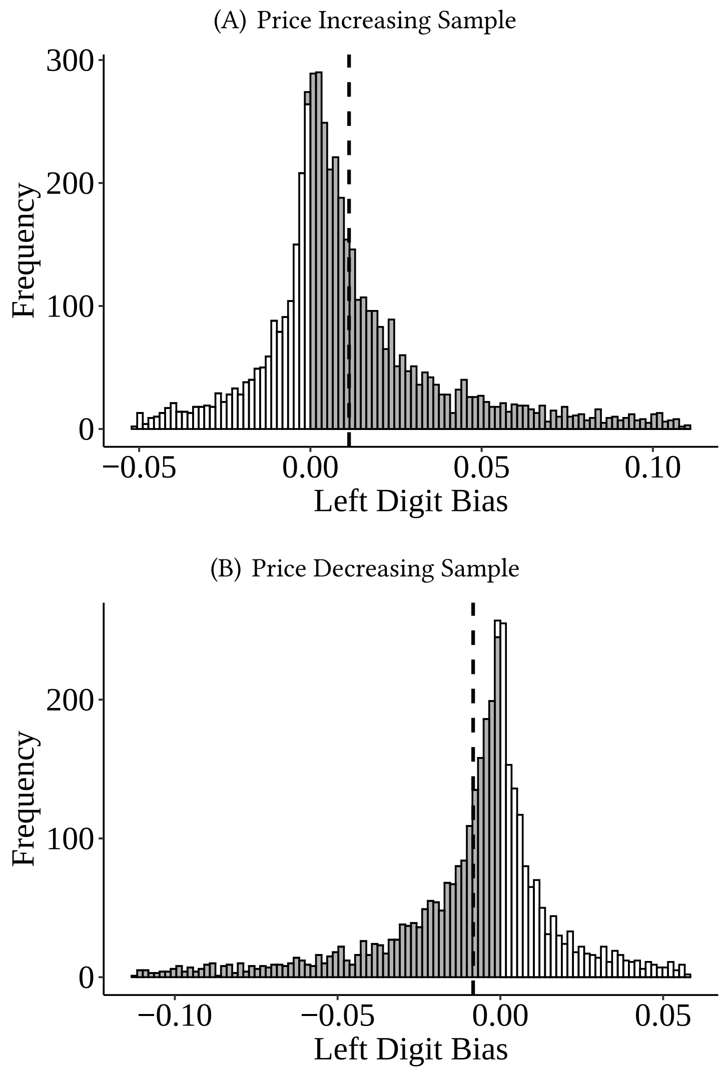


(D) Excluding Accounts with Potential Limit Orders (Linnainmaa, 2010)



Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). Panels display different sample restrictions to exclude sells corresponding to limit orders. Panel A drops sells executed when the market was closed. It also exclude potential discretionary trades (high frequency trades executed on the same stock, at the same time and at the same price that would likely correspond to sells arranged by Barclays discretionary service). Panel B excludes sells with a preceding login day. Panel C exclude non-liquid stocks, and Panel D excludes potential limit orders following Linnainmaa (2010) methodology. Panel A drops 2.2% of sells, Panel B drops 64.7% of sells, Panel C drops 75.9% of sells, and Panel D drops 11.4% of sells.

Figure 5: Distribution of Individual Left Digit Bias Coefficient Estimates



Note: The histograms plot the distribution of the coefficients for the dummy *Above Y0=1* (or left digit bias) for each account in the aggregate of price increasing samples (including the monthly, quarterly and annual samples) (left panel) and the aggregate of price decreasing samples (right panel). The dashed line reflects the mean of the distributions. Only accounts displaying at least 5 sells in the data are included (4,987 accounts in the left panel and 3,544 in the right panel). Outliers below the 5 percentile and above the 95 percentile are excluded.

Table 1: Sample Selection

	Accounts	Logins	Sells
Unrestricted Sample	91817	135331214	993312
Drop due to:			
Inactive Accounts	28990	15951667	39075
Unmatched Prices	581	26014606	101667
At Least Two Stocks in Portfolio	5999	1444418	65638
Missing Demographic Data	2282	3980478	35724
Starting Position Days	40	726121	49899
Portfolio outliers	653	2631071	16339
Baseline sample	53272	84582853	684970

Note: The unrestricted sample contains 155,300 accounts. We use a 60% random sample of accounts. The table detail the steps in sample selection. Logins and Sells are at the account $\times$ stock $\times$ day level.

Table 2: Baseline Sample Summary Statistics

	Mean	Min	p25	p50	p75	Max
A. Account Holder Characteristics						
Female	0.189					
Age (years)	54.848	17.000	47.000	57.000	67.000	87.000
Account Tenure (years)	5.291	0.060	3.063	4.049	6.959	16.975
B. Account Characteristics						
Portfolio Value (£10000)	7.106	0.000	0.654	1.911	5.347	265.820
Investment in Mutual Funds (£10000)	0.477	0.000	0.000	0.000	0.000	166.345
Investment in Mutual Funds (%)	7.862	0.000	0.000	0.000	0.000	12606.139
Number of Stocks	5.900	2.000	2.429	3.894	7.000	176.818
Login days (% all days)	18.749	0.076	4.261	11.528	28.603	100.000
Transaction days (% all market open days)	3.249	0.036	0.844	1.657	3.462	100.000
N Accounts	53272					

Note: This table presents summary statistics for the baseline sample of accounts. Age is measured at date of account opening. Account tenure is measured on the final day of the data period. Portfolio value is the value of all securities within the portfolio at market prices. Portfolio value, number of stocks and investment in mutual funds are measured as within-account averages of values at the first day of each calendar month in the data period. Login days is the percentage of days the account is open in the data period and the account holder made at least one login. Transaction days is the percentage of market open days the account is open in the data period and the account holder made at least one trade.

Table 3: Summary Stats, Quarterly Sample

Panel (A): Baseline Sample

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Price on Login Days £	84,582,853	7.392	24.028	0.000	1.144	2.989	7.348	15,051.630
Price on Sell Days £	6,390,539	6.626	23.524	0.000	0.835	2.585	6.360	3,589.000
Price of Stocks Sold £	684,970	7.069	28.262	0.000	0.844	2.645	6.479	2,057.994

Panel (B): Price Increasing Sample

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
All Stocks	4,869,714	6.035	20.802	0.000	0.738	2.961	6.074	3,589.000
Between £0.11 to £1.01	1,221,843	0.602	0.256	0.110	0.385	0.630	0.812	1.010
Between £1.1 to £10.1	2,670,842	4.864	2.305	1.100	2.947	4.519	6.550	10.100
Between £11 to £101	358,540	33.963	20.723	11.000	19.620	29.400	43.825	100.996

Panel (C): Price Decreasing Sample

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
All Stocks	4,903,878	4.116	19.497	0.000	0.178	1.030	4.492	2,062.035
Between £0.10 to £1.0	1,346,143	0.513	0.270	0.100	0.276	0.486	0.755	1.000
Between £1 to £10	2,144,544	4.507	2.511	1.000	2.349	4.112	6.227	10.000
Between £10 to £100	340,298	24.961	17.954	10.000	10.870	20.510	29.940	99.990

Table 4: Probability of Sale and Left Digit, Price Increasing Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0044***	0.0055***	0.0050***	0.0055***	0.0061***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0003***	-0.0004***	-0.0005***	-0.0008***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0005***	-0.0003***	-0.0003***	-0.0002***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0086***	0.0080***	0.0077***		
	(0.0001)	(0.0001)	(0.0008)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,869,714	4,869,714	4,869,714	4,869,714	4,869,714
R^2	0.0004	0.0004	0.0017	0.0679	0.0728

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (X0). SE are clustered by account.

Table 5: Probability of Sale and Left Digit, Price Decreasing Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	-0.0024***	-0.0038***	-0.0042***	-0.0039***	-0.0040***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		0.0002***	0.0003***	0.0004***	0.0004***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		0.0007***	0.0008***	0.0006***	0.0006***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0102***	0.0112***	0.0158***		
	(0.0002)	(0.0002)	(0.0012)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,903,878	4,903,878	4,903,878	4,903,878	4,903,878
R^2	0.0002	0.0002	0.0005	0.0675	0.0717

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks have not increased in price (regarding the first observation of the quarter) and have not changed the left most digit at least once during the quarter. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (X0). SE are clustered by account.

Table 6: Probability of Sale and Left Digit, Splitting by Median Age

	Prices Increasing Sample		Prices Decreasing Sample	
	Below Median	Above Median	Below Median	Above Median
Above Y0 = 1 (in Y0 - Y5)	0.0075***	0.0047***	-0.0040***	-0.0040***
	(0.0003)	(0.0002)	(0.0002)	(0.0003)
Digits Y0 - Y5	-0.0009***	-0.0006***	0.0004***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits X6 - X9	-0.0003***	-0.0001	0.0007***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Day FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Account FE	YES	YES	YES	YES
Stock FE	YES	YES	YES	YES
Observations	2,580,896	2,288,818	2,654,464	2,249,414
R^2	0.0866	0.0506	0.0869	0.0487

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased/decreased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (Y0). SE are clustered by account.

Table 7: Probability of Sale and Left Digit, Splitting by Gender

	Prices Increasing Sample		Prices Decreasing Sample	
	Female	Male	Female	Male
Above Y0 = 1 (in Y0 - Y5)	0.0064***	0.0061***	-0.0037***	-0.0040***
	(0.0004)	(0.0002)	(0.0004)	(0.0002)
Digits Y0 - Y5	-0.0006***	-0.0008***	0.0005***	0.0004***
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Digits X6 - X9	-0.0004***	-0.0001**	0.0005***	0.0006***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Day FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Account FE	YES	YES	YES	YES
Stock FE	YES	YES	YES	YES
Observations	837,223	4,032,491	787,316	4,116,562
R^2	0.0700	0.0746	0.0703	0.0731

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased/decreased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (Y0). SE are clustered by account.

Table 8: Probability of Sale and Left Digit, Splitting by Portfolio Value

	Prices Increasing Sample		Prices Decreasing Sample	
	Below Median	Above Median	Below Median	Above Median
Above Y0 = 1 (in Y0 - Y5)	0.0090***	0.0035***	-0.0049***	-0.0030***
	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Digits Y0 - Y5	-0.0011***	-0.0004***	0.0005***	0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0000)
Digits X6 - X9	-0.0003***	-0.0001	0.0008***	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Day FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Account FE	YES	YES	YES	YES
Stock FE	YES	YES	YES	YES
Observations	2,390,422	2,479,292	2,496,374	2,407,504
R^2	0.1030	0.0503	0.1063	0.0437

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased/decreased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (Y0). SE are clustered by account.

Table 9: Probability of Sale and Left Digit, Splitting by Account Tenure

	Prices Increasing Sample		Prices Decreasing Sample	
	Below Median	Above Median	Below Median	Above Median
Above Y0 = 1 (in Y0 - Y5)	0.0072***	0.0052***	-0.0046***	-0.0033***
	(0.0003)	(0.0002)	(0.0003)	(0.0003)
Digits Y0 - Y5	-0.0009***	-0.0006***	0.0005***	0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0000)
Digits X6 - X9	-0.0002*	-0.0002**	0.0006***	0.0005***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Day FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Account FE	YES	YES	YES	YES
Stock FE	YES	YES	YES	YES
Observations	2,394,197	2,475,517	2,495,063	2,408,815
R^2	0.0831	0.0607	0.0792	0.0645

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased/decreased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (Y0). SE are clustered by account.

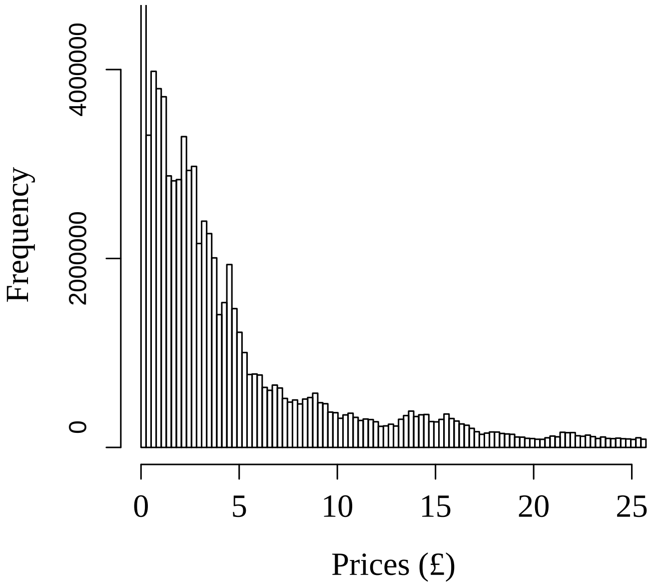
Table 10: Probability of Sale and Left Digit, Splitting by Number of Stocks

	Prices Increasing Sample		Prices Decreasing Sample	
	Below Median	Above Median	Below Median	Above Median
Above Y0 = 1 (in Y0 - Y5)	0.0088***	0.0031***	-0.0049***	-0.0030***
	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Digits Y0 - Y5	-0.0011***	-0.0004***	0.0005***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0000)
Digits X6 - X9	-0.0003***	-0.0001	0.0009***	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Day FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Account FE	YES	YES	YES	YES
Stock FE	YES	YES	YES	YES
Observations	2,650,726	2,218,988	2,492,742	2,411,136
R^2	0.0908	0.0377	0.0934	0.0329

Note: The unit of observation is an investor × stock × day. The samples is restricted to login days. We include only quarters in which the stocks increased/decreased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (Y0). SE are clustered by account.

Online Only Appendix

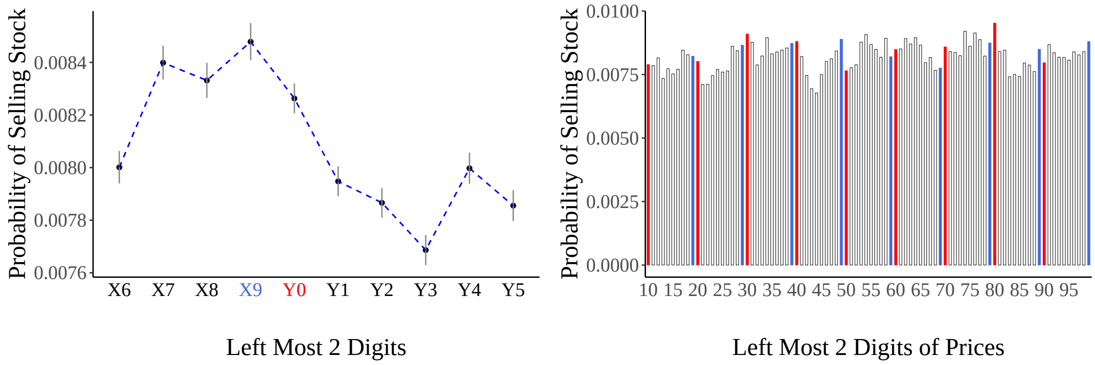
Figure A1: Histogram of Stock Prices



Note: Figure shows the histogram of prices on login days. Outliers above the 95 percentile are excluded.

Figure A2: Leftmost Stock Price Digit and Probability of Sale, Quarterly Sample

(A) All Observations Sample



Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). The figure exclude an atypical spike in sells on 2014-02-26 of stock US92343V1044 (99.99% of the total number of sales executed for that stock during the sample period).

Figure A3: Sample Selection and Simulation Exercise

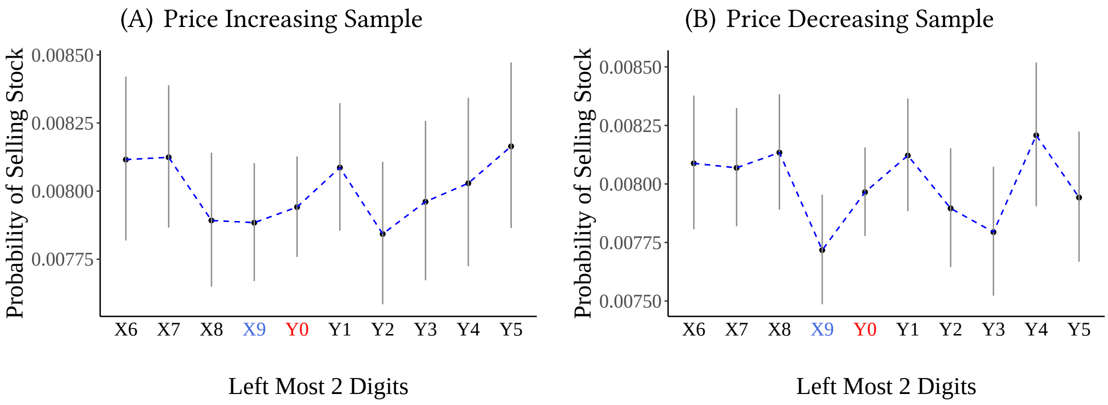
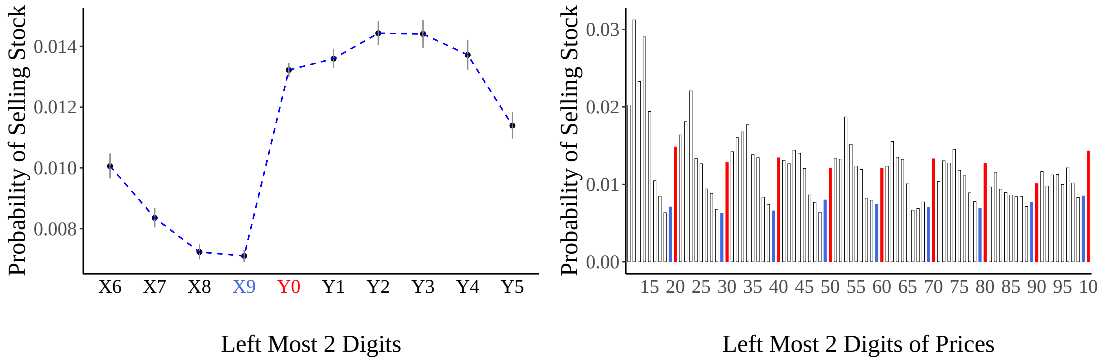
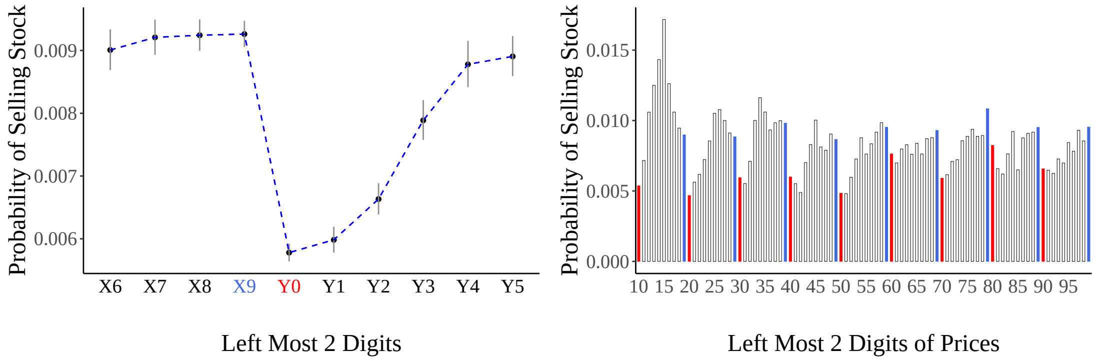


Figure A4: Leftmost Stock Price Digit and Probability of Sale, Monthly Sample

(A) Price Increasing

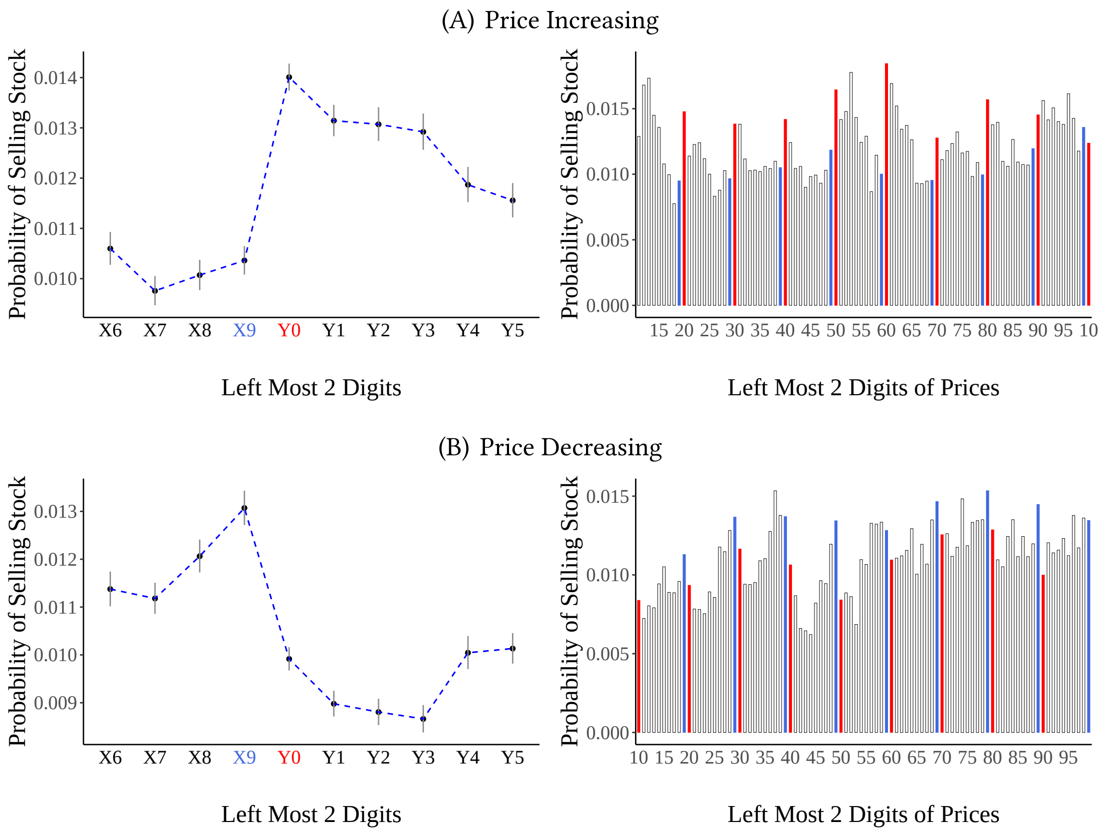


(B) Price Decreasing



Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.).

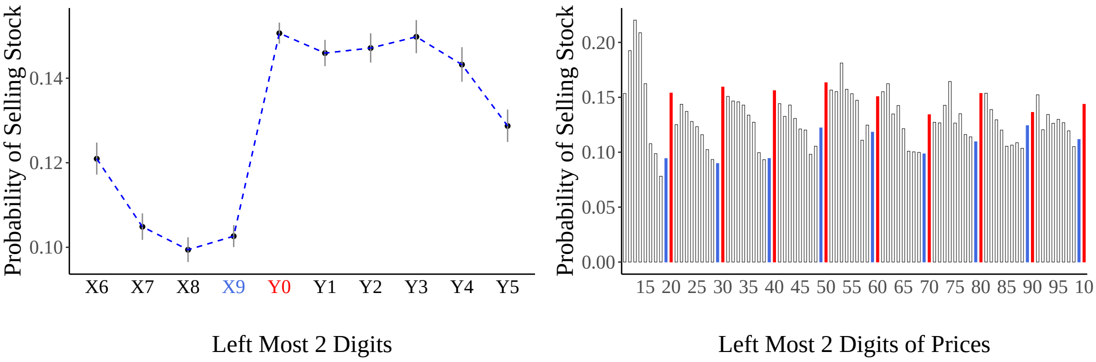
Figure A5: Leftmost Stock Price Digit and Probability of Sale, Annual Sample



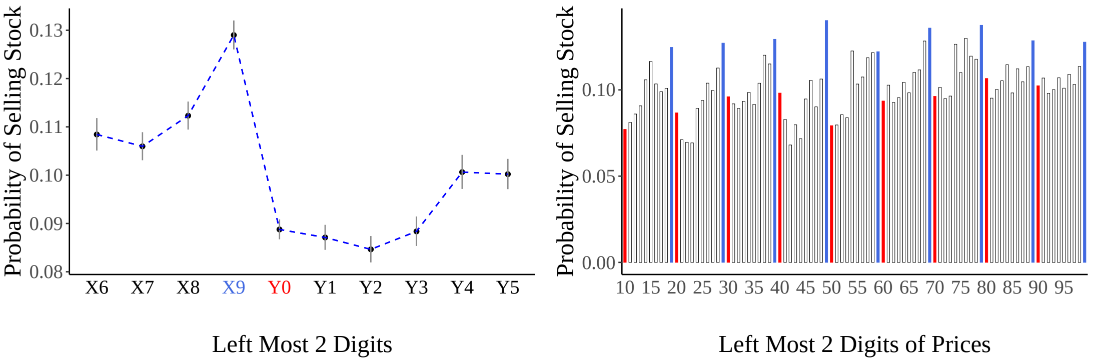
Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.).

Figure A6: Leftmost Stock Price Digit and Probability of Sale, Sell Days

(A) Price Increasing

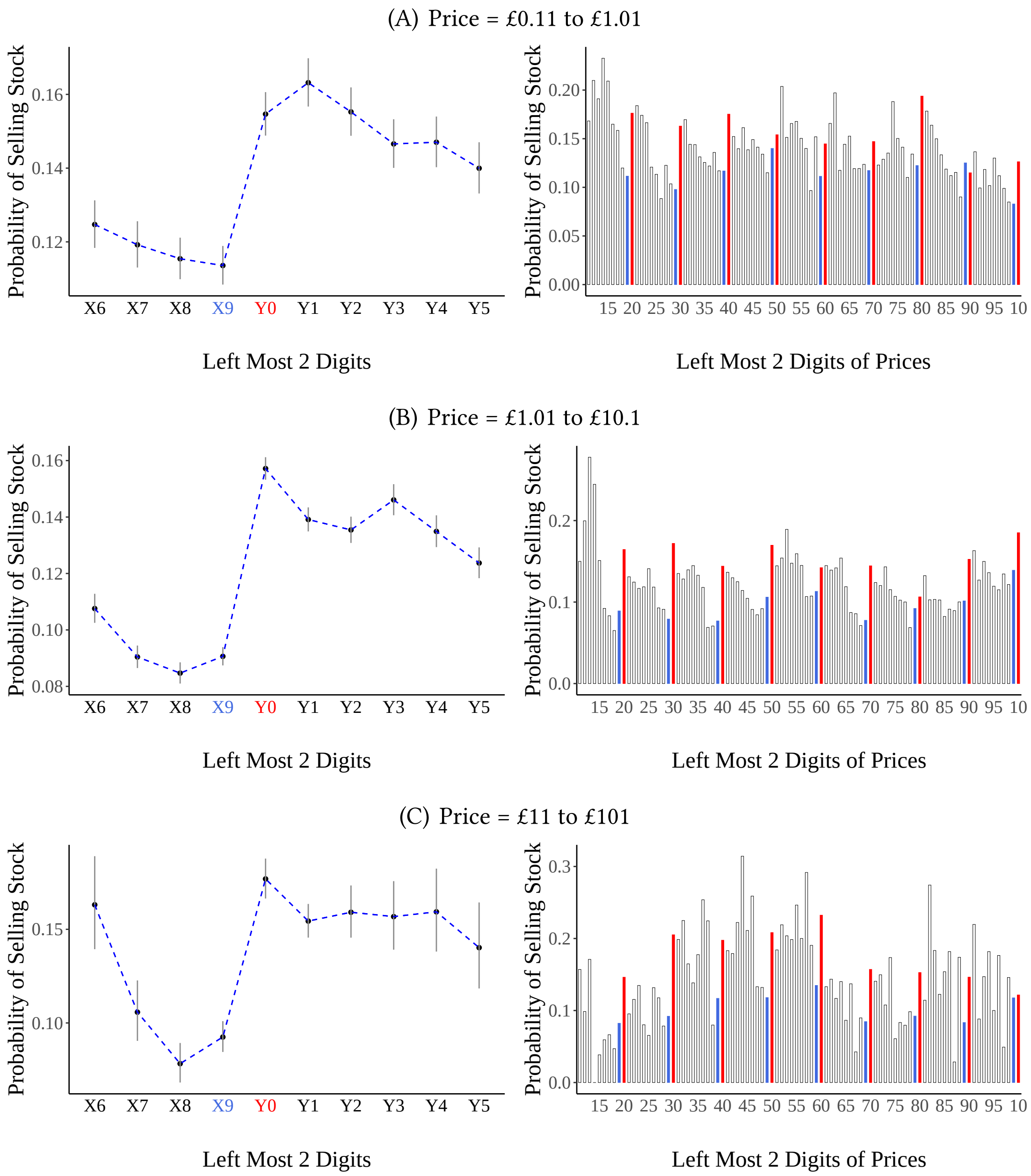


(B) Price Decreasing



Note: £Y in the X-axes is equivalent to £$X + 1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.).

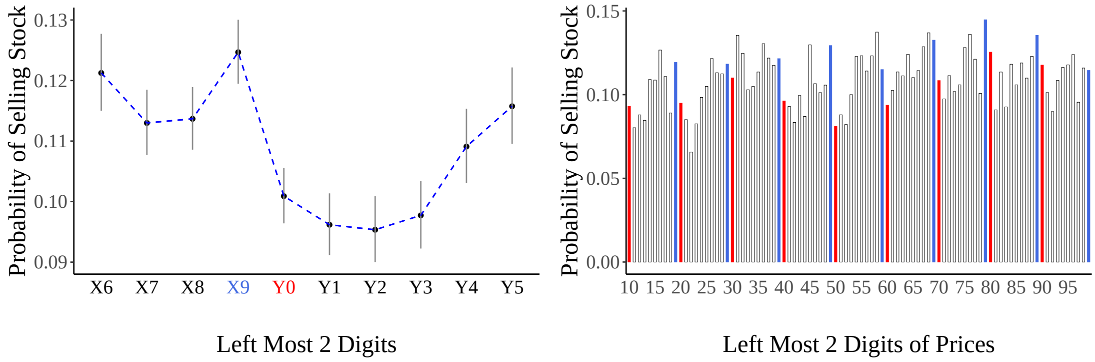
Figure A7: Leftmost Stock Price Digit and Probability of Sale, Sell Days
Prices Increasing Sample by Price Range



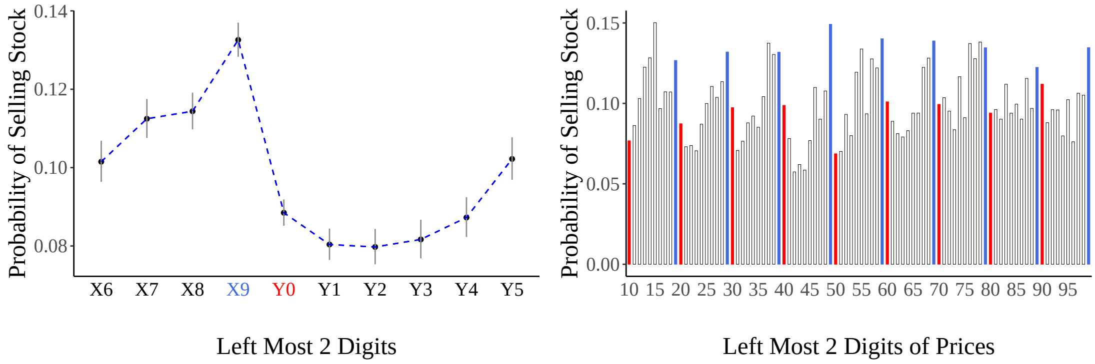
Note: £Y in the X-axes is equivalent to £$X+1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). Panels A, B and C show equal size bins of 1p, 10p and £1, respectively.

Figure A8: Leftmost Stock Price Digit and Probability of Sale, Sell Days Prices Decreasing Sample by Price Range

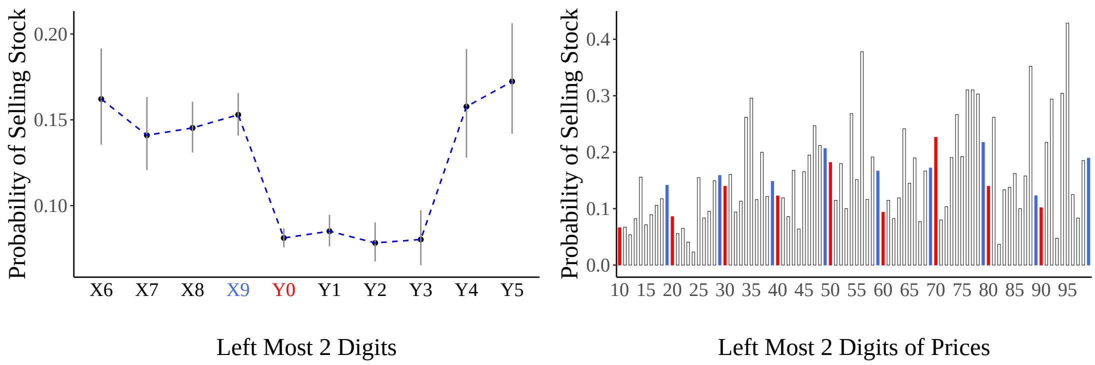
(A) Price = £0.10 to £1.00



(B) Price = £1.00 to £10.0



(C) Price = £10 to £100



Note: £Y in the X-axes is equivalent to £$X+1$ (e.g., £X9 could include £0.19, £1.9, £19, etc., while £Y0 could include £0.20, £2.0, £20, etc.). Panels A, B and C show equal size bins of 1p, 10p and £1, respectively.

Table A1: Price Increasing Subsamples with Equal Prices Bins

Panel (A): Price = £0.11 to £1.01

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0037***	0.0049***	0.0046***	0.0048***	0.0047***
	(0.0002)	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Digits Y0 - Y5		-0.0003***	-0.0003***	-0.0004***	-0.0006***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits X6 - X9		-0.0004***	-0.0002	-0.0003**	-0.0003**
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0111***	0.0106***	0.0221***		
	(0.0003)	(0.0003)	(0.0031)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	1,221,843	1,221,843	1,221,843	1,221,843	1,221,843
R^2	0.0003	0.0003	0.0013	0.1013	0.1080

Panel (B): Price = £1.01 to £10.1

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0050***	0.0065***	0.0063***	0.0064***	0.0067***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0006***	-0.0007***	-0.0006***	-0.0008***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits X6 - X9		-0.0002***	-0.0001**	-0.0002***	-0.0001
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0067***	0.0065***	0.0134***		
	(0.0001)	(0.0002)	(0.0026)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	2,670,842	2,670,842	2,670,842	2,670,842	2,670,842
R^2	0.0007	0.0007	0.0020	0.0738	0.0764

Panel (C): Price = £11 to £101

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0052***	0.0068***	0.0069***	0.0085***	0.0091***
	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
Digits Y0 - Y5		-0.0003	-0.0004*	0.0001	-0.0000
		(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits X6 - X9		-0.0015***	-0.0018***	-0.0015***	-0.0015***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)
Constant	0.0073***	0.0061***	-0.0024***		
	(0.0003)	(0.0003)	(0.0007)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	358,540	358,540	358,540	358,540	358,540
R^2	0.0006	0.0007	0.0030	0.1395	0.1444

Table A2: Price Decreasing Subsamples with Equal Prices Bins

Panel (A): Price = £0.10 to £1.00

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0037***	0.0049***	0.0046***	0.0048***	0.0047***
	(0.0002)	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Digits Y0 - Y5		-0.0003***	-0.0003***	-0.0004***	-0.0006***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits X6 - X9		-0.0004***	-0.0002	-0.0003**	-0.0003**
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0111***	0.0106***	0.0221***		
	(0.0003)	(0.0003)	(0.0031)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	1,221,843	1,221,843	1,221,843	1,221,843	1,221,843
R^2	0.0003	0.0003	0.0013	0.1013	0.1080

Panel (B): Price = £1.00 to £10.0

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	-0.0027***	-0.0042***	-0.0045***	-0.0045***	-0.0042***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		0.0001	0.0001*	0.0004***	0.0004***
		(0.0000)	(0.0000)	(0.0001)	(0.0001)
Digits X6 - X9		0.0011***	0.0011***	0.0007***	0.0007***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0093***	0.0107***	0.0207***		
	(0.0002)	(0.0002)	(0.0080)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	2,144,544	2,144,544	2,144,544	2,144,544	2,144,544
R^2	0.0002	0.0003	0.0008	0.0797	0.0838

Panel (C): Price = £10 to £100

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	-0.0069***	-0.0077***	-0.0069***	-0.0058***	-0.0046***
	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0008)
Digits Y0 - Y5		0.0006***	0.0007***	0.0006***	0.0003
		(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits X6 - X9		0.0003	0.0007*	0.0001	0.0003
		(0.0004)	(0.0004)	(0.0004)	(0.0004)
Constant	0.0128***	0.0132***	0.0080***		
	(0.0006)	(0.0006)	(0.0017)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	340,298	340,298	340,298	340,298	340,298
R^2	0.0012	0.0012	0.0031	0.1497	0.1554

Table A3: Price Increasing Sample
Limit Order Robustness Tests

Panel (A): Excluding Pre-Market and After-Hours Sells (Outside 8am to 4:30pm)

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0043***	0.0054***	0.0049***	0.0053***	0.0059***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0003***	-0.0004***	-0.0005***	-0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0005***	-0.0003***	-0.0002***	-0.0002***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0084***	0.0078***	0.0075***		
	(0.0001)	(0.0001)	(0.0008)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,868,538	4,868,538	4,868,538	4,868,538	4,868,538
R^2	0.0004	0.0004	0.0018	0.0688	0.0736

Panel (B): Excluding Sells with Login the Day Before or Weekend Logins for Monday Sells

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0016***	0.0021***	0.0020***	0.0023***	0.0025***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits Y0 - Y5		-0.0001***	-0.0001***	-0.0002***	-0.0003***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0002***	-0.0002***	-0.0002***	-0.0002***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	0.0031***	0.0028***	0.0012***		
	(0.0001)	(0.0001)	(0.0003)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,834,411	4,834,411	4,834,411	4,834,411	4,834,411
R^2	0.0002	0.0002	0.0010	0.0616	0.0643

Note: Panels A, B and C show equal size bins of 1p, 10p and £1, respectively. Panel A drops 0.018% of sells, Panel B drops 61% of sells, Panel C drops 76% of sells, and Panel D drops 11% of sells.

Table A4: Price Increasing Sample
Limit Order Robustness Tests

Panel (C): Including Only FTSE100 Stocks

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0070***	0.0090***	0.0087***	0.0096***	0.0098***
	(0.0002)	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Digits Y0 - Y5		-0.0010***	-0.0009***	-0.0009***	-0.0009***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Digits X6 - X9		-0.0001	-0.0001	-0.0005***	-0.0005***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0079***	0.0077***	0.0259***		
	(0.0002)	(0.0002)	(0.0013)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	1,126,143	1,126,143	1,126,143	1,126,143	1,126,143
R^2	0.0010	0.0012	0.0025	0.1024	0.1031

Panel (D): Excluding Accounts with Potential Limit Orders (Linnainmaa, 2010)

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0042***	0.0052***	0.0048***	0.0053***	0.0059***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0003***	-0.0004***	-0.0005***	-0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0004***	-0.0003***	-0.0003***	-0.0002***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0082***	0.0076***	0.0069***		
	(0.0001)	(0.0001)	(0.0008)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,553,582	4,553,582	4,553,582	4,553,582	4,553,582
R^2	0.0004	0.0004	0.0016	0.0700	0.0745

Note: Panels A, B and C show equal size bins of 1p, 10p and £1, respectively. Panel A drops 0.018% of sells, Panel B drops 61% of sells, Panel C drops 76% of sells, and Panel D drops 11% of sells.

Table A5: Summary Stats for Annual and Monthly Samples

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Monthly Increasing Sample	4,320,119	5.377	25.084	0.000	0.565	2.628	6.008	3,589.000
Monthly Decreasing Sample	5,124,666	4.625	24.242	0.000	0.211	1.002	5.038	2,062.035
Annual Increasing Sample	4,561,585	7.739	22.449	0.000	1.070	3.584	7.204	3,589.500
Annual Decreasing Sample	4,184,114	3.932	20.374	0.000	0.160	1.090	4.240	2,062.035

Table A6: Price Increasing Samples, Monthly and Annual Samples

Panel (A): Monthly Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0057***	0.0067***	0.0062***	0.0065***	0.0070***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0001*	-0.0002***	-0.0005***	-0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0009***	-0.0005***	-0.0001	-0.0001
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0078***	0.0069***	0.0102***		
	(0.0001)	(0.0001)	(0.0012)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,320,119	4,320,119	4,320,119	4,320,119	4,320,119
R^2	0.0007	0.0007	0.0018	0.0632	0.0681

Panel (B): Annual Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	0.0028***	0.0038***	0.0035***	0.0042***	0.0048***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		-0.0005***	-0.0005***	-0.0005***	-0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		-0.0000	0.0000	-0.0002**	-0.0001
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0102***	0.0102***	0.0089***		
	(0.0002)	(0.0002)	(0.0009)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,561,585	4,561,585	4,561,585	4,561,585	4,561,585
R^2	0.0002	0.0002	0.0025	0.0763	0.0812

Table A7: Price Decreasing Samples, Monthly and Annual Samples

Panel (A): Monthly Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	-0.0024***	-0.0037***	-0.0040***	-0.0040***	-0.0042***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Digits Y0 - Y5		0.0007***	0.0007***	0.0006***	0.0006***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		0.0001	0.0002***	0.0002***	0.0003***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0092***	0.0093***	0.0148***		
	(0.0002)	(0.0002)	(0.0010)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	5,124,666	5,124,666	5,124,666	5,124,666	5,124,666
R^2	0.0002	0.0003	0.0006	0.0590	0.0623

Panel (B): Annual Sample

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Y0 - Y5)	-0.0025***	-0.0035***	-0.0039***	-0.0032***	-0.0030***
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Digits Y0 - Y5		0.0001	0.0000	0.0003***	0.0003***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Digits X6 - X9		0.0006***	0.0008***	0.0004***	0.0004***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.0119***	0.0128***	0.0168***		
	(0.0002)	(0.0003)	(0.0012)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	4,184,114	4,184,114	4,184,114	4,184,114	4,184,114
R^2	0.0001	0.0002	0.0006	0.0796	0.0845

Table A8: Probability of Sale and Left Digit, Price Increasing Sample, Sell Days

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	0.0401***	0.0523***	0.0495***	0.0424***	0.0463***
	(0.0019)	(0.0025)	(0.0025)	(0.0024)	(0.0024)
Stock Digits Y0 to Y5		-0.0030***	-0.0036***	-0.0036***	-0.0057***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)
Stock Digits X6 to X9		-0.0052***	-0.0038***	-0.0022***	-0.0015*
		(0.0008)	(0.0008)	(0.0007)	(0.0008)
Constant	0.1057***	0.0991***	0.0958***		
	(0.0032)	(0.0032)	(0.0092)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	418,946	418,946	418,946	418,946	418,946
R^2	0.0033	0.0036	0.0112	0.2464	0.2715

Note: The unit of observation is an investor × stock × day. The samples is restricted to sell days. We include only quarters in which the stocks increased in price (regarding the first observation of the quarter) and change the left most digit at least once during the quarter. Only those stocks that have changed the left most digit are included. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (X0). SE are clustered by account.

Table A9: Probability of Sale and Left Digit, Price Decreasing Sample, Sell Days

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	-0.0240***	-0.0388***	-0.0414***	-0.0316***	-0.0313***
	(0.0013)	(0.0021)	(0.0020)	(0.0019)	(0.0019)
Stock Digits Y0 to Y5		0.0024***	0.0025***	0.0031***	0.0037***
		(0.0004)	(0.0004)	(0.0004)	(0.0004)
Stock Digits X6 to X9		0.0073***	0.0078***	0.0043***	0.0035***
		(0.0009)	(0.0009)	(0.0008)	(0.0008)
Constant	0.1147***	0.1246***	0.1554***		
	(0.0026)	(0.0031)	(0.0091)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	427,965	427,965	427,965	427,965	427,965
R^2	0.0015	0.0019	0.0035	0.2225	0.2450

Note: The unit of observation is an investor × stock × day. The samples is restricted to sell days. We include only quarters in which the stocks have not increased in price (regarding the first observation of the quarter) and have not changed the left most digit at least once during the quarter. Regressions fit an intercept for the change in the left most digit at X0 and two slopes for the left (with values in the range -3 to 0, corresponding to X6 to X9) and right (with values in the range 0 to 5, corresponding to Y0 to Y5) values. The constant shows the probability to sell the stock at when the second digit is 9 (X9). The second digit over threshold dummy shows the jump in probability when the first digit changes and so the second digit becomes 0 (X0). SE are clustered by account.

Table A10: Price Increasing Subsamples with Equal Prices Bins, Sell Days

Panel (A): Price = £0.11 to £1.01

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	0.0341***	0.0471***	0.0438***	0.0298***	0.0273***
	(0.0027)	(0.0038)	(0.0038)	(0.0037)	(0.0037)
Stock Digits Y0 to Y5		-0.0035***	-0.0033***	-0.0029***	-0.0033***
		(0.0009)	(0.0009)	(0.0009)	(0.0009)
Stock Digits X6 to X9		-0.0036***	-0.0023	-0.0016	-0.0013
		(0.0014)	(0.0014)	(0.0014)	(0.0015)
Constant	0.1177***	0.1128***	0.2175***		
	(0.0045)	(0.0048)	(0.0242)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	117,610	117,610	117,610	117,610	117,610
R^2	0.0024	0.0026	0.0147	0.3492	0.3740

Panel (B): Price = £1.01 to £10.1

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	0.0500***	0.0654***	0.0637***	0.0503***	0.0523***
	(0.0026)	(0.0035)	(0.0035)	(0.0033)	(0.0033)
Stock Digits Y0 to Y5		-0.0051***	-0.0058***	-0.0044***	-0.0062***
		(0.0007)	(0.0007)	(0.0007)	(0.0007)
Stock Digits X6 to X9		-0.0044***	-0.0036***	-0.0023**	-0.0008
		(0.0010)	(0.0010)	(0.0010)	(0.0010)
Constant	0.0919***	0.0866***	0.1168***		
	(0.0032)	(0.0031)	(0.0211)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	209,483	209,483	209,483	209,483	209,483
R^2	0.0057	0.0062	0.0141	0.3025	0.3176

Panel (C): Price = £11 to £101

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	0.0642***	0.0849***	0.0811***	0.0582***	0.0619***
	(0.0054)	(0.0068)	(0.0066)	(0.0077)	(0.0079)
Stock Digits Y0 to Y5		-0.0052**	-0.0051**	0.0023	0.0014
		(0.0023)	(0.0023)	(0.0024)	(0.0026)
Stock Digits X6 to X9		-0.0158***	-0.0172***	-0.0139***	-0.0117***
		(0.0035)	(0.0035)	(0.0039)	(0.0040)
Constant	0.0971***	0.0839***	-0.0061		
	(0.0041)	(0.0044)	(0.0133)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	27,460	27,460	27,460	27,460	27,460
R^2	0.0079	0.0090	0.0292	0.4648	0.4820

Table A11: Price Decreasing Subsamples with Equal Prices Bins, Sell Days

Panel (A): Price = £0.10 to £1.00

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	0.0341***	0.0471***	0.0438***	0.0298***	0.0273***
	(0.0027)	(0.0038)	(0.0038)	(0.0037)	(0.0037)
Stock Digits Y0 to Y5		-0.0035***	-0.0033***	-0.0029***	-0.0033***
		(0.0009)	(0.0009)	(0.0009)	(0.0009)
Stock Digits X6 to X9		-0.0036***	-0.0023	-0.0016	-0.0013
		(0.0014)	(0.0014)	(0.0014)	(0.0015)
Constant	0.1177***	0.1128***	0.2175***		
	(0.0045)	(0.0048)	(0.0242)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	117,610	117,610	117,610	117,610	117,610
R^2	0.0024	0.0026	0.0147	0.3492	0.3740

Panel (B): Price = £1.00 to £10.0

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	-0.0313***	-0.0472***	-0.0502***	-0.0388***	-0.0359***
	(0.0019)	(0.0029)	(0.0029)	(0.0030)	(0.0030)
Stock Digits Y0 to Y5		0.0018***	0.0019***	0.0037***	0.0031***
		(0.0006)	(0.0006)	(0.0006)	(0.0007)
Stock Digits X6 to X9		0.0099***	0.0100***	0.0046***	0.0048***
		(0.0013)	(0.0012)	(0.0012)	(0.0012)
Constant	0.1177***	0.1301***	0.2425***		
	(0.0030)	(0.0038)	(0.0795)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	166,494	166,494	166,494	166,494	166,494
R^2	0.0027	0.0033	0.0059	0.2875	0.3057

Panel (C): Price = £10 to £100

	$Probability\ of\ Sale_{ijt} = 1$				
	(1)	(2)	(3)	(4)	(5)
Above Y0 = 1 (in Range Y0 to Y5)	-0.0629***	-0.0735***	-0.0654***	-0.0427***	-0.0296***
	(0.0059)	(0.0070)	(0.0070)	(0.0081)	(0.0098)
Stock Digits Y0 to Y5		0.0108***	0.0099***	0.0053**	0.0017
		(0.0024)	(0.0025)	(0.0027)	(0.0030)
Stock Digits X6 to X9		0.0004	0.0030	-0.0047	-0.0029
		(0.0049)	(0.0049)	(0.0052)	(0.0053)
Constant	0.1497***	0.1501***	0.0929***		
	(0.0065)	(0.0068)	(0.0239)		
Day FE	NO	NO	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
Account FE	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	YES
Observations	24,859	24,859	24,859	24,859	24,859
R^2	0.0087	0.0102	0.0241	0.4411	0.4628

Table A12: Summary Stats for Individual Left Digit Bias

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Price Increasing Samples	4,987	0.011	0.026	-0.051	-0.002	0.006	0.020	0.111
Price Decreasing Samples	3,549	-0.008	0.027	-0.112	-0.016	-0.003	0.004	0.060

Note: Distribution of the coefficients for the dummy *Above Y0=1* (or left digit bias) for each account in the aggregate of increasing samples (including the monthly, quarterly and annual samples) and the aggregate of decreasing samples. Only accounts displaying at least 5 sells in the data are included. Outliers below the 5 percentile and above the 95 percentile were excluded.

Table A13: Summary Statistics for Quartiles in Left Digit Bias
Price Increasing Samples

	Quartile 1		Quartile 2		Quartile 3		Quartile 4	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
A. Account Holder Characteristics								
Female	0.153		0.159		0.180		0.144	
Age (years)	58.147	57.000	61.427	57.000	58.708	57.000	55.868	57.000
Account Tenure (years)	6.198	4.814	6.646	5.452	6.103	4.816	5.776	4.422
B. Account Characteristics								
Portfolio Value (£10000)	11.355	3.949	19.158	6.951	12.132	4.543	9.595	3.087
Investment in Mutual Funds (£10000)	0.496	0.000	0.904	0.000	0.482	0.000	0.278	0.000
Investment in Mutual Funds (%)	3.374	0.000	4.214	0.000	3.881	0.000	2.378	0.000
Number of Stocks	8.593	6.478	17.772	13.711	10.717	8.750	6.214	4.708
Login days (% all days)	33.150	30.546	39.009	39.035	36.416	35.424	28.557	24.053
Transaction days (% all market open days)	9.856	6.964	10.427	7.975	10.990	7.864	11.239	7.583

Note: This table presents summary statistics for investors split by quartile based on their individual coefficients for the dummy *Above Y0=1* (or left digit bias) in the aggregate of price increasing samples (including the monthly, quarterly and annual samples). Age is measured at date of account opening. Account tenure is measured on the final day of the data period. Portfolio value is the value of all securities within the portfolio at market prices. Portfolio value, number of stocks and investment in mutual funds are measured as within-account averages of values at the first day of each calendar month in the data period. Login days is the percentage of days the account is open in the data period and the account holder made at least one login. Transaction days is the percentage of market open days the account is open in the data period and the account holder made at least one trade.

Table A14: Summary Statistics for Quartiles in Left Digit Bias
Price Decreasing Samples

	Quartile 1		Quartile 2		Quartile 3		Quartile 4	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
A. Account Holder Characteristics								
Female	0.123		0.143		0.151		0.154	
Age (years)	56.764	57.000	60.405	57.000	60.326	57.000	56.910	57.000
Account Tenure (years)	5.763	4.329	6.362	4.997	6.483	5.266	5.858	4.364
B. Account Characteristics								
Portfolio Value (£10000)	8.886	2.896	15.586	4.909	18.171	6.516	10.600	3.591
Investment in Mutual Funds (£10000)	0.352	0.000	0.487	0.000	0.596	0.000	0.425	0.000
Investment in Mutual Funds (%)	2.925	0.000	3.434	0.000	3.219	0.000	2.386	0.000
Number of Stocks	7.139	5.085	12.607	9.400	17.154	12.407	7.585	5.667
Login days (% all days)	29.073	25.138	38.046	39.157	41.041	41.498	34.324	31.057
Transaction days (% all market open days)	12.041	8.852	12.014	8.846	12.663	9.588	13.467	9.412

Note: This table presents summary statistics for investors split by quartile based on their individual coefficients for the dummy *Above Y0=1* (or left digit bias) in the aggregate of price decreasing samples (including the monthly, quarterly and annual samples). Age is measured at date of account opening. Account tenure is measured on the final day of the data period. Portfolio value is the value of all securities within the portfolio at market prices. Portfolio value, number of stocks and investment in mutual funds are measured as within-account averages of values at the first day of each calendar month in the data period. Login days is the percentage of days the account is open in the data period and the account holder made at least one login. Transaction days is the percentage of market open days the account is open in the data period and the account holder made at least one trade.