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At the Top of the Mind:
Peak Prices and the Disposition Effect

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Abstract

The disposition effect is the reluctance to sell assets at a loss relative to a salient point of reference, typically assumed to be the purchase price. Using data on stocks and housing sales, we show that the *peak price* achieved by an asset during the investor's period of holding constitutes an additional salient reference point for asset owners that overlaps, and interacts, with the purchase price reference point. Peaks occurring before the investor purchased the asset do not affect future sales, indicating that ownership affects how investors form reference points.

Keywords: reference points, disposition effect, selling homes, investor behaviour

JEL Codes: G40, G41, D14

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1 Introduction

In part because absolute judgments are difficult, people often evaluate outcomes relative to salient reference points. When we refer to a "small" elephant and a "large" mouse, for example, few people would mistake the ordering of their weights, because we automatically 'norm' each descriptor to animals of the same species (Kahneman and Miller, 1986). Applied to decision making, we don't evaluate outcomes in terms of the final levels of wealth they confer (as the expected utility model assumes), but evaluate outcomes as gains or losses depending on whether they exceed or fall short of salient points of comparison.

The most widely documented case of reference dependence in economics and finance is the *disposition effect*, which refers to the reluctance of purchasers of an asset to sell it at a loss (Shefrin and Statman, 1985). The disposition effect is a feature of individual financial behaviour observed in the sale of both stocks (e.g., Barber and Odean, 2000; Shapira and Venezia, 2001; Feng and Seasholes, 2005; Chang et al., 2016) and housing (Genesove and Mayer, 2001; Andersen et al., 2021; Bracke and Tenreyro, 2021).[1] Most prior research on the disposition effect has assumed that the relevant price reference point for selling decisions is the purchase price of the owned asset.[2] Both field research focusing on housing sales, and field and experimental research involving financial assets, have supported the disposition effect prediction that people will be reluctant to sell assets at prices below the nominal price at which they were purchased.[3]

However, perhaps as a result of some kind of motivated bias (Bénabou and Tirole, 2016), or simply the salience of extreme values (Gagne and Dayan, 2021), asset owners often have a distorted view of true value. Casual observation of both home-owners and stock-holders

[1] Using data from a sample of 5,800 condominium property listings from downtown Boston in the 1990s, Genesove and Mayer (2001) show that owners who experience nominal losses on the original purchase price set higher asking prices to compensate (and attain higher selling prices). Recent studies also show that prevailing market conditions at the time of house purchase influence future selling prices, on which see Andersen et al. (2021) and Bracke and Tenreyro (2021).

[2] With the exception of our own series of contributions on this topic, starting with Quispe-Torreblanca et al. (2021). In that paper, we examined the impact of the price of an asset *on the last occasion on which the investor logged in* on selling behavior. Also, a few studies have examined the impact of reference points not related to the price history. Hartzmark (2015) finds that investors selling decisions are influenced by their stocks' rank of returns within their portfolio. Frydman et al. (2018) find that there is a disposition effect when using both a stock's purchase price and the purchase price of a recently sold stock. An et al. (2019) show that the portfolio gain/loss moderates the disposition effect.

[3] Genesove and Mayer (2001), for example, show that real prices – nominal prices adjusted for inflation – do not predict reluctance to sell.

suggests that owners often seem to believe that the ‘true’ value of their asset is the highest price it achieved while they have held it, the *peak price*. This might lead to a reluctance to sell at what is perceived to be an unfair lower price (Isoni, 2011; Weaver and Frederick, 2012), and can also contribute to the belief that the asset’s value is likely to regress toward the higher price, corresponding to its perceived true value.

In this paper, we examine whether a consideration of the peak historic price an asset achieved while the owner has held it does, indeed, help to predict selling behavior. To do so we estimate the disposition effect on returns since purchase and returns since peak price in both housing and stock data.[4] Housing and stock markets represent the two largest, and distinct, asset markets in which individuals participate. Our empirical analysis confirms the importance of peak prices in individual trading decisions for both housing and stocks.

Our estimates reveal that the selling probability for stocks and homes more than doubles when returns since a past peak price turn positive. Whereas a stock (home) in gain since purchase but in loss since a past peak price is approximately 50% (40%) more likely to be sold, a stock (home) in gain since purchase and in gain since a past peak price is 130% (96%) more likely to be sold. These discontinuities in the sale probability are found regardless of the magnitudes of gains or losses—with respect to either the peak price or the purchase price.

We evaluate explanations for the existence of the peak price effect. We consider two mains explanations: belief in reversion of prices to the peak, and regret-avoidance. Examining top-up behaviour, we find that the probability of an investor topping-up their position with more of the same stock increases as losses since peak price increase. This is consistent with a role for beliefs based on peak-reversion that cause the investor to purchase more of the asset. Examining the role of ownership, we show that these reference point effects only occur if the peak price events took place during the time when the individual owns the asset. Peak price events that occurred before the investor bought the asset do not affect sale decisions. In other words, the psychological effects of peak prices on investor behavior are dependent on whether an individual has personally experienced the highs of owning an asset. Hence, our

[4] Our housing data provides population-level coverage of house price sales, providing a substantially larger data set in which to examine the housing disposition effect compared with previous studies. Our large sample of stock data, in addition to records of trades, provides records of login events allowing us to restrict our sample to days on which investors pay attention to their trading accounts.

findings point to an explanation for the peak price effect based upon peak-reversion, potentially enhanced by stronger beliefs when the individual held the asset at the point in time of the latest peak. The existence of the peak price reference point conditional upon ownership is also important because it serves as evidence that individuals update their reference points over time (Hartzmark et al., 2021; Kindermann et al., 2021; Medina et al., 2021; Carney et al., 2022).

Our main estimates are robust to a variety of econometric specifications and a wide range of controls, including the duration of holding, which has been shown to be important for understanding the disposition effect for stocks (Ben-David and Hirshleifer, 2012a). In a series of tests, we condition the model to include property (for housing) or investor (for stocks) fixed effects; flexible controls for returns since purchase and returns since the peak price event; a range of controls for housing and stock characteristics, plus other controls for portfolio and investor characteristics. We conduct additional checks to address particular confounds which might apply to the analysis of housing and stocks, for example, leverage which might impact on the ability of a homeowner to sell the home at a loss. We find the peak price effect does not arise due to these potential confounds.[5] Our results are also very similar when using hazard models to estimate the disposition effect, as in Seru et al. (2010).

We interpret our results in light of a recent framework of the disposition effect in which asset prices experienced by the individual during their period of ownership can generate reference points for future decisions (Quispe-Torreblanca et al., 2021). The key assumption of the framework, motivated by diverse research in psychology, is that asset owners tend to focus on *the highest* of the different reference points they could pay attention to. Adopting an asset's highest price as one's reference point is self-serving in the sense that it assumes that the 'true' value of an asset one purchased is the highest price that asset achieved, thus giving oneself maximum credit for making a smart purchase decision. Yet, at the level of utility maximization it may not be self-serving since it means that current market valuations will

[5] In the analysis of housing sales, we show that our results are not due to market liquidity or individual leverage, which might restrict selling opportunities (Ortalo-Magné and Rady, 2004; Chan, 2001; Stein, 1995) and remain consistent after taking into account the time since purchase and the time since peak. In the analysis of stocks, further tests confirm that our results are not due to portfolio rebalancing; our results also remain consistent after taking into account overall market movements since the purchase of the stock and since the past peak price; and our results are consistent across samples of sell-days and login-days.

generally fall below one's reference value.[6]

The framework generates two main predictions, both of which are confirmed in our empirical analysis.[7] First, the framework implies the existence of a disposition effect defined over returns since purchase, but also a disposition effect defined over returns since the peak price. Second, the framework implies that an individual may not sell even when the asset is in the domain of gains since purchase if the peak price is higher than the purchase price. When this is the case, then the reference point is at the peak price. In such cases, the positive effect on utility of the return since purchase is nullified by the loss since the peak. Hence, the peak reference price suppresses the propensity to sell.[8]

Our study builds upon a large experimental literature and smaller field literature on the role of peak prices in individual decisions. An experimental literature beginning with Kahneman et al. (1993) presents evidence in support of a "peak-end rule," which states that agents judge an experience or event by how they felt at its peak and end rather than by the sum total, or the average, of every moment of the event (for a review of this literature, see Fredrickson, 2000). Peaks play an important role in the subjective evaluation of magnitudes, including economic magnitudes. For example, in range-frequency theory (Parducci, 1965, 1995) the range of values encountered – and the top of the range is the peak – provide the context against which magnitudes are evaluated, such that a higher peak makes any given magnitude seem smaller.[9]

Perhaps most relevant to the current research, previous studies in finance show how the 52-week high acts as reference points in momentum trading strategies (George and Hwang, 2004) and merger and acquisition decisions (Baker et al., 2012). Furthermore, in the popular

[6] The same pattern is evident in many other domains in life in which people tend to make upward social comparisons (Festinger, 1954), which could be motivating, but entails hedonic costs (Salovey and Rodin, 1984). This tendency is probably largely responsible for the hedonic treadmill phenomenon (Lykken and Tellegen, 1996), whereby people continually struggle to achieve aspirations but then raise them further the moment they are attained. In general, people do not seem to adopt the reference points that would make them hedonically best off (Thaler, 1985).

[7] An illustration of the framework in a basic four-period setting is presented in the Online Appendix.

[8] Further details of the framework and a simulation exercise using sensible parameters in a prospect theory value function are provided in the Online Appendix, see Table A1.

[9] In laboratory choice experiments, increases in the peak gain on offer across an experiment cause large reductions in the propensity to accept the chance to play gambles offering a mixture of gains and losses, as if a higher peak gain makes other gains seem smaller (Walasek and Stewart, 2015; Walasek et al., 2020). In personnel economics, Heath et al. (1999) show that employees are more likely to exercise stock options when the stock price exceeds the maximum price attained during the previous year. In strategic games, Anderson and Green (2018) show that chess players stop playing once they pass their previous maximum rating.

news media, house price indices are among the most commonly reported economic data, and turning points in indices are newsworthy events. Even just the tone of local housing news is found to be predictive of future house prices (Soo, 2018; Ploessl and Just, 2022). Price anchors (such as the 52-week high) are also commonly published alongside current prices. Hence, home owners and investors in stocks are exposed to information on peak prices on a regular basis.

Unlike typical price anchors, we study here the effect of the highest price experienced by asset holders during the period of asset ownership. Importantly, we show that the peak price acts as a reference point only when it is a price experienced by the individual during the holding period. Consistent with other research showing that events that happen to oneself are much more salient to people than those that happen to others, or at other times (Kaustia and Knüpfer, 2008; Simonsohn et al., 2008; Herz and Taubinsky, 2018; Hartzmark et al., 2021; Malmendier et al., 2020), we show that peak prices that pre-date the individual's purchase of the stock have no bearing on future trading decisions. Hence, it is the individual's experience of the peak price that forms the enduring reference point.

The disposition effect is a widely documented bias. It has been observed in brokerage data across multiple countries and time periods (Grinblatt and Keloharju, 2001; Brown et al., 2006; Barber et al., 2007; Calvet et al., 2009), as well as in experimental settings, such as in Weber and Camerer (1998). Models of the disposition effect have centred on the importance of realization utility and loss aversion (Barberis and Xiong, 2009; Frydman et al., 2014).[10] Odean (1998) shows that the disposition effect cannot be explained by portfolio rebalancing, transaction costs, a preference for realizing gains more frequently than losses, or due to different beliefs about expected future returns. In a laboratory experiment, Frydman and Rangel (2014) study the role of the salience of prices in the disposition effect, demonstrating that the disposition effect diminishes with reduced salience.[11]

Our findings also contribute to the growing literature studying the consequences of salience

[10] However, mixed evidence on whether these aspects of Prospect Theory preferences determine the disposition effect have been observed in other studies (Kaustia, 2010; Hens and Vlcek, 2011; Henderson, 2012).

[11] There is also evidence that the disposition effect tends to be stronger in retail investors, as compared with institutional investors (Shapira and Venezia, 2001), less-experienced investors (Feng and Seasholes, 2005), as well as with investors who are lower in wealth (Dhar and Zhu, 2006). In more recent research, the disposition effect has, however, been shown to not arise for mutual funds (Chang et al., 2016). The focus of our analysis of stock market investors is, however, on sales of individual stocks rather than index funds or mutual funds.

and attention for individual behaviours. Arkes et al. (2008) study the shift in each subject's reference point following prior gains or losses. Their experimental evidence suggests that reference point adaptation is asymmetric: adaptation following a gain is greater than following a loss. Earlier work suggests that the first and last prices act as reference points. Baucells et al. (2011) explore the determinants of investor reference points by exposing participants to hypothetical sequences of stock prices in a laboratory experiment. They find that a stock's starting and ending prices are the two most important inputs into an investor's reference point. More generally, research in the psychology literature documents that participants exposed to a series of stimuli tend to remember better the first and the most recent values (Ebbinghaus, 1913; Murdock, 1962; Ward, 2002). We extend this line of work by empirically testing the effects of another salient reference point, the peak price.

More generally, our study expands a new line of research on how multiple reference points interact to determine individual choices. Very few empirical papers have examined the consequences for decision making of situations in which specific outcomes are evaluated against multiple reference points, despite evidence of reference-dependent behavior in a variety of settings.[12] Studies documenting the importance of different reference points, have tended to examine each in isolation.[13] Prior research has, moreover, typically involved hypothetical choices (see. e.g., Sullivan and Kida, 1995; Ordóñez et al., 2000) or stylized laboratory experiments (Koop and Johnson, 2012), although one recent empirical study found that purchase price and neighborhood price influenced the length of ownership in Singapore's private housing market (Huang et al., 2021). A limited number of studies explore how multiple reference points affect choices on separate dimensions, such as income and work hours (Crawford and Meng, 2011) or goals and experience (Markle et al., 2018). Another strand of the literature seeks to understand

[12] Studies of reference-dependent behaviour in the context of multiple reference points include consumer products marketing (Hardie et al., 1993), tax compliance (Yaniv, 1999), food choices (Van Herpen et al., 2014), and effort in sports (Allen et al., 2016)

[13] For example, people evaluate the salary they receive from work relative to what they received in the past (Bewley, 2009; DellaVigna et al., 2017), but also relative to what they expected to receive (Kőszegi and Rabin, 2006; Mas, 2006; Crawford and Meng, 2011),what others receive (Brown et al., 2008; Card et al., 2012; Bracha et al., 2015), and what they would like to receive (aspirations) (March and Shapira, 1992; Heath et al., 1999). Neale and Bazerman, in a book describing research on negotiation (cited in Kahneman, 1992) identify five possible reference points that might influence worker responses to a wage offer from management: last year's wage; management's initial offer; the union's estimate of management's reservation point; the union's reservation point; and the union's publicly announced bargaining position.

how reference points relate to Regret Theory in dynamic decisions (Brettschneider et al., 2020; Strack and Viefers, 2021).

The remainder of the paper proceeds as follows. Section 2 describes the two data sets (home sales and stockbroking data), and Section 3 explains, for each, the methodology we used to calculate returns since purchase and since peak. Section 4 presents the econometric specification used in the analysis and describes the sample selection restrictions. Section 5 and Section 6 present the main results for housing and stocks. Section 7 presents the analysis of ownership and mechanisms for the peak price effect. Section 8 concludes.

2 Data

2.1 Home Sales Data

We use data on home sales provided by the UK's principal registry of home sale data,[14] His Majesty's Land Registry (HMLR) Price Paid Dataset (PPD).[15] The price paid data contain entries for the universe of residential property sales in the UK beginning on 1 January 1995. We draw upon records up to and including 31 December 2019. In total, the dataset covers 25.1 million transactions relating to 14.6 million properties. The data record the date and price of each property purchase, the property's address and property characteristics, including whether the property is a new-build home or a resale and the type of dwelling.[16] With these data, we can identify property resales, where an individual purchases a property and then sells it at a later date.

Unlike stocks, where the current market price is continually available, houses only have an up-to-date market price at the time of their sale; consequently, we estimate each property's valuation each calendar quarter from purchase to sale. To do so, we combine the price paid data with a local-level house price index to create property $\times$ quarter observations of property

[14] The UK consists of the four nations of England, Northern Ireland, Scotland and Wales. Northern Ireland and Scotland, which comprise 7.5% of the UK population, have separate land registries.

[15] HM Land Registry data © Crown copyright and database right 2018. This data is licensed under the Open Government Licence v3.0. HMLR is a UK government agency with legal responsibility for registering the ownership of land and property in England and Wales. The dataset provides no details about property owners.

[16] Dwelling types are flat, or apartment; detached house, one with no walls shared with neighbouring property; semi-detached house, shares a common wall on one side; and terraced house, shares common walls on both sides.

values, which is the unit of observation for our analysis of the disposition effect for housing. We draw upon the UK House Price Index (HPI) using records for England and Wales (EW). The index is constructed by the UK's national institute of statistics, the Office of National Statistics (ONS) using the price paid data as well as local government property tax and demographic datasets to determine property and location characteristics.[17] The index is a strong predictor of sales prices. The correlation between a property's most recent quarterly valuation prior to sale based upon the index value, and the actual sale price achieved is 0.9.[18]

In our analysis, we also use the difference between the price paid for a property (as recorded in the price data set) and the average value of properties of the same type in the locality as a measure of "quality", following Genesove and Mayer (2001). In addition, we merge in a set of local-level covariates, including the size of the housing stock, volume of property transactions, and average loan-to-value (LTV) ratio.[19]

2.1.1 Sample Selection

We apply a number of steps in sample selection. First, as our interest is in the selling behaviour of owners of standard residential properties, we drop non-standard sales (as defined by HMLR). These include commercial transactions, properties purchased specifically to be rented out (where identifiable), gifts, and sales below full market value or under court or compulsory purchase order. At this step, we also drop a very small number of properties sold for token values (less than £250). Second, we drop properties with incomplete address details. A property's address is used to match its purchase with any subsequent sale and to link the property with the other datasets. Properties without full addresses, or that for other reasons cannot be matched

[17] The ONS applies a hedonic regression model to the data sources to produce estimates of property price changes for each period (ONS, 2016). We use the indices for each calendar quarter between 1 January 1995 until 31 December 2019 by dwelling type and at the most granular level of geographic area provided, which are the 340 EW local government districts.

[18] This is illustrated in Figure A2.

[19] The annual estimated housing stock for England and Wales districts is published by the Ministry of Housing, Communities & Local Government (for English districts) and the Welsh Government (for Welsh districts). Data are available from 31 March 2001 to 31 March 2018. Quarterly housing stock is estimated by linear interpolation of the annual figures. The number of property transactions by district and calendar quarter is derived from the PPD dataset. The PPD, HPI and housing stock datasets are publicly available, online and free. Additionally, the Financial Conduct Authority (FCA), the conduct regulator for the UK financial services sector provided to us a private dataset of quarterly LTV ratios for re-mortgagors by the 10 EW regions between the second quarter 2005 and the fourth quarter of 2019. This is an extension of a table that the FCA makes public as part of their quarterly Mortgage Lenders & Administrators Return. (The 10 EW regions are shown in Table A5).

to the HPI dataset, are necessarily excluded. Third, we drop a small number of observations with apparent data errors, such as properties owned for less than a week before resale.

Together, these restrictions result in 3.1% of properties being dropped from the data set. Due to computational limits, we then take a 15% random sample of the total data. We use this baseline (or "Full") sample of approximately 3.6 million home purchases and 128.4 million observations for the estimates of the disposition effect based upon returns since purchase. Additionally, observations where there is no peak price achieved that differs from the purchase price (for example due to a very recent purchase) are necessarily dropped for the estimates of the disposition effect based upon returns since purchase and since peak, with approximately 2.4 million property purchases and 72.1 million observations retained in this "Peak sub-sample".[20]

2.1.2 Summary Statistics

The proportion of properties by dwelling type ranges from 16.2% for flats to 29.7% for terraced houses, with new-build properties representing 10.0% of all transactions. The median purchase price is £250,000 and the corresponding mean is £333,000 (prices are adjusted to December 2019 prices for the purpose of this table, but in our regression analyses the purchase prices used are actual prices paid). The median time to resale (i.e., length of ownership) is 8.8 years and the corresponding mean is 9.6 years.[21]

2.2 Stockbroking Data

We use brokerage data provided by Barclays Stockbroking, an execution-only online brokerage service operating in the United Kingdom. The data cover the period April 2012 to March 2016 and include daily-level records of all trades and quarterly-level records of all positions in the portfolio. Barclays provides brokerage services for both common stocks and mutual funds, although the former are much more common in the portfolios of investors using Barclays Stockbroking. By combining the account-level data with daily stock price data, we can calculate the value of each stock in an investor's portfolio on each day of the sample period. This data

[20] Further details of sample selection are provided in Table A2.

[21] North East England has the lowest proportion of property transactions at (4.5% of all transactions) whereas London and South East England have the highest proportions (13.4% and 17.0% of all transactions, see Table A5). Table A4 provides summary statistics for the baseline sample of property × quarter observations.

construction allows us to track prices at daily frequency, which is the time unit we use in analysis. The unit of observation used in the analysis is an investor × stock × day.

We focus on new accounts that open after the beginning of April 2012, as this sample restriction allows us to calculate returns since purchase on all stocks held within the account, which is required for the estimation of the disposition effect. This provides a starting sample of approximately 13,600 accounts and approximately 123,000 observations in which an investor makes a sale.

2.2.1 Sample Selection

We apply two stages of sample selection. At the first stage, we drop observations due to data cleaning restrictions. We drop observations for which we cannot match stocks with price data. We also drop observations for which there is an unknown purchase price because the position was transferred into the account after opening (e.g., from a different brokerage service provider). Together, these restrictions result in 1,196 accounts and 29,700 sells being dropped from the sample.

At the second stage, we apply a series of restrictions necessary for the topic of analysis. First, following Odean (1998), we keep only observations for which we observe at least two stocks in the portfolio on the day of the observation. This restriction allows us to analyse selling decisions when investors have the possibility to choose which stock they prefer to sell among the set of stocks they hold in their portfolio. We also drop accounts for which there are missing demographic data. In a third step, we exclude the days in which the stocks were purchased (days when stocks started a positive position) since we are interested in analysing trades for stocks that have been held at least one day in the portfolio—also, note that day trading is usually performed by professional investors, whose trading strategies differ from those used by retail investors. In a fourth step, we also drop accounts for which there are no sales in the sample period, resulting in a drop of 1,244 accounts, but no sales. Finally, we drop observations for which the returns since purchase and/or returns since peak price (defined below) are above the 99th percentile or below the 1st percentile, to remove outliers from the data that might skew the analysis. The resulting baseline sample retains approximately 8,800 accounts and 58,863 observations of sales.[22]

2.2.2 *Summary Statistics*

Approximately 85% of the account holders are male, and the average age of an account holder is 48 years. A similar profile for account holders is observed in the Large Brokerage Dataset used by Barber and Odean (for example, see Barber and Odean, 2000).[23] The average tenure of an account is approximately two years. The average portfolio value is approximately £43,000, with a right-skewed distribution with a median portfolio value of approximately £10,000.

The large majority of holdings in the sample are common stocks. By value, investors hold only 5.6% of their position in mutual funds (a small minority of investors hold only mutual funds in their portfolio). Investors also overwhelming hold positions in a few common stocks. On average, investors hold only four stocks, with the median number of stocks held of three.[24] On average, investors login once every four days (median once ever six days). On average, investors make a trade (either a buy or a sell) every 20 market open days.[25]

3 Calculation of Returns

Our main analysis uses two calculations of returns: return since purchase and return since "peak" price. For housing, quarterly returns are calculated via application of the house price index at the locality. Returns since purchase are the difference between the valuation of the property and purchase price. For stocks, returns are calculated using daily prices. Returns since purchase represent gross returns on the asset prices over the holding period and in cases of multiple purchases of a stock, returns are calculated as a weighted average.[26] For housing and stocks, in addition to returns, we also define a dummy variable by whether the value of the

[22] A breakdown of the steps in sample selection is shown in Table A3.

[23] In the LBD used in Barber and Odean (2000), 79% of account holders are male, with an average age of 50 years, see Table 1 in Barber and Odean (2000).

[24] Note that in sample selection we dropped observations in which investors held only one stock in their position. Hence, the unconditional mean of the number of stocks held is lower than four in the starting sample.

[25] Full summary statistics for the baseline sample are shown in Table A6 in the Online Appendix.

[26] For housing and stocks, gross return is calculated before fees (such as real estate fees, or brokerage fees). Gross returns for housing are calculated as levels rather than as percentages to be consistent with the way homeowners commonly describe the change in value of their properties, unlike stocks where investors' personal brokerage accounts display the percentage changes.

asset is in gain or loss since purchase (i.e., whether the return since purchase is positive or negative).

An innovation of our study is to introduce the concept of return since peak. Return since peak price measures the return since the asset's most recent peak price. "Peak price" requires definition. We define the peak price as the highest price achieved by an asset in the individual's period of ownership, that remains the highest price for a persistent period of time. Central to this definition is the idea that a peak price is a price that has persisted as the highest price for some period. For example, an asset that monotonically increases in value in each period could not be said to have formed a "peak" in any period; but an asset that hits a high price from which it then falls for a number of periods could be said to have achieved a peak.[27] Analogous to a series of peaks in a mountain range, peaks are salient price-points in the history of the individual's ownership of the asset.[28] This definition captures the idea that a "peak" occurs when an asset reaches a high value that stands out in its recent history. In our main analysis, we define a peak house price as the highest price achieved by the house in the home owners holding period that remains the highest price for at least three calendar quarters. We define a peak stock price as the highest price achieved by the stock in the investor's holding period that remains the highest price for at least one week.[29]

We illustrate the concept of a peak price using examples for housing and stocks. Panel A of Figure 1 illustrates a quarterly price series for a property in the data. The price series, for the full data period since the property was first purchased, shows the house price drifting upwards (with a notable drop in 2009 during the Great Recession). A peak price is defined using the three-quarter time horizon. Each blue dot therefore shows a price which is the highest price since the start of the period and which remains the highest price for at least three quarters. In a sensitivity analysis, we widen this to two-quarter and four-quarter time horizons. Each

[27] An extreme case would result if *every* new high was considered a peak. Under that implementation, in a monotonically increasing price series, every day would see a new peak price.

[28] By constraining the search for peaks to the individual's ownership period, we avoid extreme cases which would result if only the all-time high was considered to be a peak, such as a stock that has a historical peak many years earlier, but has recent price spikes, which would not constitute peaks using the all-time-high definition.

[29] This definition of peak price is different from the concept of an all-time high or low price. All-time high or low prices are defined by the day's price breaching the maximum or minimum of the complete to-date series. A peak price, by contrast, is a salient peak within the individual's own personal experience of the asset price. The salience of the peak may arise due to its persistence, whereby the peak remains the highest point in the price series for some period of time.

blue dot in Figure A7 shows a price which is the highest price since the start of the period and which remains the highest price for at least two quarters (Panel A) or four quarters (Panel B). Panel B of Figure 1 illustrates a daily price series of a commonly purchased stock in the data. The price series shown runs from April 2013 to September 2014, and shows the stock price drifting upward. A peak price is defined using the 1-week time horizon. Each blue dot shows a price which is the highest price since the start of the period and which remains the highest price for at least one week.[30] For housing and stocks, in addition to returns since peak, we also define a dummy variable by whether the value of the asset is in gain or loss since peak price.

Using this method, we calculate returns since purchase and returns since peak for observations in the baseline sample. For housing, the distributions of returns since purchase and since past peak price are both positively skewed, reflecting medium-term positive house price growth in the UK. For stocks, the distributions of returns since purchase and since past peak resemble a normal distribution, reflecting the relatively flat medium-term stock market performance in the UK.[31]

4 Econometric Model

We estimate the disposition effect using the standard model in the empirical literature based upon Chang et al. (2016), which we apply to housing and stocks. The standard model takes the form:

$$Sale_{ijt} = b_0 + b_1 GainSincePurchase_{ijt} + \epsilon_{ijt}, \tag{1}$$

in which the unit of observation for housing is at the property *(j)* and date *(t)* level, with quarterly measures of returns since purchase. *Sale* is a dummy equal to 1 if the home owner sells their property *(j)* on date *(t)*. *GainSincePurchase* is a dummy variable indicating whether, the property *(j)* had made a gain on date *(t)* compared to the purchase price. For stocks, the

[30] In sensitivity analysis, we widen this to a 1-month time horizon, see Figure A13.

[31] We illustrate and summarize the distributions of returns in more detail in the Online Appendix. For housing, see Figure A3 - Figure A6 and Table A7 - Table A9. Additional summary data for an two-quarter time horizon definition of a peak are shown in Figure A8 and Table A11 and for the four-quarter definition in Figure A10 and Table A12. For stocks, see Figure A12 and Table A10, with additional summary data for the 1-month time horizon definition of a peak shown in Figure A13 and Figure A14 and Table A13.

unit of observation is at the account *(i)*, stock *(j)* and date *(t)* level. Note that, given the detailed stock data, we can construct daily measures of returns since purchase. *Sale* is a dummy equal to 1 if the investor holding account *(i)* sells the stock *(j)* on date *(t)*. *GainSincePurchase* is a dummy variable indicating whether, for the investor holding account *(i)*, stock *(j)* had made a gain on date *(t)* compared to the purchase price.

We modify the baseline specification in Equation 1 by adding a dummy variable indicating whether the asset is in gain compared to the peak price. We call this dummy variable *GainSincePeak*. The modified econometric specification is now:

$$Sale_{ijt} = b_0 + b_1 GainSincePurchase_{ijt} + b_2 GainSincePeak_{ijt} + \epsilon_{ijt} \qquad (2)$$

in which *GainSincePeak* is a dummy indicating whether property *(j)* was in gain at date *(t)* compared to the peak price (housing), or for the investor *(i)*, stock *(j)* was in gain at date *(t)* compared to the peak price (stocks).

The variable *GainSincePeak* therefore adds a new element to the estimation of the disposition effect. Note that in the modified econometric specification in Equation 2 the dummy variable indicating whether a property × date (housing) or an account × stock × date (stocks) is in gain since peak constitutes an interaction with gain since purchase. This is because, by definition, a gain since the past peak must also be a gain since purchase.

We estimate both Equation 1 and Equation 2, allowing us first to replicate the standard estimation of the disposition effect from Equation 1 before introducing results from the revised specification in Equation 2. In subsequent robustness analyses, we also estimate models that add i) property (housing) or investor (stocks) fixed effects to control for property-specific or individual-specific time invariant heterogeneity in selling behavior, ii) continuous measures of returns since purchase above and below the zero threshold, iii) a more extensive battery of control variables, including controls for property characteristics and several investment portfolio and account characteristics. In addition we iv) show that our results remain consistent when estimating a different econometric estimation approach, a Cox proportional hazard model with time-varying covariates,[32] and v) show that our results remain consistent when using

[32] For the stockholding analysis, results also remain consistent when restricting the analysis to liquidations of

different time horizons in the definition of a peak price. In the stock holding analysis, we also perform a placebo test using peak prices that occurred within the past year, instead of peak prices strictly taking place during the holding period.[33] We show that the disposition effect around peak prices is only found when the investor has experienced the peak price (i.e., when the peak occurred during the holding period).

5 Peak Price Effects in Home Sales

5.1 Returns Since Purchase Price and the Disposition Effect

The disposition effect based upon the purchase price is not as widely documented among housing sales compared with stock sales. Therefore, we first show results based on purchase price, together with a series of robustness tests, before introducing our results for the disposition effect based upon the peak price.

We draw upon our baseline sample of observations of property $\times$ quarters.[34] The unconditional relationship between return since purchase and probability of sale is illustrated in Panel A of Figure 2. The figure is a binscatter plot, with each point representing a 0.5% bin of observations. Panel A illustrates the housing disposition effect result for returns since purchase. The probability of sale increases sharply when returns since purchase turn positive, in the unconditional plot the increase in the probability of sale is approximately 0.5%, against a baseline probability of approximately 0.7% (an increase in the probability of sale of over 70%).

This result is confirmed by the OLS regression estimate for Equation 1 shown in Table 1. Column 1 shows the unconditional relationship between the sale of the property and the dummy for gain since purchase. The coefficient on Gain Since Purchase of 0.0053 is positive and implies that a house which is in gain since purchase is 0.53 percentage points more likely to sell than a house in loss. Against the base probability of selling a house from the constant in the regression of 0.7% (0.0070), this represents an increase of 75%.

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entire positions from the portfolio (i.e., excluding partial sells that could occur as a result of portfolio rebalancing strategies).

[33] This exercise is possible because stock prices show a higher frequency of peak price dates than peak house prices, which cluster around relatively few dates (Figure A5).

[34] The baseline sample which provides over 128 million property $\times$ quarter observations pools together properties and calendar quarters, hence we cluster standard errors at the property and date level.

Column 2 adds a set of non-linear controls for the number of years between purchase and valuation (included as quintics) and controls for property characteristics. Property characteristics are the property's type; whether it is new-build; its regional location and its quality.[35] The coefficient of 0.74% (0.0074) in Column 2 implies that a property in gain since purchase is twice as likely to be sold than a property in loss (the latter value defined by the unconditional probability of selling a house at a loss, given by the constant in Column 1, of 0.7%).

This result is robust to a range of additional tests, first, the addition of continuous measures of returns and property and year-quarter fixed effects, see Table 2, and second, tests to account for market conditions, including liquidity, market size and leverage, as well as time since purchase, see Table 3. These tests are important as, for example, highly levered mortgagors (at the limit, 100% levered) may be unable to sell at any price below the purchase price. We measure housing market liquidity using the number of housing transactions per quarter; housing market size, using housing stock volumes per quarter; and home owner's leverage, using quarterly LTV percentages. Then, for each case, we split the dataset at the median value of the variable of interest (housing transactions, housing stock, LTV percentage or time since purchase) and estimate the OLS regression models specified by Equation 1 for the "high" (above-median) and "low" (below-median) subsets. The pattern of positive coefficients demonstrates that the disposition effect for gain since purchase exists in above- and below- median samples in each case.[36]

5.2 Returns Since Peak Price and the Disposition Effect

Our main result is the existence of a disposition effect arising from a past peak price. We use the baseline sample of observations of property × quarters with a peak price.[37] Figure 2 Panel B is a binscatterplot, illustrating the relationship between the probability of sale and returns since peak price. It reveals the existence of a housing disposition effect for returns since the peak price. Similar to Panel A, here we also observe a sharp increase in the probability of sale

[35] Quality is proxied by the difference between the purchase price and the price at purchase predicted by the house price index, a measure of the quality suggested by Genesove and Mayer, 2001

[36] Across the above- and below- median splits, the coefficient estimates on the gain since purchase dummy in Table 3 are consistent in magnitude when evaluated relative to the model constants, also shown in the table. Full results for these tests relating to liquidity, size, leverage and time since purchase are shown in Table A14 - Table A17.

[37] This baseline sub-sample provides over 72 million property × quarter observations.

when returns since peak price turn positive (i.e., when the property price crosses its previous peak). By definition, a property that is in gain since peak must be in gain since purchase—as the peak price must be higher than the purchase price—and so the gain since peak should be understood as showing the effect of a gain since peak over and above a gain since purchase. Panel C shows the interaction of returns since purchase and returns since a past peak. There is a strong interaction effect: the disposition effect for returns since purchase doubles its magnitude when the house price is in gain since a past peak.

Table 4 shows the results from OLS regression models. Columns 1 - 3 show unconditional estimates for coefficients on the *GainSincePeak* and *GainSincePurchase*, independently in Columns 1 and 2, and combined in Column 3. The coefficients in Column 3 are positive for both gain since purchase and gain since peak. Column 4 introduces control variables including years from purchase, property type controls, and the quality measure used previously. The model also includes non-linear controls (quintics) for the length of period since purchase, and region fixed effects. Coefficients for gain since peak and gain since purchase are positive and precise.

Unconditional estimates in Column 3 suggest that a home in gain since purchase but in loss since peak price is approximately 0.10 percentage points more likely to be sold (representing a 13% increase), whereas a home in gain since purchase and in gain since peak price is 0.41 percentage points more likely to be sold (representing a 55% increase, both effects evaluated against a baseline probability of 0.75%, given by the intercept), an effect size consistent with the patterns observed in Figure 2 Panel C. Including controls in Column 4 leads to even larger effects. A home in gain since purchase but in loss since peak price is approximately 0.36 percentage points more likely to be sold (representing a 48% increase), whereas a home in gain since purchase and in gain since peak price is approximately 0.72 percentage points more likely to be sold (representing a 96% increase, with both effects evaluated against the same baseline probability of 0.75%, given by the intercept of Column 3).

In the following subsection, as described earlier, we examine the robustness of this main result with the series of additional tests, we estimate results using a Cox proportional hazard model, and we show that our results remain consistent when using different time horizons in the definition of a peak price.

5.3 Robustness Tests

5.3.1 Controls for Continuous Returns and Property Fixed Effects

In Table 5 and Table 6, we add a further series of covariates to the main specification. In both tables we show estimates for coefficients on the *GainSincePeak* and *GainSincePurchase*, independently in Columns 1 and 2, and combined in Column 3. Table 5 includes all the controls from Column 4 of Table 4 plus continuous measures of returns since purchase. Separate linear controls are added for returns on either side of zero, for both returns since purchase and returns since peak price. Estimates show positive coefficients on both gain since purchase and gain since peak. In Table 6, we further add property and year-quarter fixed effects to the specification to account for unobserved (time invariant) heterogeneity across properties and over different time periods. Once again, the estimates show positive and precisely defined coefficients on gain since purchase and gain since peak.

5.3.2 Liquidity, Market Size, Leverage, Time Since Purchase and Time Since Peak

In Table 7, we replicate the robustness tests for market liquidity, market size, leverage[38] and time since purchase described earlier, and carry out a similar robustness test for time since peak. All the above and below-median samples show the disposition effect for gain since purchase and gain since peak, except for the above-median sample of time since purchase. Here there is no gain since purchase disposition effect. A small percentage of observations (9.5%) in this sample are in loss since purchase, suggesting collinearity between the gain since purchase dummy and the model's intercept, thus, resulting in larger standard errors.

We note that our results highlight a stronger effect of peak prices after a short period of time has passed since a previous peak price. It may be that homeowners refinance at a peak, thus reducing their ability to sell their properties (Genesove and Mayer, 1997). This mechanism, however, will result in homeowners being less able to sell their homes when losses from a previous peak are substantial. However, a closer inspection of Panel B of figure Figure 2 rules

[38] Similar to Andersen et al. (2021), we find a stronger disposition effect in low-leveraged households. Detailed models estimates are provided in the supplementary Online Appendix, see Table A18 – Table A22.

out this possibility. The panel shows that the extent of losses since peak does not alter selling patterns.

5.3.3 Additional Robustness Tests

Additional robustness and sensitivity tests are presented in the supplementary Online Appendix. To better account for the effects of the holding period, we estimate a Cox proportional hazard model that exploits the duration dimension of the data, which is an important determinant of asset-selling decisions (Ben-David and Hirshleifer, 2012b). The hazard model allows us to estimate the time-varying probability of a sell event without imposing any structure on the baseline hazard (i.e., without specifying the exact form of the distribution of the sell event times).

The three-quarter time horizon used to define peak prices was selected as a pragmatic lower bound. The quarter following a high price is required to establish that this price is indeed a peak, rather than part of a monotonically increasing series. Additionally, the homeowner needs some time to become aware of the peak. As a sensitivity analysis, we also estimated peak prices using two- and four-quarter definitions of peak price and found consistent results across these alternative definitions.

6 Peak Price Effects in Stock Sales

The existence of a disposition effect among stock trading based upon the purchase price is widely documented, and replicated in our data. We therefore focus on our main result for the existence of a disposition effect around the peak price. This is illustrated in Figure 3. The figure is a binscatter plot, illustrating the relationship between the probability of sale and returns since purchase price (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase price and peak price (Panel C). Following the previous literature on stockholding and the disposition effect, we present main estimates from models using the subsample of observations of account $\times$ stock $\times$ days on which the investor made a sale of at least one stock.[39]

Figure 3 Panel A illustrates the standard disposition effect results for returns since purchase. The probability of sale increases sharply when returns since purchase turn positive, in the unconditional plot the increase in the probability of sale is approximately eight percentage points against a baseline probability of twelve percent (an increase in the probability of sale of two-thirds).

Figure 3 Panel B reveals the existence of a disposition effect for returns since the peak price. Again, here we observe a sharp increase in the probability of sale when returns since peak price turn positive (i.e., when the stock price crosses its previous peak). In the plot, the increase in the probability of sale is large, with the probability more than doubling when returns since peak turn positive.[40]

These patterns are confirmed by OLS regression estimates of Equations 1 and 2, which are shown in Table 8. Column 1 shows the estimate of Equation 1. The coefficient of the Gain Since Purchase dummy is positive and implies that a stock which is in gain since purchase is approximately 8.3 percentage points more likely to be sold compared with a stock in loss. Against the base probability of selling a stock from the constant in the regression of 11.4%, this represents an increase of 73%.

The model in Column 2 replaces the gain since purchase dummy from Equation 1 with the gain since peak price. The coefficient of this dummy variable is again positive and precisely

[39] As discussed in (Chang et al., 2016), on days with no sales, we cannot tell whether the absence of a sale is a deliberate choice on the part of the investor, or whether it is due to inattention. Consequently, previous studies (beginning with Odean, 1998), restrict the sample to account × stock × time units on which the investor sold at least *one* stock in their portfolio. This sample restriction ensures that the investor was paying attention to the portfolio at those points in time and there was some risk that the investor would sell *any* stock. We also show results from a login-day sample: the subsample of observations of × stock × days on which the investor made a login to their account. The rationale for this sample is that on login days investors pay attention to their accounts, and hence have some non-zero likelihood of making a sale. The Sell-Day sample provides approximately 396,000 account × stock × days for investors who sold at least one stock on the day, whereas the login sample is much larger (because login days are much more common than sale days). The Login-Day sample provides approximately 6,259,000 account × stock × days for investors who made at least one login on the day. Both data samples pool together investors and days, hence we cluster standard errors at the account and date level.

[40] The plot has fewer observations to the right in consistency with the underlying distribution of returns observed in Figure A12 and Table A10 (where returns since peak are on average -16.2% (median -9.6%), while returns since purchase, -4.8% (median -2.2%)).Also note that because of the higher volatility in stock prices, compared to house prices, peak prices in the stock data are updated frequently, as observed in Panel A of Figure 1, which implies that gains since peaks last a shorter time and are therefore of small magnitude. In Figure A15, we replicate the plots using peak prices that should be the highest prices for at least a month, instead of a week, and we observe in Panel B a larger frequency of gains since peak.

defined. The coefficient of the gain since peak price dummy in Column 2 implies that a stock that is in gain since peak price is approximately 12.8 percentage points more likely to be sold compared to a stock in loss. Against the base probability of selling a stock of 13.3%, this represents a 96% increase in the likelihood of a sale.

Figure 3 Panel C shows the interaction of returns since purchase and returns since peak. Similar to houses, the disposition effect since purchase is stronger when the price is above a past peak. Estimates of Equation 2, the corresponding regression, are shown in Column 3. Results show a positive coefficient on both the gain since purchase and the gain since peak price dummies, which are both precisely estimated. A stock in gain since purchase but in loss since peak price is 5.7 percentage points more likely to be sold. When the stock is also in gain since the peak price, this probability increases further by 9.1 percentage points. Hence, evaluated against a baseline probability of 11.4%, a stock in gain since purchase but in loss since peak price is approximately 50% more likely to be sold, whereas a stock in gain since purchase and gain since peak price is 130% more likely to be sold.

We examine the robustness of this main result with a series of additional tests. Previous studies have shown that particular covariates may be important for explaining the disposition effect, including the length of the holding period and the magnitude of returns. We therefore include these controls in additional robustness tests, together with other control variables, such as the time elapsed since a past peak, investor demographics, and several portfolio characteristics. We also estimate fixed effects regressions, and a modified econometric specification that employs a Cox proportional hazard model.

6.1 Robustness Tests

6.1.1 Individual Fixed Effects

The first robustness test adds individual fixed effects to control for individual-specific time-invariant heterogeneity in selling behavior. Results are shown in Table 9. The table reports results for the same four specifications as those shown in Table 8. With the inclusion of individual fixed effects, the coefficient values are very similar to those in Table 8.

6.1.2 Controls for Continuous Returns

A second robustness test adds linear controls for returns to the econometric models in Equation 1 and Equation 2. Separate linear controls are added for returns on either side of zero, for both returns since purchase and returns since peak price. Results are shown in Table 10, which reports estimates both without individual fixed effects (shown in Columns 1-3) and with the addition of individual fixed effects (shown in Columns 4-6). The coefficient values are again very similar to those in the baseline OLS models, slightly attenuated by the linear controls for returns, which are precisely defined in the majority of models and imply that investors have a higher probability of sale when experiencing greater returns since purchase and greater returns since peak price.

6.1.3 Additional Controls

Table 11 shows estimates from models with additional controls. Previous studies suggest important control variables in econometric specifications of the disposition effect, including the stock holding period (see Ben-David and Hirshleifer, 2012b) and investor experience (see Da Costa Jr et al., 2013). In a series of econometric models presented in the table, we control for the holding period (days since purchase), days since peak, portfolio and account characteristics (portfolio value, number of stocks in the portfolio, and account tenure) plus individual controls for account holder gender and account holder age. We also show specifications that include account and stock fixed effects. Coefficient estimates for gain since purchase and gain since peak are stable across a wide range of specifications incorporating these additional controls.[41]

6.1.4 Additional Robustness Tests

Additional robustness and sensitivity tests are presented in the supplementary Online Appendix. We find consistent results when using (i) a hazard model specification instead of a linear probability model (following Seru et al., 2010), (ii) excluding partial sales to rule out confounds

[41] The fullest pooled model (Column 8 of Table 11) returns coefficient values of 0.0637 and 0.0779 on the gain since purchase and gain since peak dummies, respectively, which show little change in a model that includes account and stock fixed effects (Column 10) in which the values are 0.0724 and 0.0769. These estimates are again very similar to the OLS estimates reported in Table 8: the increased probability of sale for a stock in gain since purchase and gain since peak is 14.9 percentage points in Column 10 of Table 11, compared with 14.8 percentage points in Column 3 of Table 8.

arising from portfolio rebalancing strategies, and (iii) using month periods to define peak prices instead of week periods. We also replicate our results using (iv) the sample of login-days (which encompasses the sample of sell-days used in the main analyses, since investors have to log in to trade). These additional checks also include sensitivity analyses that include estimates of interaction effects with (v) market movements (daily market movements as well as market movements since the purchase of the stock and since past peak prices), (vi) the time elapsed since purchase and since the past peak price event, and (vii) investor and account characteristics (e.g., gender, age, account tenure, portfolio value, and portfolio size). The Online Appendix also reproduces the analysis on the triple interaction between gains since purchase, gains since the past peak price, and gains since the most recent login to the account, we document in Quispe-Torreblanca et al. (2021).[42] Losses on any of these margins reduce the probability that the investor will sell, even when other margins show gains. This further shows the importance of other reference points in creating a reluctance to realise losses.

7 Explanations for the Peak Price Effect

In the remainder of the paper, we evaluate explanations for the existence of a peak price effect. We consider two main explanations. First, a belief in 'peak-reversion': Owners of assets might optimistically infer from the fact that an asset at one point achieved a particular price that its 'true' value corresponds to that peak price and, hence, expect the market price to evolve toward the peak price. Anticipation of such an increase in price would lead to a reluctance to sell the asset at its current, lower, price. This explanation is related to an explanation for the disposition effect proposed by Shefrin and Statman (1985) and Odean (1998) – that investors hold on to losing stocks because they expect higher future returns from losing stocks compared with winning stocks, i.e., they expect losing stocks to outperform in the future as they rebound in price.

Second, regret-avoidance: The peak price can be a source of regret for owners who wish they had sold at the peak. Asset owners may resist selling, therefore, to avoid converting the

[42] In Quispe-Torreblanca et al. (2021), we show that the price observed on the last login day constitutes another important reference point that influences investors selling decisions.

paper loss of not having sold at the peak to the real loss of actually selling 'too late'. Such an account would be consistent with research on "inaction inertia" (Tykocinski and Pittman, 1998), which finds that "when an attractive action opportunity has been forgone, individuals tend to decline a substantially less attractive current opportunity in the same action domain, even though, in an absolute sense, it still has positive value" (page 206).

Note that these explanations are not mutually exclusive – e.g., an individual could regret not having sold at the peak, could want to wait for the asset price to rise back to the peak before selling, and could also be over-optimistic that this opportunity will arise, as a result of belief in peak-reversion.

We evaluate these explanations via additional analysis of the role of ownership in generating the peak price effect, and the role of top-up purchases. If the peak price effect arises due to regret, we would expect to see a stronger effect among those who held the asset at the point in time of reaching the peak price (as only this group would experience greater regret). If the peak price effect arises due to belief in reversion to the peak, we would expect to observe individuals making top-up purchases when the price falls below the peak price (in expectation of future gains as the price reverts to the peak). We examine both issues using the stock trading data.[43]

7.1 Ownership and the Peak Price Effect

We first examine the relationship between ownership and the peak price effect. Recent studies suggest that ownership is itself important for attention and belief formation (Hartzmark et al., 2021; Kindermann et al., 2021; Medina et al., 2021; Carney et al., 2022). For each investor × stock × day observation, we first identify the peak price for that stock within the past year (defined as the highest price achieved over the past year). We then divide the sample into observations for which the investor held the stock on the peak price day, and observations for which the investor did not hold the stock on the peak price day.

Figure 4 provides examples of scenarios in which investors held (Panel A) and did not hold (Panel B) a stock on the peak price day. In Panel A, the investor purchased the stock prior to the peak day event, and in this case has experienced a gain since purchase and a gain since

[43] It is not feasible to conduct the analysis on the housing data as "top-up" purchases of a residential house are typically not possible.

the peak price day. In Panel B, the investor purchased the stock after the peak price day event (which occurred approximately six months prior to the purchase day), and has also experienced a gain since purchase and a gain since peak price day.

Using this approach, we find much weaker evidence for a disposition effect around peak price events which pre-date the investor holding the stock. We estimate Equation 2 on both samples, with results shown in Table 12. Panel A reports results for the sample of observations in which the investor did not hold the stock on the peak price day. Estimates show a positive and precisely defined coefficient of the gain since purchase dummy. The coefficient of the gain since peak dummy is imprecisely defined in Column 1, and negative in Column 2 (statistically significant at the 5% level). The coefficient remains negative in Column 3 after adding account and stock fixed effects to account for heterogeneity across investors and assets.

Panel B reports results for the sample of observations in which the investor did hold the stock on the peak price day. In this sample, in contrast with Panel A, estimates show positive and precisely defined coefficients for both the gain since purchase and gain since peak price dummies.[44] The coefficient values are smaller than in the main analysis, as expected—given that a peak price in the past year is likely less salient than a peak price since purchase—but show the existence of both forms of the disposition effect as expected. Hence, this test adds evidence that peak prices affect trading behaviours through returns experienced by the investor.

7.2 Top-Up Purchases and the Peak Price Effect

If investors believe that stocks that have performed poorly since their peak price will eventually return to that level, they may be more likely to make additional purchases of those stocks the larger the loss since the past peak event. To explore this, Figure 5 shows binned scatterplots of the relationships between losses since purchase, losses since peak and the propensity of investors to top-up current positions with new purchases of the same stock. The proportion of observations with top-ups is shown on the y-axis, with loss since purchase (Panel A) and since peak (Panel B) shown on the x-axis. Results in Panel A show that the probability of top-up *decreases* as losses *since purchase* increase. However, in Panel B we observe the opposite

[44] The coefficient on Gain Since Peak in Panel B is 0.0298 [95% CI 0.0200, 0.0396]. In Panel A the coefficient is -0.0015 [95% CI -0.017376, 0.014376].

relationship for losses since peak price: the probability of top-up *increases* as losses *since peak price* increase. These relationships are confirmed by regression analysis with the former showing a positive coefficient of the loss since purchase variable, and the latter showing a negative coefficient of the loss since peak variable.[45]

While our analysis has shown that observations with higher losses since peak price display a higher probability of top-up purchases, which is consistent with the idea of belief in reversion to the past peak price, one might expect that a similar relationship would hold when the reference point is the purchase price. That is, one would expect that higher losses since purchase would be related to a higher probability of a top-up purchase. However, our analysis did not find this relationship in the data. This suggests that investors may not necessarily be chasing losses in general, but rather only chasing losses relative to certain reference points that are independent of the time they purchase the stock. These higher reference points, such as the peak price, may be more salient for investors and may influence their decision-making more significantly. This indicates that the peak price may serve as a particularly influential reference point for investors and may shape their perceptions of the value of an asset in a way that the purchase price does not.

In combination, these results provide strong support for a peak-reversion account – we should not expect to observe elevated top-ups when prices are below peak unless investors anticipate that prices will rise – and also positive, but less strong support for regret-avoidance. Support for regret-avoidance comes from the observation that peak prices occurring when the asset is owned have a much greater impact than peak prices before the asset was owned, consistent with an account in which people, naturally, only regret not selling assets they actually owned. However, the latter finding could also be consistent with a peak-reversion account if people pay more attention to, and hence have a stronger belief in peak-reversion to – peaks occurring when they hold an asset.

[45] See Table A34 and Table A35. In an extension, in Table A36, we also test whether the negative slope found in Panel B of Figure 5 is different for the cases in which the investor has not held the stock during the past peak price, following the same spirit of our earlier test, but this time analysing topping-up decisions. We, however, find that the slopes are quantitatively similar for peaks occurring before the purchase of the stocks and peaks occurring after the purchase. These findings provide additional support to the notion of beliefs in reversion to the peak.

8 Conclusion

Using data on buying and selling behaviour of individual asset-owners – both housing and stocks – we show a new disposition effect for returns based upon the peak price reached by the asset during the individual's period of ownership. This disposition effect arising from the peak price experienced by the asset owner exists over and above the disposition effect arising from the purchase price. We show that this effect is robust to a range of econometric tests, and also sensitivity analyses. For the stock data, whose prices are more volatile and therefore contain a larger frequency of peak prices, we were also able to perform a placebo test that exploits peak price events that occur before investors purchase stocks.

Our study contributes to the expanding literature on how multiple reference points affect individual decisions. Research has documented the operation, and consequences for economic behavior, of diverse reference points – for example, past wages (Bewley, 2009; DellaVigna et al., 2017), other people's wages (Brown et al., 2008; Card et al., 2012; Bracha et al., 2015), and what people expect to receive (Kőszegi and Rabin, 2006; Mas, 2006; Crawford and Meng, 2011) in settings as varied as consumer products marketing (Hardie et al., 1993), tax compliance (Yaniv, 1999), food choices (Van Herpen et al., 2014), sports (Allen et al., 2016; Pope and Schweitzer, 2011), and rental choices Bordalo et al. (2019). Very few of these papers, however, have examined the interplay between different reference points in situations in which multiple natural points of comparison are operative.

The current research also contributes to the growing literature showing that an individual's personal history can affect their economic behavior (see, for examples, Malmendier and Nagel, 2011; Malmendier et al., 2011; Malmendier and Nagel, 2016; Andersen et al., 2019), and that, more specifically, the history of an individual's ownership of an object – e.g., how they came to acquire the object – can affect valuations (Loewenstein and Issacharoff, 1994; Strahilevitz and Loewenstein, 1998). One dimension of understanding the consequences of individual experience for future behavior, the current research suggests, is to understand the reference points that experience makes salient.

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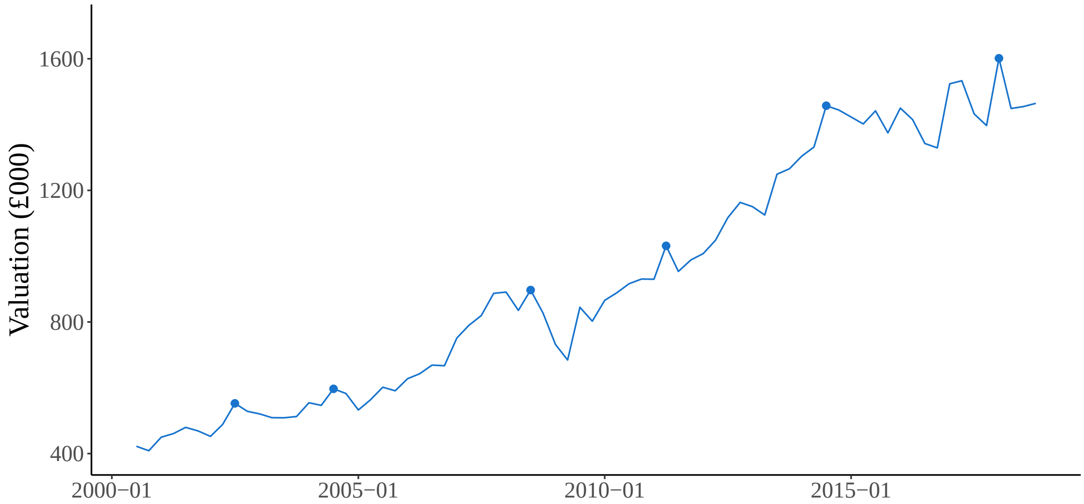
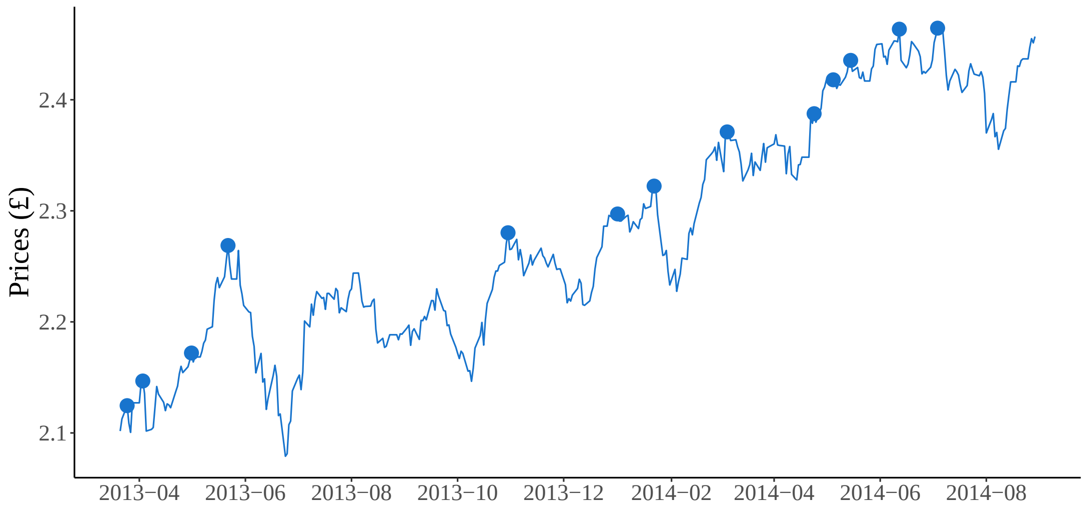
Figure 1: Examples of Peak Prices

(A) Example of Housing Price Peaks

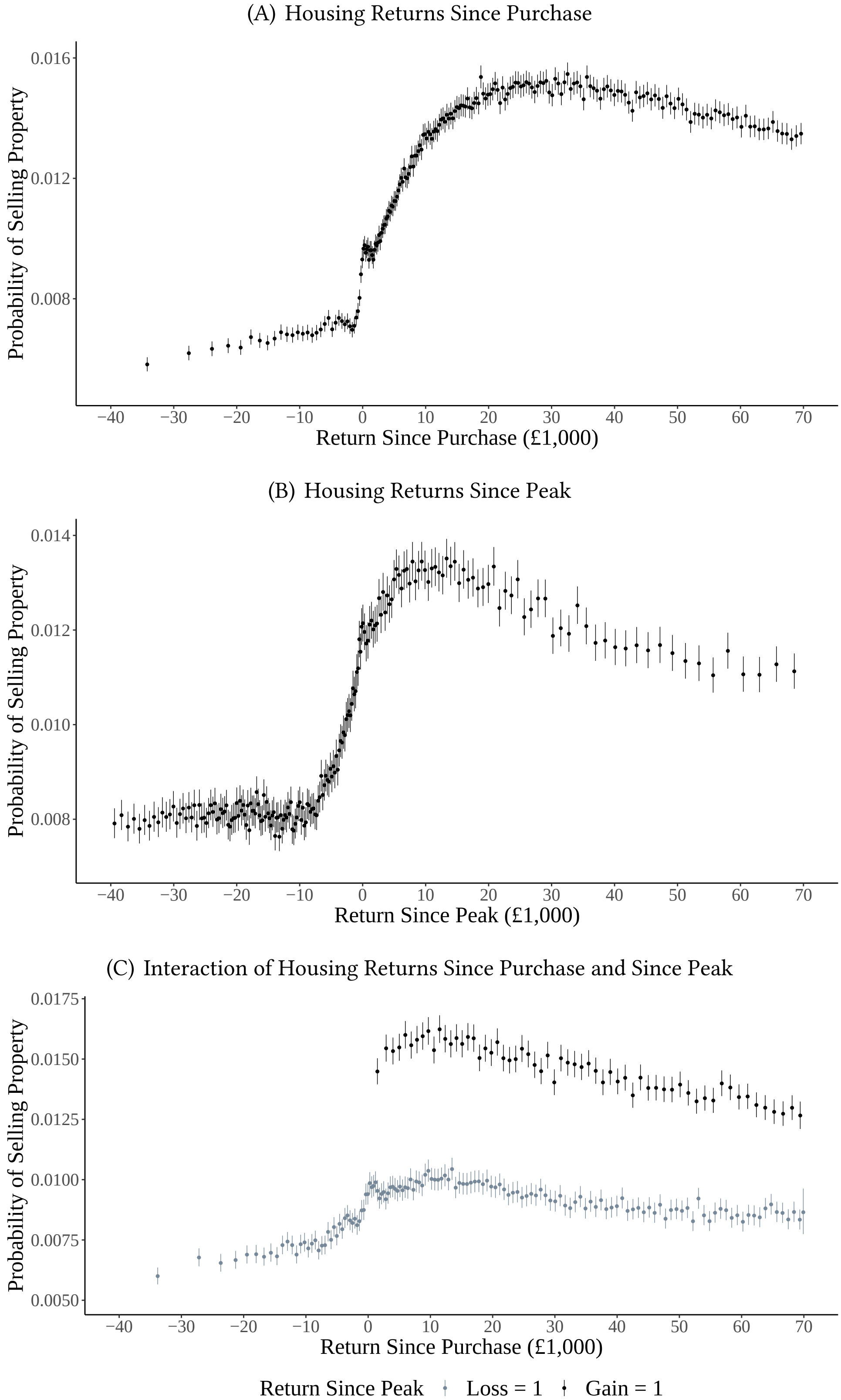


(B) Example of Stock Price Peaks



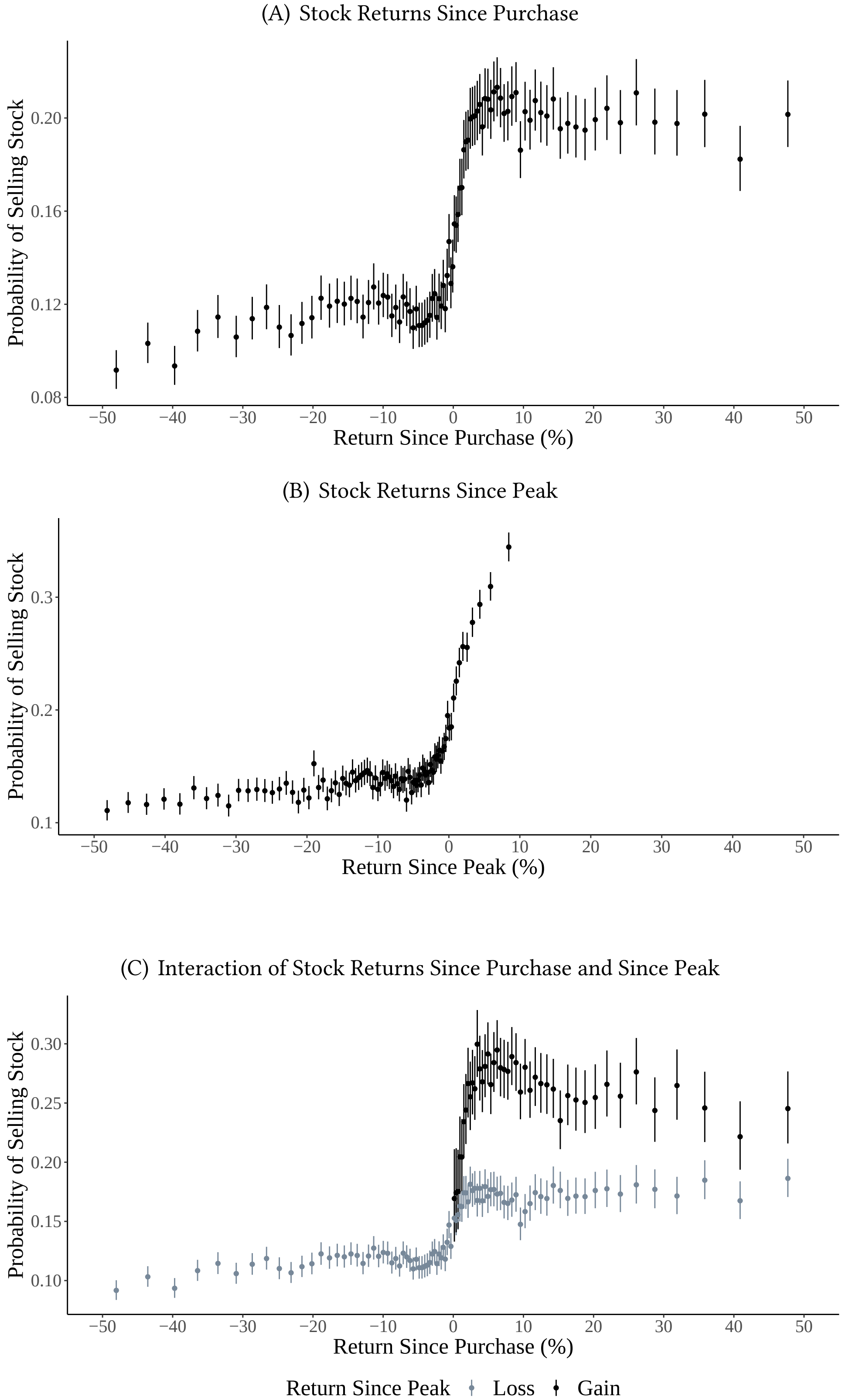
Note: The figure illustrates the sequence of peak prices for a single example home (Panel A) and a single example stock (Panel B). For the case of houses in Panel A, a peak price is defined as the highest price (since purchase) that lasts for at least three quarters; while for the case of stocks in Panel B, the peak price must last for at a week. In both cases, a new price can only be a peak if it is higher than the purchase price and all previous peaks.

Figure 2: Probability of Housing Sale, Returns Since Purchase and Returns Since Peak



Note: The figure shows the probability of house sales against return since purchase and return since peak price. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -£40,000 and + £70,000, otherwise observations include all property × quarters in the baseline sample. Vertical lines represent 95% confidence intervals.

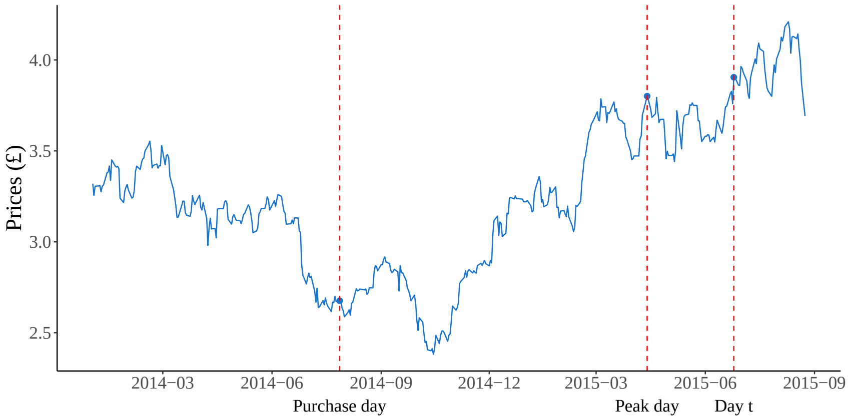
Figure 3: Probability of Stock Sale, Returns Since Purchase and Returns Since Peak



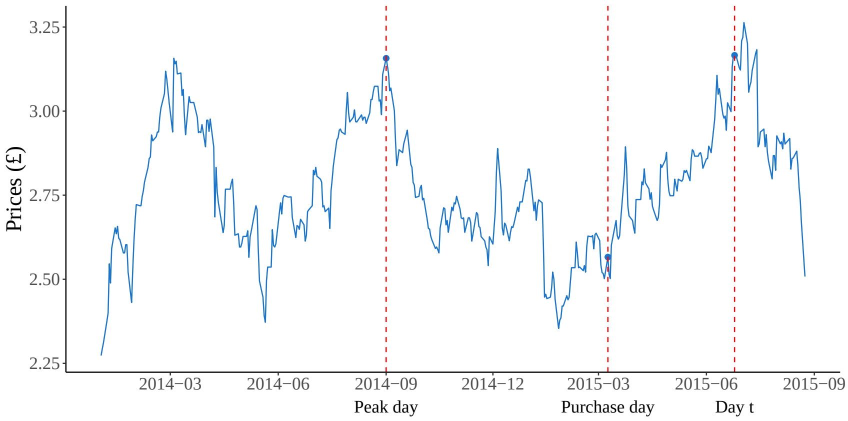
Note: The figure shows the probability of stocks sales against return since purchase and return since peak price. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -50% and 50%. The sample includes all investor × stock × days on which the investor sold at least one stock in his portfolio. Vertical lines represent 95% confidence intervals.

Figure 4: Examples of Stocks Price Trajectories for the Placebo Analysis

(A) Holding Stock on Peak Day - Gain Since Purchase - Gain Since Peak



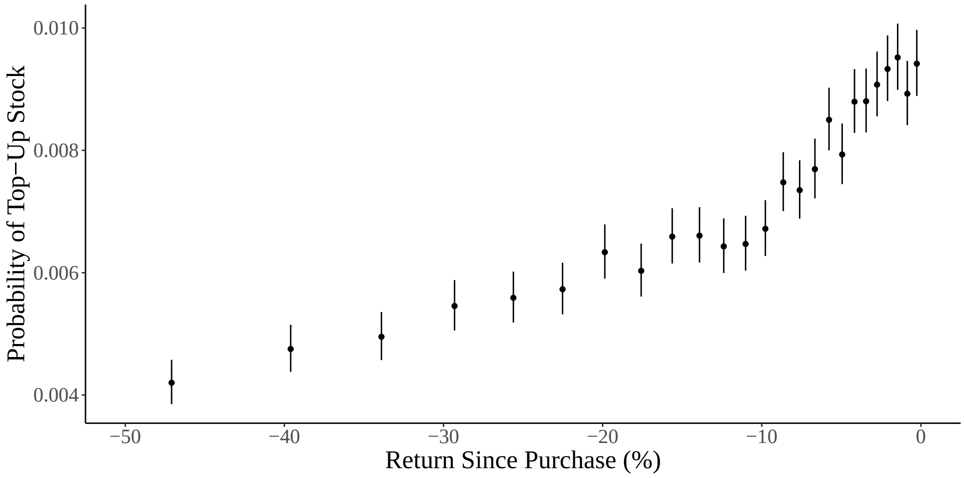
(B) Not Holding Stock on Peak Day - Gain Since Purchase - Gain Since Peak



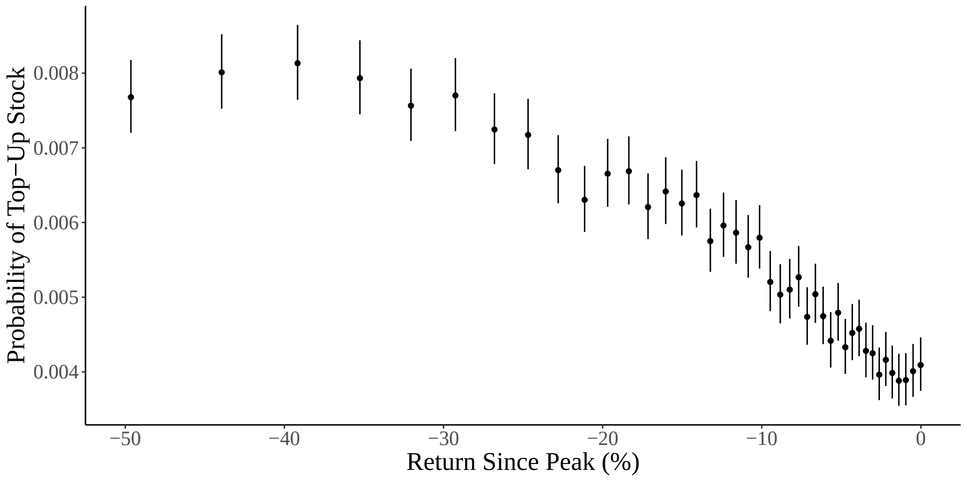
Note: The figure illustrates the test that contrasts the effect of peak prices that occurred before the purchase of the stock with those that occurred after the purchase of the stock. Across panels, peak prices are defined over the past year. The panels display examples of days with a gain since the past peak day and a gain since purchase (the day of evaluation is *Day t*, 2015-06-25) but distinguishing the case when the investor has held the stock during the past peak (Panel A) or hasn't held it (Panel B).

Figure 5: Stock Top-Ups, Returns Since Purchase and Return Since Peak

(A) Stock Disposition Effect Since Purchase for Top-Ups



(B) Stock Disposition Effect Since Peak for Top-Ups



Note: The figure display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), and returns since peak price (Panel B). Plots intend to test potential beliefs in reversion to the purchase price and peak price, respectively. As such, returns are restricted to the range of -50% and 0%. The sample includes all investor × stock × days on which the investor made at least one login to his account. Vertical lines represent 95% confidence intervals.

Table 1: Purchase Price Disposition Effect for Housing: OLS Estimates

	$Sale_{it}$	
	(1)	(2)
Gain Since Purchase = 1	0.0053***	0.0074***
	(0.0005)	(0.0006)
Years From Purchase		0.0074***
		(0.0005)
Detached = 1		-0.0055***
		(0.0004)
Semi-detached = 1		-0.0040***
		(0.0003)
Terraced = 1		-0.0017***
		(0.0002)
New-build = 1		0.0016***
		(0.0002)
Quality (£100,000)		-0.0005***
		(0.0000)
Constant	0.0070***	0.0030***
	(0.0003)	(0.0004)
Years From Purchase Quintics	NO	YES
Region	NO	YES
Observations	128,444,588	128,444,588
R^2	0.0002	0.0017

Note: The table presents ordinary least squares regression estimates. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Column 1 displays the baseline specification. Column 2 adds controls for year since purchase and property characteristics. Years from Purchase constitute the length of property's ownership at valuation and are evaluated as quintics. Property characteristics include: detached, semi-detached, and terraced, which take the value of 1 if the property is of that type, otherwise zero (for the case of apartments). New-build takes a value of 1 if the property was acquired as a new development, otherwise zero if acquired as a resale. Quality is a proxy measure of the calibre of the property (computed following Genesove and Mayer, 2001). Region is the official EW region where the property is located. Observations includes all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 2: Purchase Price Disposition Effect for Housing:
Property Fixed Effects Estimates

	$Sale_{it}$	
	(1)	(2)
Gain Since Purchase = 1	0.0054***	0.0034***
	(0.0005)	(0.0011)
Return Since Purchase > 0 (£100,000)	0.0004**	0.0004
	(0.0002)	(0.0006)
Return Since Purchase < 0 (£100,000)	0.0194***	0.0277*
	(0.0022)	(0.0164)
Years From Purchase	0.0076***	0.0111***
	(0.0005)	(0.0007)
Constant	0.0049***	
	(0.0003)	
Years From Purchase Quintics	YES	YES
Property Characteristics	YES	NO
Property FE	NO	YES
Quarter FE	NO	YES
Observations	128,444,588	128,444,588
R^2	0.0018	0.0263

Note: The table presents ordinary least squares (Column 1) and fixed effect (Column 2) regression estimates for our baseline specification with the addition of continuous control variables for the return since purchase when the return since purchase is negative and, in a separate variable, when the return since purchase is positive. Both regression estimates include the controls used in Table 1, Column 2. Property characteristics are time invariant and therefore dropped in Column 2. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Fixed effects are at the property and year-quarter level. Observations include all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 3: Purchase Price Disposition Effect for Housing: Liquidity, Market Size, Leverage and Time since Purchase Tests

	Gain Since Purchase		Constant	
Liquidity (Sales)				
Above Median	0.0051***	(0.0005)	0.0063***	(0.0004)
Below Median	0.0043***	(0.0004)	0.0047***	(0.0003)
Size (Stock)				
Above Median	0.0064***	(0.0007)	0.0043***	(0.0004)
Below Median	0.0059***	(0.0006)	0.0039***	(0.0004)
Leverage (LTV%)				
Above Median	0.0024***	(0.0005)	0.0043***	(0.0004)
Below Median	0.0052***	(0.0008)	0.0024***	(0.0007)
Time Since Purchase				
Above Median	0.0028***	(0.0005)	0.0246***	(0.0077)
Below Median	0.0066***	(0.0005)	0.0062***	(0.0005)

Note: The table summarises ordinary least squares regression estimates for our baseline specification for separate samples divided by liquidity, market size, leverage and time since purchase. The full estimates are presented in Table A14, Table A15 Table A16 and Table A17 respectively. Each row reports coefficients and standard errors from a single regression in which the dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. There are covariates for continuous returns since purchase; years from purchase and property characteristics equivalent to Table 2, Column 1. Column 1 displays the main coefficient of interest for the gain since purchase dummy. Column 2 shows the intercept to enable a better interpretation of the effect size of the gain since purchase dummy. Observations include all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 4: Purchase and Peak Price Disposition Effects for Housing: OLS Estimates

	$Sale_{it}$			
	(1)	(2)	(3)	(4)
Gain Since Purchase = 1	0.0024***		0.0010***	0.0036***
	(0.0004)		(0.0003)	(0.0004)
Gain Since Peak = 1		0.0033***	0.0031***	0.0036***
		(0.0005)	(0.0005)	(0.0005)
Years From Purchase				0.0053***
				(0.0007)
Detached = 1				-0.0039***
				(0.0003)
Semi-detached = 1				-0.0034***
				(0.0003)
Terraced = 1				-0.0020***
				(0.0002)
New-build = 1				0.0013***
				(0.0001)
Quality (£100,000)				-0.0002***
				(0.0000)
Constant	0.0075***	0.0084***	0.0075***	0.0021**
	(0.0003)	(0.0003)	(0.0003)	(0.0009)
Years From Purchase Quintics	NO	NO	NO	YES
Region	NO	NO	NO	YES
Observations	72,113,609	72,113,609	72,113,609	72,113,609
R^2	0.0001	0.0003	0.0003	0.0011

Note: The table presents ordinary least squares regression estimates for our modified baseline specification that incorporates gain since peak price. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Years from purchase constitute the length of property's ownership at valuation and are evaluated as quintics. Property characteristics include: detached, semi-detached, and terraced, which take the value of 1 if the property is of that type, otherwise zero (for the case of apartments). New-build takes a value of 1 if the property was acquired as a new development, otherwise zero if acquired as a resale. Quality is a proxy measure of the calibre of the property (computed following Genesove and Mayer, 2001). Region is the official EW region where the property is located. Observations includes all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 5: Purchase and Peak Price Disposition Effects for Housing: Including Continuous Returns Since Purchase and Since Peak

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0040***		0.0026***
	(0.0005)		(0.0004)
Return Since Purchase > 0 (£100,000)	0.0001		0.0001
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0112***		0.0068***
	(0.0015)		(0.0020)
Gain Since Peak = 1		0.0039***	0.0036***
		(0.0005)	(0.0005)
Return Since Peak > 0 (£100,000)		-0.0018***	-0.0017***
		(0.0003)	(0.0004)
Return Since Peak < 0 (£100,000)		0.0050***	0.0039**
		(0.0015)	(0.0016)
Years From Purchase	0.0058***	0.0055***	0.0053***
	(0.0008)	(0.0007)	(0.0007)
Constant	0.0025**	0.0037***	0.0032***
	(0.0010)	(0.0011)	(0.0009)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	72,113,609	72,113,609	72,113,609
R^2	0.0008	0.0010	0.0011

Note: This table presents ordinary least squares regression estimates for our modified baseline specification with the addition of continuous control variables for the return since purchase (and the return since peak) when the return since purchase (peak) is negative and, in a separate variable, when the return since purchase (peak) is positive. The regression estimates also include all controls from Table 4, Column 4, (covariates for years from purchase quintics and property characteristics). The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Observations include all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 6: Purchase and Peak Price Disposition Effects for Housing: Property Fixed Effects Estimates

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0032***		0.0030***
	(0.0011)		(0.0011)
Return Since Purchase > 0 (£100,000)	-0.0012***		-0.0012**
	(0.0004)		(0.0006)
Return Since Purchase < 0 (£100,000)	0.0055		0.0064
	(0.0096)		(0.0102)
Gain Since Peak = 1		0.0014***	0.0011**
		(0.0004)	(0.0004)
Return Since Peak > 0 (£100,000)		-0.0014***	-0.0003
		(0.0004)	(0.0005)
Return Since Peak < 0 (£100,000)		0.0007	-0.0003
		(0.0011)	(0.0013)
Years From Purchase	0.0107***	0.0103***	0.0104***
	(0.0019)	(0.0018)	(0.0019)
Years From Purchase Quintics	YES	YES	YES
Property FE	YES	YES	YES
Quarter FE	YES	YES	YES
Observations	72,113,609	72,113,609	72,113,609
R^2	0.0597	0.0596	0.0597

Note: The table presents fixed effect regression estimates for our modified baseline specification with the addition of time varying controls (return since purchase; return since peak and years from purchase quintics) from Table 5, Column 3. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Fixed effects are at the property and year-quarter level. Observations includes all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 7: Purchase and Peak Price Disposition Effects for Housing: Liquidity, Market Size, Leverage, Time Since Purchase and Time Since Peak Sensitivity Tests

	Gain Since Purchase		Gain Since Peak		Constant	
Liquidity (Sales)						
Above Median	0.0031***	(0.0004)	0.0036***	(0.0005)	0.0021*	(0.0012)
Below Median	0.0020***	(0.0003)	0.0031***	(0.0004)	0.0039***	(0.0008)
Size (Stock)						
Above Median	0.0027***	(0.0004)	0.0041***	(0.0006)	0.0008	(0.0010)
Below Median	0.0025***	(0.0004)	0.0036***	(0.0007)	0.0042***	(0.0012)
Leverage (LTV%)						
Above Median	0.0015***	(0.0004)	0.0020***	(0.0004)	0.0040***	(0.0008)
Below Median	0.0027***	(0.0005)	0.0036***	(0.0006)	0.0034***	(0.0010)
Time Since Purchase						
Above Median	-0.0002	(0.0015)	0.0017***	(0.0002)	-0.0054	(0.0237)
Below Median	0.0021***	(0.0004)	0.0057***	(0.0007)	0.0038**	(0.0019)
Time Since Peak						
Above Median	0.0023***	(0.0002)	0.0021***	(0.0003)	0.0153**	(0.0064)
Below Median	0.0031***	(0.0005)	0.0049***	(0.0008)	0.0011	(0.0008)

Note: The table summarises ordinary least squares regression estimates for our modified baseline specification for separate samples divided by liquidity, market size, leverage, time since purchase and time since peak. The full estimates are presented in Table A18, Table A19, Table A20, Table A21 and Table A22 respectively. Each row reports coefficients and standard errors from a single regression in which the dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. There are covariates for return since purchase; return since peak; years from purchase quintics and property characteristics equivalent to Table 5, Column 3. Columns 1 and 2 display the main coefficient of interest for the gain since purchase and gain since peak price dummies. Column 3 shows the intercept to enable a better interpretation of the effect size of the gain dummies. Observations include all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table 8: Purchase and Peak Price Disposition Effect for Stocks: OLS Estimates

	$Sale_{ijt}$		
	(1)	(2)	(3)
Gain Since Purchase=1	0.0828***		0.0572***
	(0.0045)		(0.0039)
Gain Since Peak=1		0.1281***	0.0906***
		(0.0063)	(0.0050)
Constant	0.1135***	0.1332***	0.1135***
	(0.0042)	(0.0040)	(0.0042)
Observations	396,186	396,186	396,186
R^2	0.0132	0.0137	0.0188

Note: The table presents ordinary least squares regression estimates. The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. The sample includes of all investor × stock × days on which the investor sold at least one stock in the portfolio. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table 9: Purchase and Peak Price Disposition Effects for Stocks: Individual Fixed Effects Estimates

	$Sale_{ijt}$		
	(1)	(2)	(3)
Gain Since Purchase=1	0.0860***		0.0647***
	(0.0041)		(0.0033)
Gain Since Peak=1		0.1132***	0.0740***
		(0.0059)	(0.0047)
Observations	396,186	396,186	396,186
R^2	0.1466	0.1445	0.1502

Note: The table presents fixed effects regression estimates. The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. Fixed effects are at the account level. The sample includes all investor × stock × days on which the investor sold at least one stock in the portfolio. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table 10: Purchase and Peak Price Disposition Effects for Stocks:
Including Continuous Returns Since Purchase and Since Peak Price

	$Sale_{ijt}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Gain Since Purchase=1	0.0680***		0.0453***	0.0704***		0.0522***
	(0.0047)		(0.0039)	(0.0044)		(0.0036)
Return Since Purchase > 0 (%)	0.0002		-0.0001	0.0005***		0.0002
	(0.0002)		(0.0002)	(0.0001)		(0.0001)
Return Since Purchase < 0 (%)	0.0007***		0.0016***	0.0006***		0.0018***
	(0.0001)		(0.0002)	(0.0001)		(0.0002)
Gain Since Peak=1		0.0564***	0.0413***		0.0516***	0.0332***
		(0.0060)	(0.0055)		(0.0057)	(0.0051)
Returns Since Peak > 0 (%)		0.0177***	0.0179***		0.0157***	0.0156***
		(0.0013)	(0.0013)		(0.0012)	(0.0012)
Returns Since Peak < 0 (%)		0.0009***	-0.0008***		0.0008***	-0.0012***
		(0.0001)	(0.0002)		(0.0001)	(0.0002)
Constant	0.1264***	0.1496***	0.1207***			
	(0.0045)	(0.0041)	(0.0045)			
Account FE	NO	NO	NO	YES	YES	YES
Observations	396,186	396,186	396,186	396,186	396,186	396,186
R^2	0.0140	0.0176	0.0220	0.1473	0.1473	0.1528

Note: The table presents ordinary least squares regression estimates of our main specification with the addition of continuous control variables for the return since purchase (and return since peak price) when the return since purchase (peak) is negative and, in a separate variable, when the return since purchase (peak) is positive. The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. The sample includes all investor × stock × days on which the investor sold at least one stock in the portfolio. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table 11: Purchase and Peak Price Disposition Effects for Stocks:
Including Portfolio and Demographic Controls

	$Sale_{ijt}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gain Since Purchase=1	0.0566***	0.0590***	0.0636***	0.0652***	0.0627***	0.0634***	0.0633***	0.0637***	0.0678***	0.0724***
	(0.0038)	(0.0037)	(0.0040)	(0.0040)	(0.0038)	(0.0038)	(0.0038)	(0.0037)	(0.0036)	(0.0036)
Gain Since Peak=1	0.0903***	0.0833***	0.0824***	0.0814***	0.0773***	0.0776***	0.0777***	0.0779***	0.0746***	0.0769***
	(0.0049)	(0.0048)	(0.0048)	(0.0048)	(0.0047)	(0.0047)	(0.0047)	(0.0047)	(0.0047)	(0.0046)
Days Since Purchase (100 days)		-0.0060***	-0.0088***	-0.0079***	-0.0082***	-0.0074***	-0.0073***	-0.0072***	-0.0021**	0.0021**
		(0.0007)	(0.0011)	(0.0011)	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0008)	(0.0009)
Days Since Peak (100 days)			0.0049***	0.0044***	0.0058***	0.0057***	0.0057***	0.0056***	0.0039***	0.0018
			(0.0013)	(0.0013)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0011)	(0.0011)
Portfolio Value (£10000)				-0.0015***	-0.0006**	-0.0006**	-0.0006**	-0.0006***	-0.0013***	-0.0013***
				(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)
Number of Stocks (10 stocks)					-0.0368***	-0.0374***	-0.0373***	-0.0363***	-0.0109	-0.0108
					(0.0094)	(0.0096)	(0.0095)	(0.0091)	(0.0083)	(0.0085)
Account Tenure (years)						-0.0060**	-0.0059**	-0.0040		
						(0.0026)	(0.0027)	(0.0025)		
Female=1							-0.0084	-0.0021		
							(0.0056)	(0.0051)		
Age (10 years)								-0.0134***		
								(0.0016)		
Constant	0.1079***	0.1198***	0.1175***	0.1283***	0.1739***	0.1874***	0.1882***	0.2520***		
	(0.0039)	(0.0047)	(0.0046)	(0.0044)	(0.0100)	(0.0136)	(0.0133)	(0.0135)		
Account FE	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Observations	388,297	388,297	388,297	388,297	388,297	388,297	388,297	388,297	388,297	388,297
R^2	0.0192	0.0203	0.0205	0.0271	0.0479	0.0481	0.0482	0.0509	0.1302	0.1518

Note: The table presents ordinary least squares regression estimates of the baseline model with the addition of demographic controls and (daily level) portfolio controls. The sample includes all investor × stock × days on which the investor sold at least one stock. Outliers (investor × stock × days) below the 1st and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table 12: Estimates of the Stocks Disposition Effect, Placebo Analysis

Panel (A): No Holding Stock

	$Sale_{ijt}$		
	(1)	(2)	(3)
Gain Since Purchase=1	0.1582***	0.1431***	0.1502***
	(0.0073)	(0.0071)	(0.0064)
Gain Since Peak=1	-0.0161	-0.0249**	-0.0015
	(0.0102)	(0.0102)	(0.0081)
Days from Purchase Day (100 days)		-0.0450***	-0.0053***
		(0.0025)	(0.0017)
Constant	0.1268***	0.1723***	
	(0.0052)	(0.0066)	
Account FE	NO	NO	YES
Stock FE	NO	NO	YES
Observations	242,536	242,536	242,536
R^2	0.0383	0.0480	0.2397

Panel (B): Holding Stock

	$Sale_{ijt}$		
	(1)	(2)	(3)
Gain Since Purchase=1	0.0361***	0.0350***	0.0322***
	(0.0043)	(0.0043)	(0.0040)
Gain Since Peak=1	0.0320***	0.0290***	0.0298***
	(0.0054)	(0.0055)	(0.0050)
Days from Purchase Day (100 days)		-0.0033***	0.0054***
		(0.0009)	(0.0007)
Constant	0.1172***	0.1289***	
	(0.0047)	(0.0062)	
Account FE	NO	NO	YES
Stock FE	NO	NO	YES
Observations	169,800	169,800	169,800
R^2	0.0045	0.0050	0.1998

Note: The table presents ordinary least squares regression estimates for the placebo test that compares the effect of peak prices that took place before the holding period of the stock with those that ocurred during the holding period. Peak prices are defined over the past year. The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. The sample includes all investor × stock × days on which the investor sold at least one stock in the portfolio. However, Panel A includes the set of days in which past peak prices occurred before the purchase of the stock; and Panel, the set of days in which peak prices occurred after the purchase of the stock. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Supplementary Web Appendix for Online Publication

Appendix 1: Realization Utility and the Peak Price Effect

We derive predictions about the interactive impact of purchase price and peak price on selling decisions drawing upon a recent framework of the disposition effect proposed by Quispe-Torreblanca et al. (2021). In that paper, the authors develop a framework of realization utility which incorporates prospect theory preferences, but with the innovation of multiple reference points (e.g., the purchase price, the price at the last login day, the peak price, and the current price). A key assumption in the framework is that an individual who is exposed to more than one salient reference point focuses on the most aspirational price − here meaning the highest price − when deciding whether or not to sell an asset at a particular point in time. This price represents the best price achieved to date and hence it is actually the least favourable for a comparison of the individual's current position.

In Figure A1, we augment the basic four-period model of Quispe-Torreblanca et al. (2021), introducing peak prices into the model.

> Period 0. The individual purchases an asset at a price p_0. This purchase price constitutes a salient reference point. Between Period 0, and Period 1, the price then either rises or falls with equal likelihood to a price p_1.
>
> Period 1. In Period 1, the individual observes the new price p_1, which becomes a salient reference point. Between Period 1, and Period 2, the price then either rises or falls with equal likelihood to a price p_2.
>
> Period 2. In Period 2, the individual observes the new price, then chooses whether or not to sell the asset. Between Period 2, and Period 3, the price then either rises or falls with equal likelihood to a price p_3.
>
> Period 3. In this final period, the individual liquidates any remaining position in the asset.

The model incorporates two simplifying assumptions, first, that at the start of Period 0 the individual purchases an asset which takes the form of a single unit and that prior to each period the price rises or falls with equal likelihood (independent of the price history) by a fixed amount (for simplicity, normalized to 1), and second, that once having sold the asset, the receipts are held in a risk-free asset, as is most commonly the case with proceeds from housing sales or modern brokerage accounts.[46] With the assumption of realization utility, the individual is only concerned with the utility experienced from selling the asset, either in Period 2 or 3.

The version of the framework presented here differs from that in Quispe-Torreblanca et al. (2021) by assuming that at Period 1 the individual always observes the price of the asset. In the formulation of the model in Quispe-Torreblanca et al. (2021), which focuses on the role of attention in creating reference points, whether the individual observed the price depended on whether she looked (e.g., made a login to the account on the investment platform, or consulted a financial news database).

Figure A1 Panel A illustrates the events in the framework. Beginning from p_0 at time $t = 0$, the price of the asset rises or falls through Periods $t = 1, 2, 3$, resulting in the individual arriving at a node in each time period, dependent on the evolution of the price of the asset. Panel B describes the individual's selling decision under prospect theory preferences at each node in

[46] Proceeds from housing sales, net of any mortgage redemption, are transferred to checking accounts. In the Barclays Stockbroking data used in this study, proceeds from sales are automatically transferred to a liquid account paying nominal money market returns.

the period $t = 2$.

At $t = 2$, the individual maximises a prospect theory value function given by

$$\begin{aligned} &|p - r|^{\delta} \ \text{ if } \ p - r \geq 0, \\ -\lambda &|p - r|^{\delta} \ \text{ if } \ p - r < 0, \end{aligned} \tag{3}$$

where δ, $(0 < \delta < 1)$ and λ respectively, determine the curvature of the value function and the degree of loss aversion. The reference point r, is determined by the price in period $t = 1$. The reference point is given by:

$$r = \gamma p_1 + (1 - \gamma) p_o \tag{4}$$

where γ takes a value of 1 if $p_1 > p_0$ and 0 otherwise.

Node +2 and Node −2 are two degenerate cases in the model. These result from the price either falling prior to both $t = 1$ and $t = 2$, or rising prior to both $t = 1$ and $t = 2$. At Node −2 the individual is in the domain of losses. Because of the convexity of the value function, the individual is risk-seeking in this situation, which means holding the asset and risking the possibility of an increase prior to $t = 3$. At Node +2 the individual is in the domain of gains. Because of the concavity of the value function, the individual is risk-averse and hence sells the asset, shifting receipts to the safe asset.

Node 0 constitutes the most interesting situation. At this node, whether the individual is in loss or gain rest on the price history of the asset. If the asset price rose, then the reference point is the peak price $p_o + 1 > p_0$, and the individual is in the risk-seeking domain of losses and doesn't sell (incurs the risk of holding the asset for an additional period). If the asset price fell, then the reference point is equal to the purchase price, which is equal to the sell price and the individual sells (due to the concavity of the value function).

The model generates two main predictions. First, it implies the existence of a disposition effect defined over returns since purchase, but also a disposition effect defined over returns since the peak price. Second, the model implies that an individual may not sell even when the asset is in the domain of gains since purchase if the peak price is higher than the purchase price. When this is the case, then the reference point is at a higher price (this is the case at Node 0 when the price of the stock rose, then fell at period $t = 2$). In such cases, the positive effect on utility of the return since purchase is nullified by the loss since the peak. Hence, the individual chooses not to sell. A simulation exercise using sensible parameters in a prospect theory value function are provided in Table A1.

Appendix 2: Additional Results

Peak Price Effects in Housing and Stock Sales: Additional Robustness Test

Hazard Models

In addition to linear probability models, we also estimate a stratified Cox proportional hazard model with time-varying covariates, following the approach suggested by Seru et al. (2010). The Cox model exploits the duration dimension of the data, which is relevant for asset-selling decisions (Ben-David and Hirshleifer, 2012b). The hazard model allows us to estimate the time-varying probability of a sell event without imposing any structure on the baseline hazard (i.e., without specifying the exact form of the distribution of the sell event times).

Specifically, for housing we estimate the owner selling their property j at time t (conditional on not selling the property until time t, h_{jt}). In our specification, we count every purchase of a property as the beginning of a new period of ownership which ends on the date of sale. For stocks we estimate the investor i's probability of selling position j at time t (conditional on not selling the position until time t, h_{ijt}). As in Seru et al. (2010), in our specification, we count every purchase of an stock as the beginning of a new position, and we assume that the position ends on the date the investor first sells part or all of his holdings. Our estimates are stratified by property (housing) or account (stocks), in a similar fashion to the fixed effect analysis described in the paper. That is, although coefficients are equal across accounts, baseline hazard functions are unique to each account, ϕ_i.

$$h_{ijt} = \phi_i \exp\{b_1 GainSincePurchase_{ijt} + b_2 GainSincePeak_{ijt}\} \tag{A.1}$$

We incorporate time-varying covariates into the Cox regression model, like the gain since purchase and gain since peak price variables, by dividing the follow-up time of each property (housing) or each account (stocks) into shorter time intervals. Specifically, we split the data at each calendar quarter (housing) or the observed selling days (stocks).

Table A27 shows estimates of Equation A.1 for housing sales. The coefficient of the gain since purchase dummy in Column 3 is 0.840, which indicates that when the property is in loss since the past peak price day, homeowners are $\exp(0.840) \approx 2.316$ times more likely to sell a property in gain since purchase compared to a property in loss. The coefficient of the gain since peak price dummy is 0.173, and indicates that when there is a gain since peak price, homeowners are $\exp(0.840 + 0.173) \approx 2.753$ times more likely to sell a property in gain compared to one in loss. This estimates are qualitatively similar to those obtained under the linear probability analysis described in the main body of the paper

Similarly Table A28 shows estimates of Equation A.1 for stock sales. The coefficient of the gain since purchase dummy in Column 3 is 0.323, which indicates that when the stock is in loss since the past peak price day, investors are $\exp(0.323) \approx 1.38$ times more likely to sell a winning stock (since purchase) compared to a losing stock. The coefficient of the gain since peak price dummy is 0.6702, and indicates that when there is a gain since peak price, investors are $\exp(0.323 + 0.670) \approx 2.699$ times more likely to sell a winning stock compared to a losing stock. These estimates are also qualitatively similar to those obtained under the linear probability analysis described in the main body of the paper[47]

[47] The magnitude of the effect of a gain since purchase, conditional on a gain since past peak, in Column 3 is also qualitatively similar to results obtained by Seru et al. (2010). Seru et al. (2010) estimated a Cox model using data from 11,000 individual investors in Finland. In their analyses, they computed the hazard ratio for selling a winning stock (since purchase) for each investor and year in the data, finding that the median investor has a hazard ratio of about 2.8, a value close to the hazard ratio we observe in the data of 2.699

Peak Price Effects in Housing Sales: Sensitivity Analysis

Peak Price Definition

Our main estimates use the three-quarter time horizon to define a peak price event: a peak price is the highest price achieved by a property in the homeowner's holding period that remains the highest price for at least three quarters. We test the sensitivity of our main estimates by replacing the three-quarter time horizon with two quarters and four quarters. Figure A7 illustrates the implementation of the two-quarter time horizon (Panel A) and four-quarter time horizon (Panel B) using an example property. Using the two-quarter time horizon, a given property has more peak price events in its history due to the shorter period over which any high price event must remain the highest to be classed as a peak price. Conversely using the four-quarter time horizon, a given property has fewer peak price events.

Figure A8 and Figure A10 show the distributions of returns since purchase and returns since peak using the two-quarter and four-quarter definitions respectively. Table A11 and Table A12 summarise the returns since purchase and returns since peak using the two-quarter and four-quarter definitions respectively.

Figure A9 illustrates the unconditional results for the two-quarter definition and Figure A11 for the four-quarter definition. Both mirror those shown in Figure 2. The plots reveal a large increase in the probability of sale when returns turn from negative to positive for both returns since purchase (Panel A) and returns since the peak price (Panel B). The plots also reveal a large interaction effect whereby the increase in probability of sale when returns turn from negative to positive is much greater when the stock is in gain since peak price compared with when the stock is in loss since peak price (Panel C).

Ordinary least squares estimates of the peak and purchase disposition effects for the two-quarter and four-quarter definitions are displayed in Table A23 and Table A24 respectively. The regression models include the same covariates for continuous returns since purchase; years from purchase and property characteristics as the main results reported in Table 5. Comparing column 3, which has the fullest set of controls, in each table the coefficient values of 0.0032, 0.0026 and 0.0019 on the gain since purchase dummies for the 2-quarter, 3-quarter and 4-quarter peak definitions, respectively, and the coefficient values of 0.0040, 0.0036 and 0.0031 on the gain since peak dummies for the 2-quarter, 3-quarter and 4-quarter peak definitions, respectively, demonstrate a consistency in results despite the variation in the definition of a peak price event.

Peak Price Effects in Stock Sales: Sensitivity Analysis

Excluding Partial Sells

One potential explanation for the disposition effect might be portfolio rebalancing, whereby investors decrease their positions in winning stocks in order to rebalance their portfolio. To test for this, we restrict the dependent variable to indicate complete sales only (i.e., liquidation of positions), thereby excluding partial sales which might reflect a desire to rebalance portfolios. This test of whether selling activity is driven by a desire to rebalance when prices increase (increasing the likelihood of a gain since purchase of gain since peak price) is used by Odean (1998). Results are shown in Table A29, which reports estimates from models with and without the inclusion of individual fixed effects. The coefficient estimates from these models are in line with those in the main results, with the coefficients of gain since purchase and gain since peak price both precisely defined and returning similar magnitudes to those in the earlier analysis. This result suggests that the increased likelihood of selling a stock when the investor experiences a gain since purchase and/or gain since peak price does not arise due to a desire to rebalance the overall portfolio.

Peak Price Definition

Our main estimates use the one-week time horizon to define a peak price event: a peak price is the highest price achieved by a stock in the the investor's holding period that remains the highest price for at least one week. In this section, we test the sensitivity of our main estimates by replacing the one-week time horizon with one month. Figure A13 illustrates the implementation of the one-month time horizon using an example stock. Using the one-month time horizon, a given stock has fewer peak price events in its history due to the longer period over which any high price event has remained the highest so far in the history of the stock for it to be classed as a peak price.

Using the same baseline sample, we implement the one-month time horizon definition of a peak price. Figure A14 shows the distributions of returns since purchase and returns since peak using the month-peak definition. Table A13 summarises the returns since purchase and returns since peak using the month-peak definition.

We see the same quantitative patterns in the unconditional analysis and econometric model estimates using the month-peak definition as for the week-peak definition. Figure A15 illustrates the unconditional results, which mirror those shown in Figure 3. We see a large increase in the probability of sale when returns turn from negative to positive for both returns since purchase (Panel A) and returns since the peak price (Panel B). We also see a large interaction effect whereby the increase in probability of sale when returns turn from negative to positive is much greater when the stock is in gain since peak price compared with when the stock is in loss since peak price (Panel C).

Table A25 reports estimates of Equation 2 (Column 1) plus a rich set of additional specifications including a range of controls as reported in the main analysis in Table 11. The fullest pooled model (Column 8 of Table A25) returns coefficient values of 0.0699 and 0.0511 on the gain since purchase and gain since peak dummies respectively, which show little change in the model that includes account and stock fixed effects (Column 10) in which the values are 0.0759 and 0.0586. These estimates are again very similar to the OLS estimates reported in Table 8: the increased probability of sale for a stock in gain since purchase and gain since peak is 13.4 percentage points in Column 10 of Table A25, compared with 14.8 percentage points in Column 3 of Table 8.

Login Days

We also test the sensitivity of our estimates by using the sample of login days. Our main estimates use sell-days, following previous studies (beginning with Odean, 1998), which restrict the sample to account × stock × time units on which the investor sold at least *one* stock in their portfolio. The rationale for this sample restriction is that the investor was paying attention to the portfolio at those points in time and there was some risk that the investor would sell *any* stock. Given the availability of login data in the Barclays Stockbroking data set, we also show results from a login-day sample: the subsample of observations of × stock × days on which the investor made a login to their account. The rationale for this sample is that on login days investors pay attention to their accounts, and hence have some non-zero likelihood of making a sale. Figure A16 shows distributions of returns since purchase and returns since peak in the login-day sample.

Again, we see the same quantitative patterns in the unconditional analysis and econometric model estimates using the login-day sample as for the sell-day sample. Figure A17 illustrates the unconditional results, which mirror those shown in Figure 3. We see a large increase in the probability of sale when returns turn from negative to positive for both returns since purchase (Panel A) and returns since the peak price (Panel B). We also see a large interaction effect whereby the increase in probability of sale when returns turn from negative to positive is much greater when the stock is in gain since peak price compared with when the stock is in loss since peak price (Panel C).

In Table A26, we report estimates of Equation 2 (Column 1) plus a rich set of additional specifications including a range of controls as reported in the main analysis in Table 11. The probability of sale in the login-day sample is one tenth of that the sell-day sample (for comparison, in Table A25 the intercept value is approximately 0.1, whereas in Table A26, the intercept value is approximately 0.01).

The coefficient values in Table A26 are very similar to those in the main analysis (adjusting for the 1:10 ratio of sales in the login-day and sell-day samples). In a model that includes account and stock fixed effects (Column 10), the coefficient values of the gain since purchase and gain since peak price variables are 0.0058 and 0.0068, respectively. These estimates are again very similar to the OLS estimates reported in Table 8, once allowing for the 1:10 ratio of sales: the increased probability of sale for a stock in gain since purchase and gain since peak is 12.6 percentage points in Column 10 of Table A26, compared with 14.8 percentage points in Column 3 of Table 8.

Interactions

We test the sensitivity of our main results to market, account and investor characteristics. This subsection analysis is motivated by previous studies showing that investor behaviours vary by a range of characteristics such as gender and age (Barber and Odean, 2001; Agnew et al., 2003; Dorn and Huberman, 2005; Mitchell, Mottola, Utkus, and Yamaguchi, Mitchell et al.) and trading experience (Feng and Seasholes, 2005; Seru et al., 2010).

To begin, Table A30 shows estimates by subsamples split by market index movements and days elapsed since purchase and days elapsed since the peak price event. In this analysis, we report the coefficients for the gain since purchase and gain since peak from a separate regression on each row of the table. First, we find that the coefficients for gain since purchase and gain since peak are very similar in rising and falling markets. Second, we find some evidence that the strength of the disposition effect varies with time since purchase and time since the peak price event. Notably, the coefficient of gain since purchase is the weakest when the peak price event was more recent, suggesting that recent peak price events may diminish the power of the purchase price as a reference point.

Table A31 shows estimates by subsamples of individual characteristics. Results show the disposition effect on gain since purchase and gain since peak price exists across both samples of females and males, younger and older, with smaller coefficient estimates for the subsample of older investments. The coefficient estimates are also slightly smaller among investors who have held their accounts for longer, these two pieces of evidence suggest a weaker disposition effect among more experience investors. Estimates also show smaller coefficients for those with larger portfolios and those with a larger number of stocks. These estimates might suggest that the propensity to exhibit a disposition effect over purchase price or peak price falls with the financial stakes of the decision (as proxied by the total value of the portfolio and the number of stocks). However, because intercept terms are also smaller in these subsamples, the *relative* effect of the gain dummies (with respect to the baselines given by the intercepts) doesn't diminish in large portfolios.

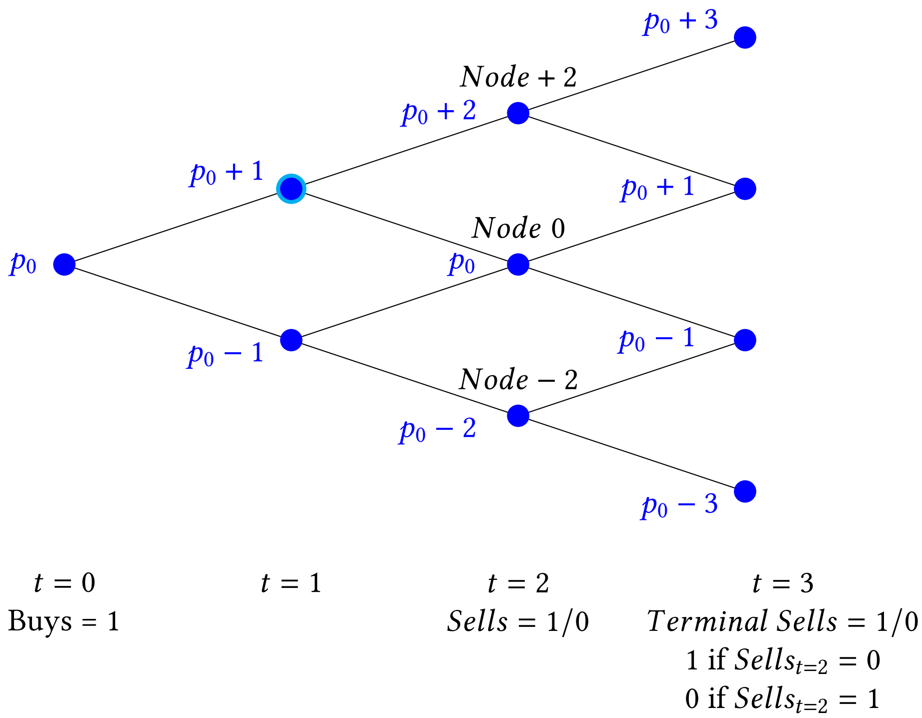
In a final analysis in this subsection, Table A32 and Table A33 present estimates from subsamples of observations defined by market gains / losses since purchase and since the day of the peak price event. This analysis splits the sample by whether the market (FTSE100) was in loss or gain since the peak price event (results shown in Columns 1-3 and 4-6 respectively). Coefficient estimates show the existence of quantitatively similar disposition effects on both purchase price and peak price, with some evidence that the effect of being in gain since peak is weaker when the market is in gain since peak (Column 6 compared with Column 3 in both tables).

Other Reference Points

In Quispe-Torreblanca et al. (2021), we show that the price observed on the last login day constitutes another important reference point that influences investors selling decisions. Using our one-week time horizon definition of peak events, stocks could be in gain since the peak price day but at the same time in loss since the most recent login day to their account. Figure A18 reproduces the analysis on the triple interaction between gains since purchase, gains since the past peak price, and gains since the most recent login, which we document in Quispe-Torreblanca et al. (2021) (Figure A6). We observe that losses on any of these margins reduce the probability that the investor will sell, even when other margins show gains. These results are consistent with the framework presented in Quispe-Torreblanca et al. (2021), in which people focus on the most aspirational reference point (i.e., the highest reference point).

Figure A1: Illustration of the Model of Multiple Reference Points

(A) Model Structure

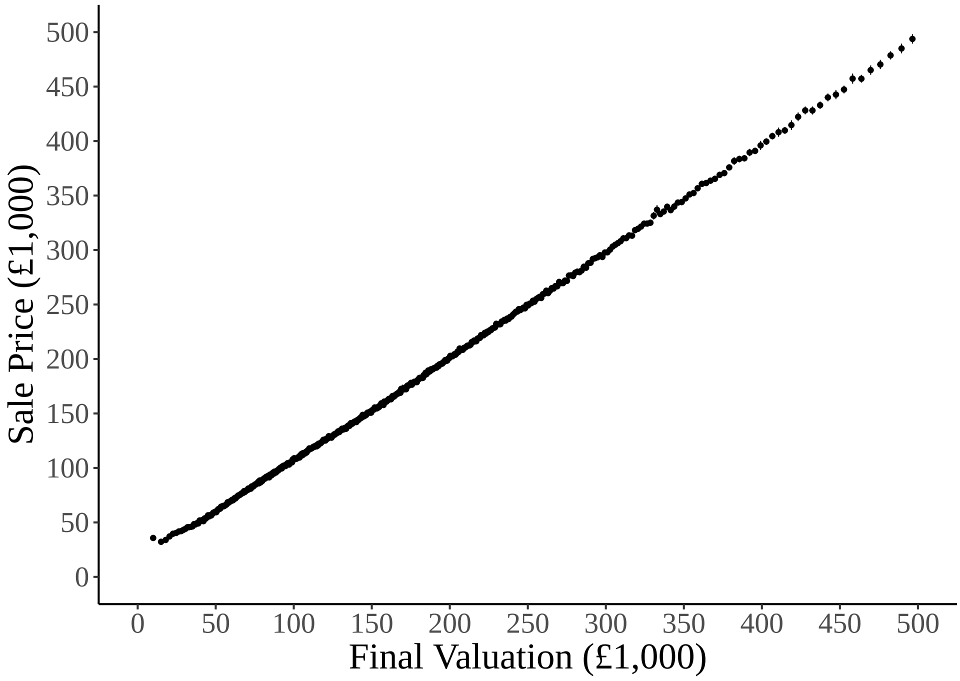


(B) Sell Decisions for Different Reference Points

Price at $t = 1$	Reference point at $t = 2$	Price at $t = 2$: Node -2	Node 0	Node +2
$P_0 + 1$	$P_0 + 1$	Don't Sell	Don't sell	Sell
$P_0 - 1$	P_0	Don't Sell	Sell	Sell

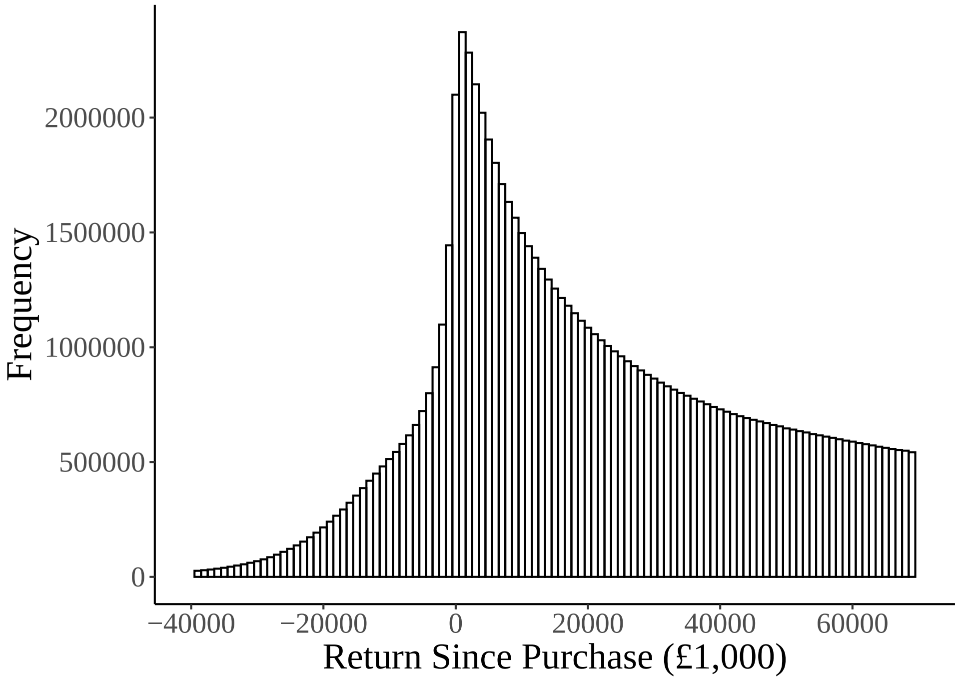
Note: The figure illustrates the four-period model of multiple reference points. In Panel A, at $t = 0$ the individual purchases an asset at a price p_0, which constitutes a first reference point. At $t = 1$, he observes his portfolio and the price observed becomes a new reference point. At $t = 2$, he chooses whether or not to sell the asset, and at $t = 3$ he liquidates any remaining position in the asset. Panel B displays the predictions of the model under which an individual with prospect theory preferences based his selling decisions using the highest reference point. An example of a peak price is highlighted in Panel A when the price reaches $p_0 + 1$. An individual experiencing that peak price will use it as the main reference point for his selling decision at $t = 2$.

Figure A2: Property Sale Price Against Valuation Prior to Sale



Note: The figure shows a bin scatter plot to illustrate the relationship between a property's final quarterly valuation prior to sale and its sale price. For a better visualisation, valuations are truncated at £500,000 with no lower bound. Observations include all property sales in the baseline sample. Vertical lines represent 95% confidence intervals.

Figure A3: Housing Return Since Purchase (Full Sample)

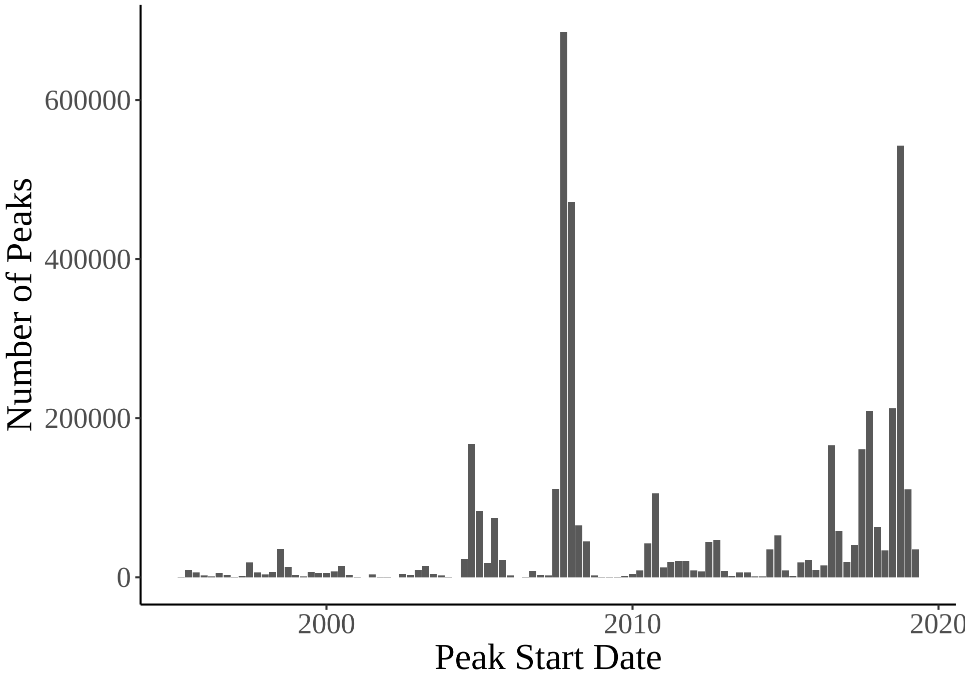


Note: The figure shows the distribution of returns since purchase. Returns are plotted as levels and for a better visualisation are in the range -£40,000 and +£60,000. Observations include all property × quarters in the baseline sample.

Figure A4: Housing Return Since Purchase (Peak Price Sub-Sample)

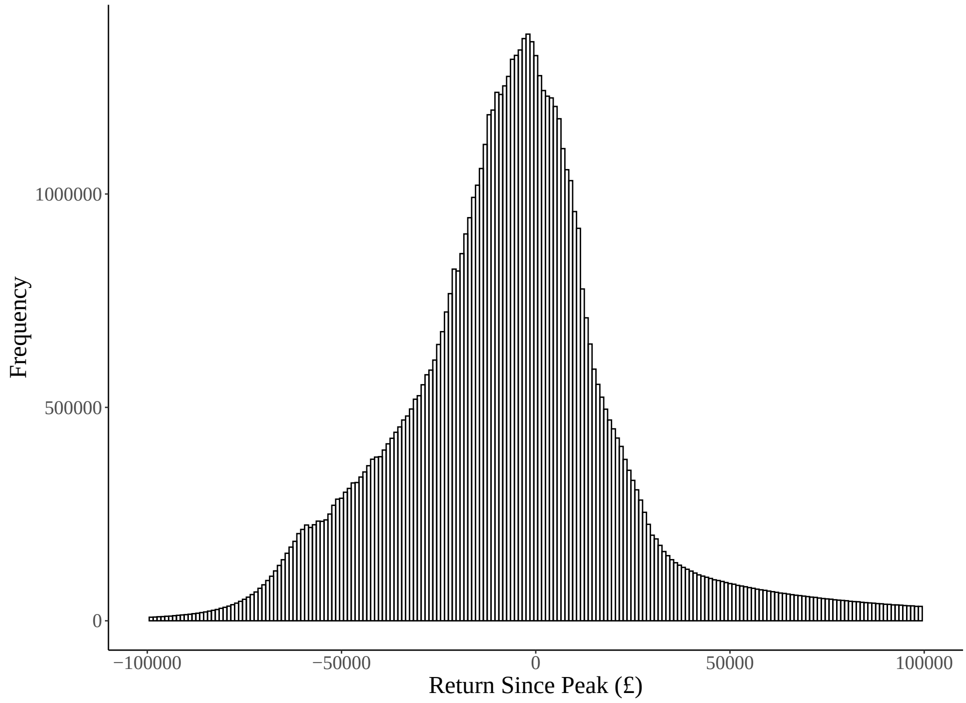
Note: The figure shows the distribution of returns since purchase. Returns are plotted as levels and for a better visualisation are in the range -£40,000 and +£60,000. Observations include all property × quarters in the baseline sample with a past peak price.

Figure A5: Frequency Distribution of Peak Price Dates



Note: The figure shows the distribution of the peak dates for house prices. Peak prices are clustered at the start of the Great Recession and, to a lesser extent, at the date of the UK Brexit vote.

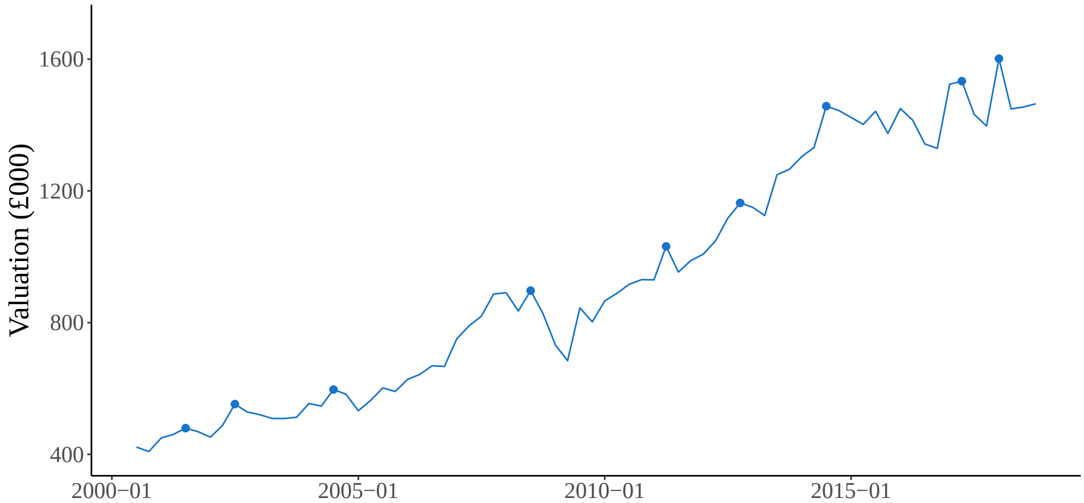
Figure A6: Housing Returns Since Peak (Peak Price Sub-Sample)



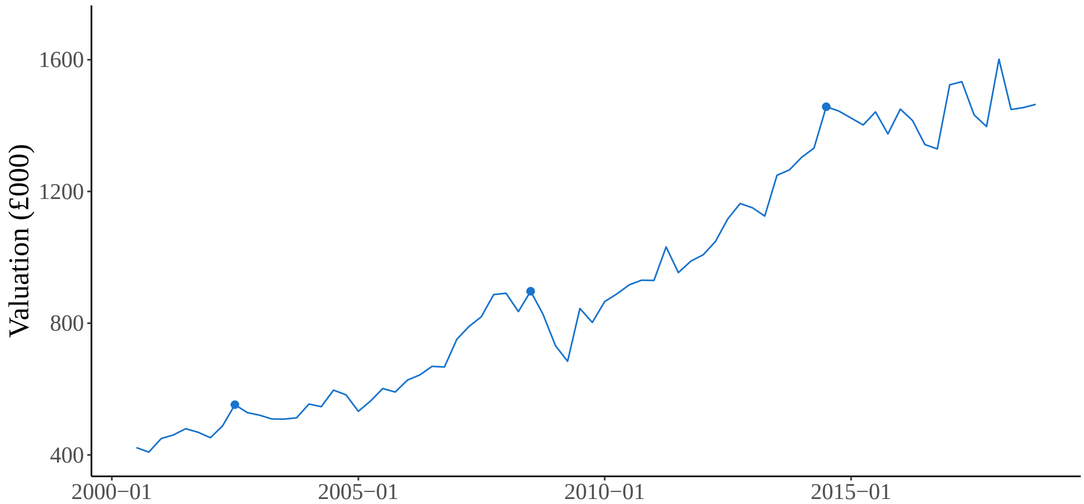
Note: The figure shows the distribution of residualized returns since peak price. Residualized returns are plotted as levels and to remove the effect of returns clustered on a few dates (see Figure A5), the panels display residuals from linear specifications that regress return since peak against year-quarter dummies, controlling for time since peak and omitting the intercepts. For a better visualisation, levels are in the range -£100,000 and £100,000. Observations includes all property × quarters in the baseline sample with a past peak price.

Figure A7: Example of Peak Prices, Housing Data, Alternative Definitions

(A) Two Quarters Definition



(B) Four Quarters Definition

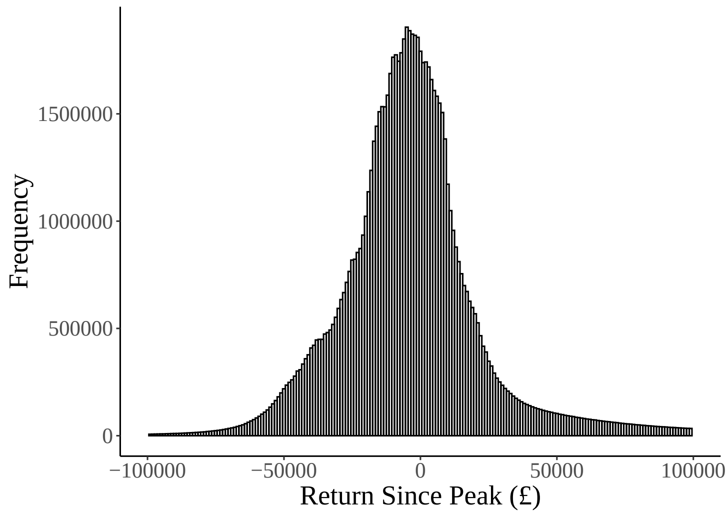


Note: The figure shows the sequence of peak prices for housing data under two alternative definitions of peaks. In the figure, a peak price remains as the highest price (since purchase) for at least two quarters (Panel A) and for at least four quarters (Panel B), instead of three quarters (as in the main results of the paper, see Figure 1 Panel A).

Figure A8: Housing Returns Since Purchase and Returns Since Peak (Two Quarters Definition)

(A) Housing Returns Since Purchase

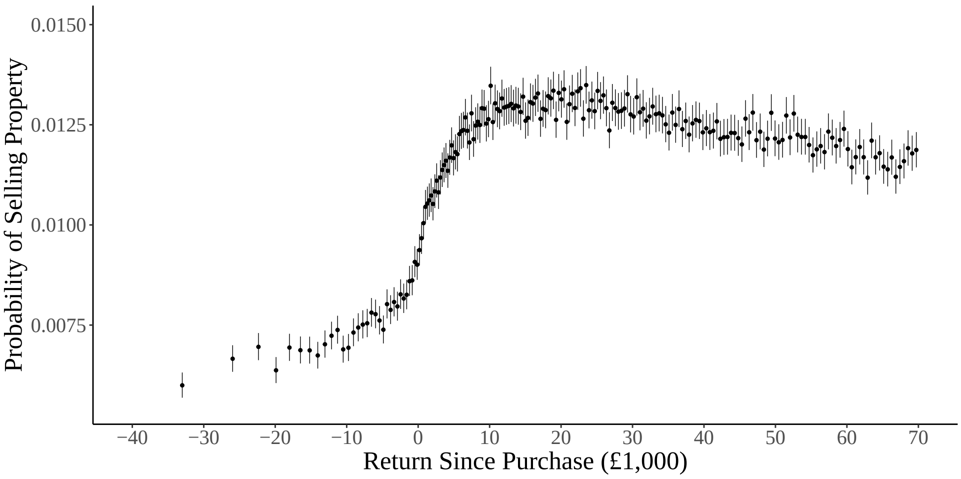
(B) Housing Returns Since Peak



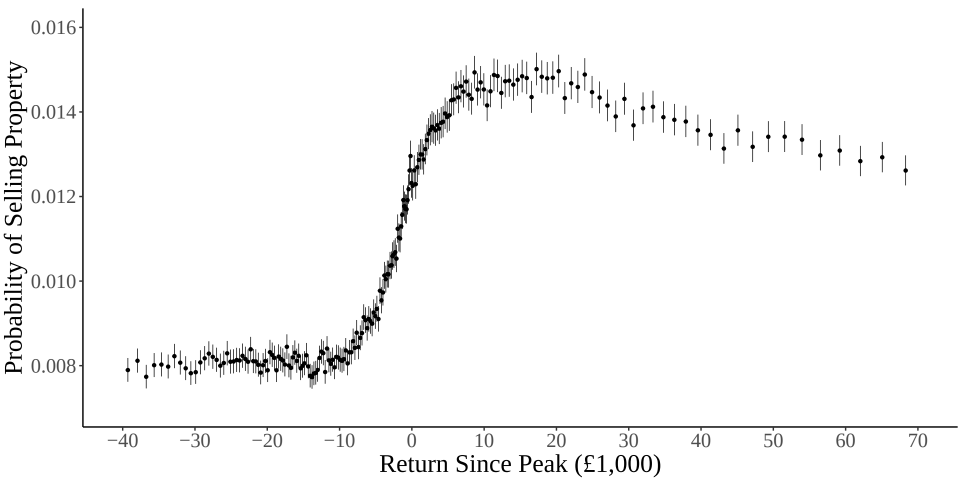
Note: The figure shows the distribution of returns since purchase (Panel A) and residualized returns since peak (Panel B) under an alternative definition of peaks. In the figure, a peak price remains as the highest price (since purchase) for at least two quarters, instead of three quarters (main results). Returns are plotted as levels. To remove the effect of returns clustered on a few dates Panel B displays residuals from linear specifications that regress return since peak against year-quarter dummies, controlling for time since peak and omitting the intercepts. For a better visualisation levels are in the range -£40,000 and +£60,000 (Panel A) and -£100,000 and +£100,000 (Panel B). Observations include all property × quarters in the baseline sample with a past peak price.

Figure A9: Probability of Housing Sale, Returns Since Purchase and Returns Since Peak (Two Quarters Definition)

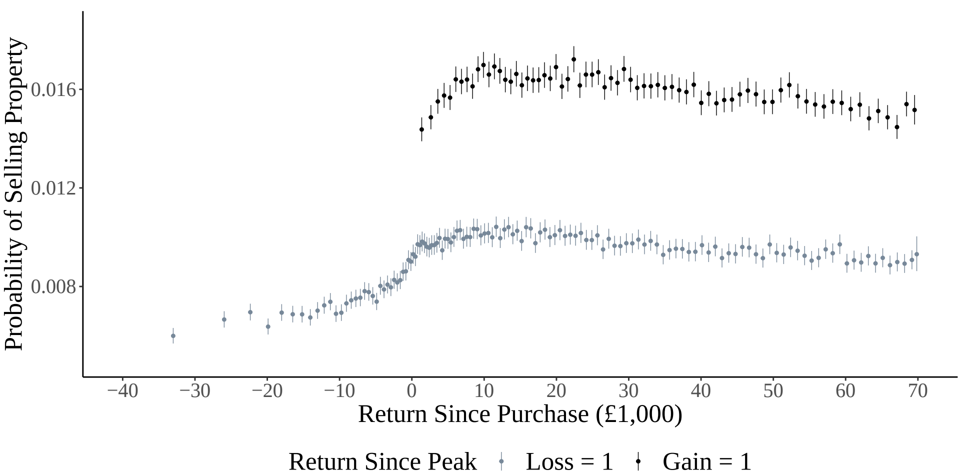
(A) Housing Returns Since Purchase



(B) Housing Returns Since Peak



(C) Interaction of Housing Returns Since Purchase and Since Peak

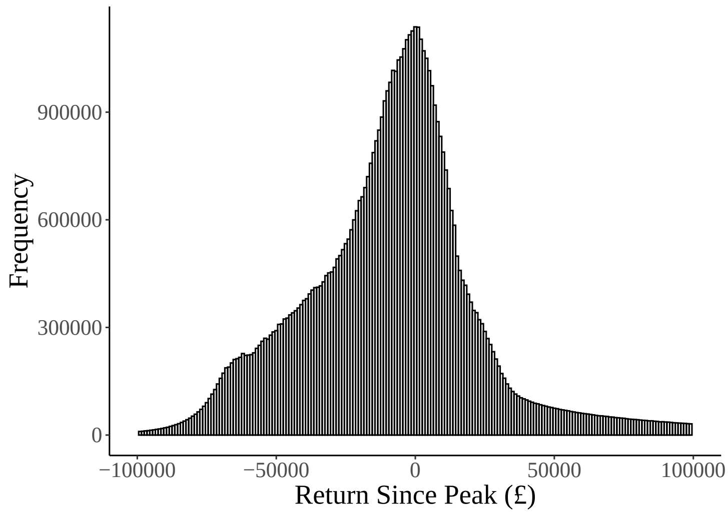


Note: The figure shows the probability of housing sales against return since purchase and return since peak price. Peak prices use an alternative definition: a peak price remains as the highest price (since purchase) for at least two quarters, instead of three quarters. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -£40,000 and + £70,000, otherwise observations include all property × quarters in the baseline sample. Vertical lines represent 95% confidence intervals.

Figure A10: Housing Returns Since Purchase and Returns Since Peak (Four Quarters Definition)

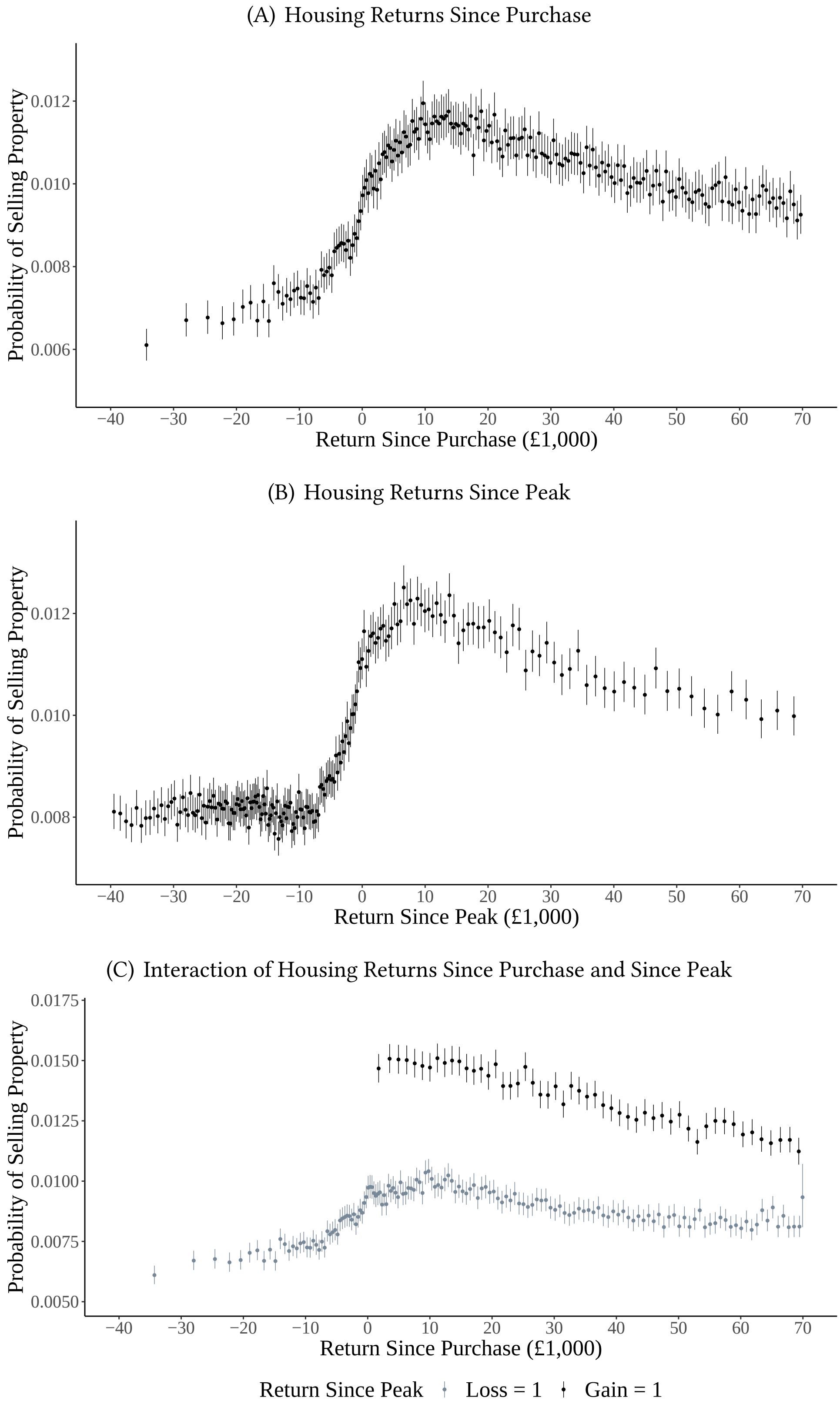
(A) Housing Returns Since Purchase

(B) Housing Returns Since Peak



Note: The figure shows the distribution of returns since purchase (Panel A) and residualized returns since peak (Panel B) under an alternative definition of peaks. In the figure, a peak price remains as the highest price (since purchase) for at least four quarters, instead of three quarters (main results). Returns are plotted as levels. To remove the effect of returns clustered on a few dates Panel B displays residuals from linear specifications that regress return since peak against year-quarter dummies, controlling for time since peak and omitting the intercepts. For a better visualisation levels are in the range -£40,000 and +£60,000 (Panel A) and -£100,000 and +£100,000 (Panel B). Observations include all property × quarters in the baseline sample with a past peak price.

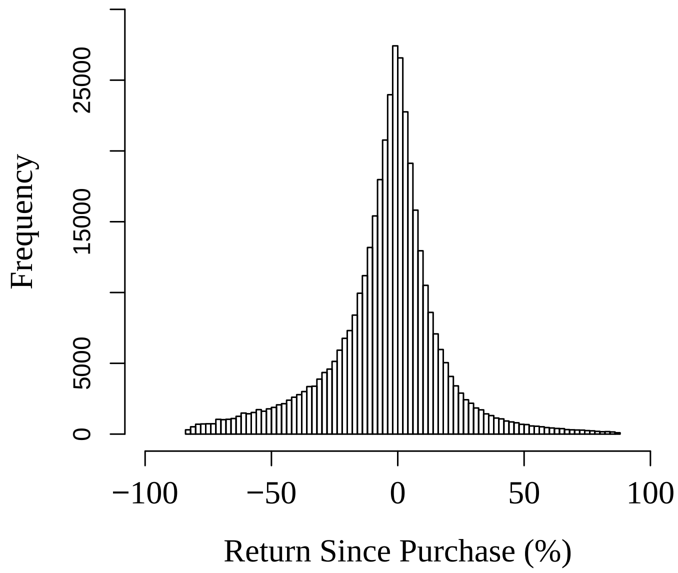
Figure A11: Probability of Housing Sale, Returns Since Purchase and Returns Since Peak (Four Quarters Definition)



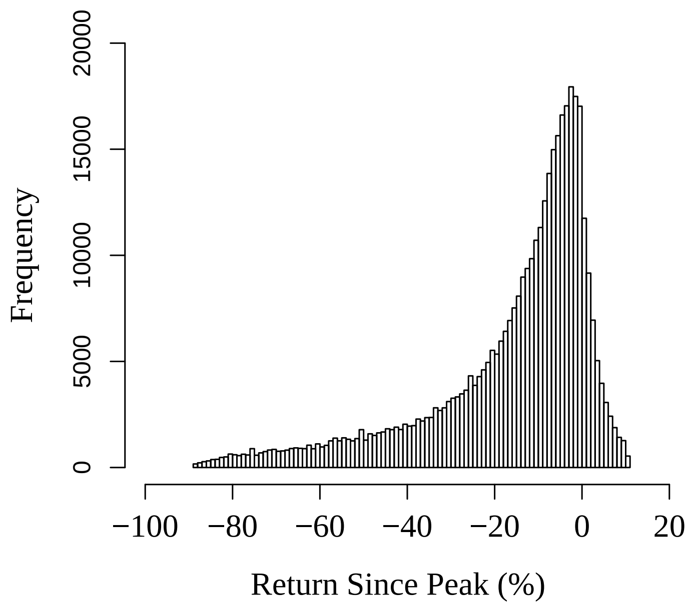
Note: The figure shows the probability of housing sales against return since purchase and return since peak price. Peak prices use an alternative definition: a peak price remains as the highest price (since purchase) for at least four quarters, instead of three quarters. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -£40,000 and + £70,000, otherwise observations include all property × quarters in the baseline sample. Vertical lines represent 95% confidence intervals.

Figure A12: Stock Returns Since Purchase and Returns Since Peak (Week Definition)

(A) Stock Returns Since Purchase

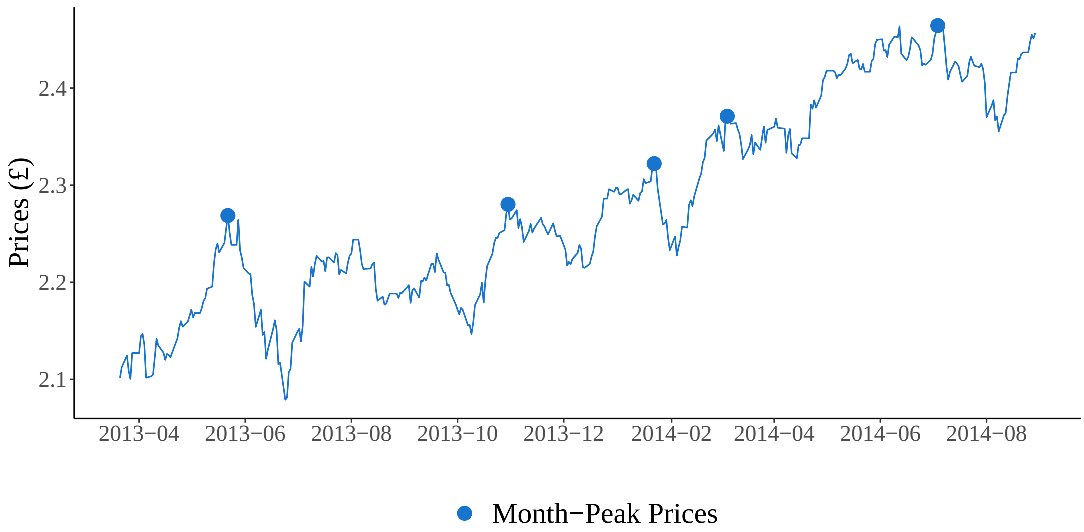


(B) Stock Returns Since Peak



Note: The figure shows the distribution of returns since purchase (top panel) and returns since peak (bottom panel). Observations include all investor × stock × days on which the investor sold at least one stock in his portfolio. Outliers below the first and above the 99th percentiles of returns are excluded.

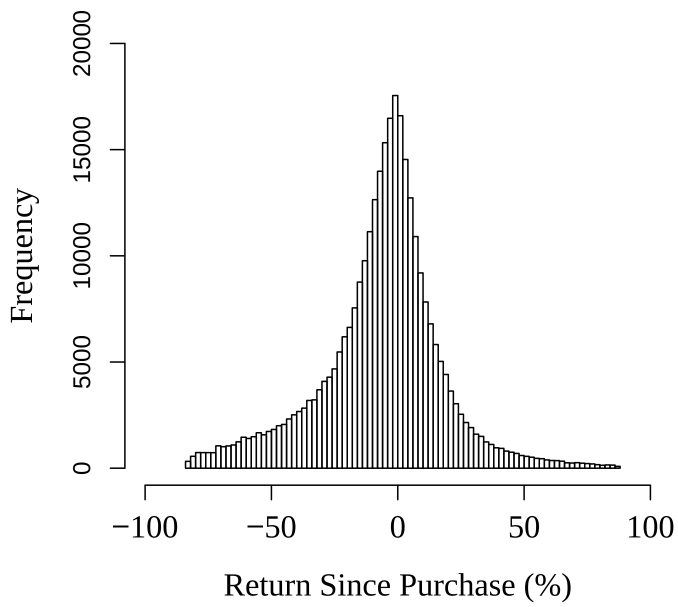
Figure A13: Example of Peak Prices, Stock Data, Month Definition



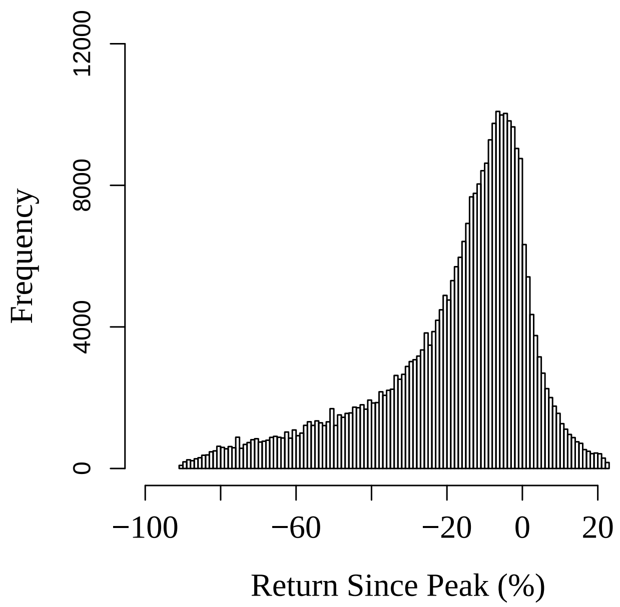
Note: The figure shows the sequence of peak prices under an alternative definition of peaks. In the figure, a peak price remains as the highest price (since purchase) for at least a month, instead of a week (as in the main results of the paper, see Figure 1 Panel B).

Figure A14: Stock Returns Since Purchase and Returns Since Peak (Month Definition)

(A) Stock Returns Since Purchase



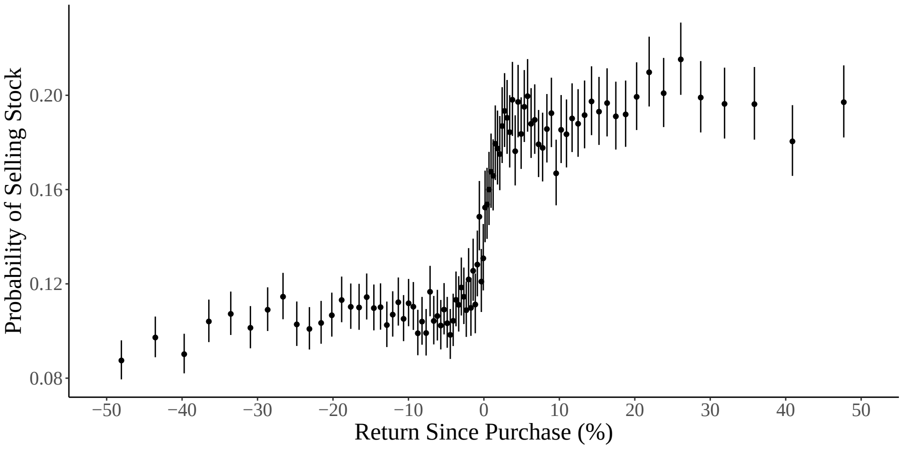
(B) Stock Returns Since Peak



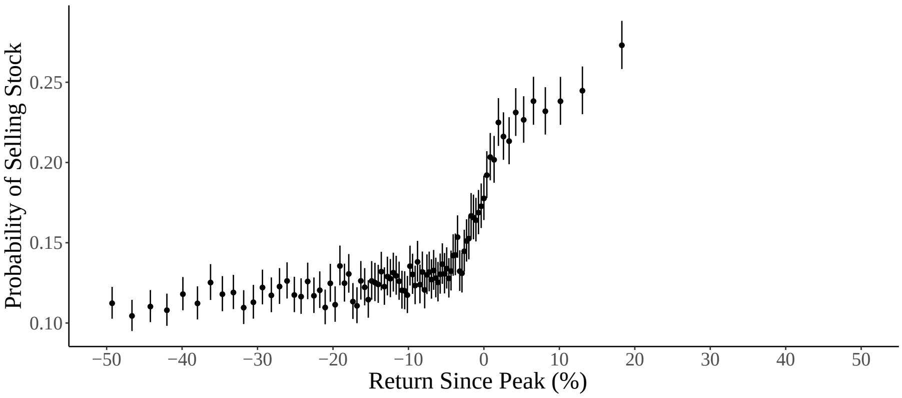
Note: The figure shows the distribution of returns since purchase (top panel) and returns since peak (bottom panel) under an alternative definition of peaks. In the figure, a peak price remains as the highest price (since purchase) for at least a month, instead of a week. Observations include all investor × stock × days on which the investor sold at least one stock in his portfolio. Outliers below the first and above the 99th percentiles of returns are excluded.

Figure A15: Probability of Stock Sale, Returns Since Purchase and Returns Since Peak (Month Definition)

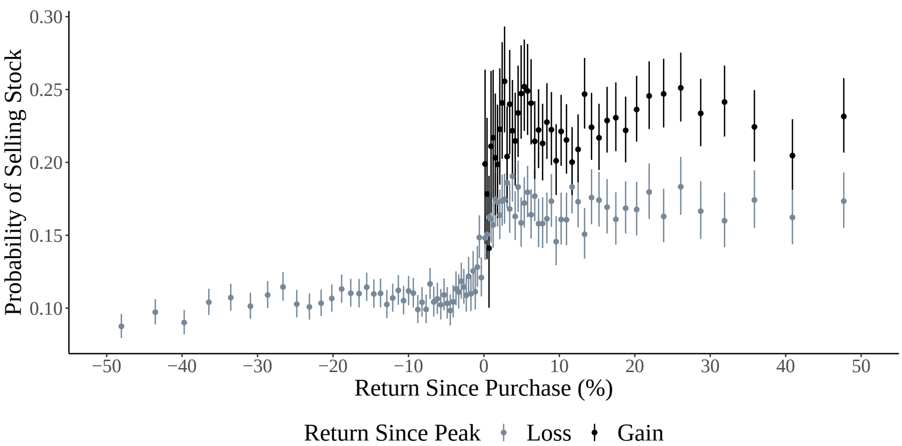
(A) Stock Returns Since Purchase



(B) Stock Returns Since Peak



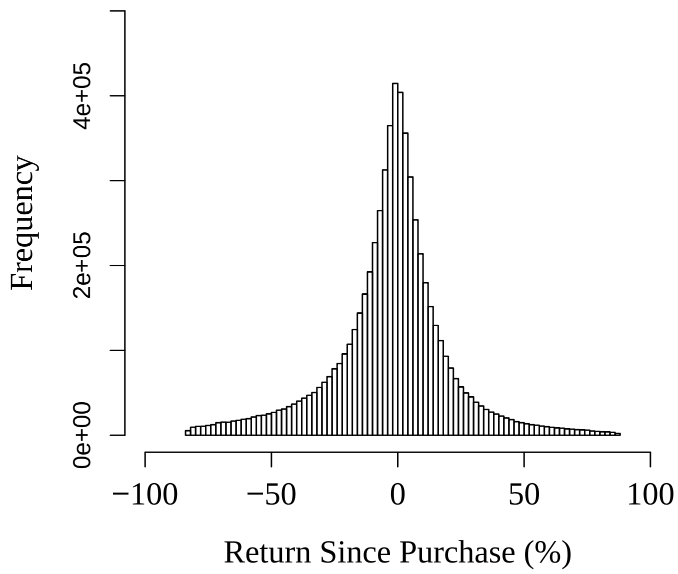
(C) Interaction of Stock Returns Since Purchase and Since Peak



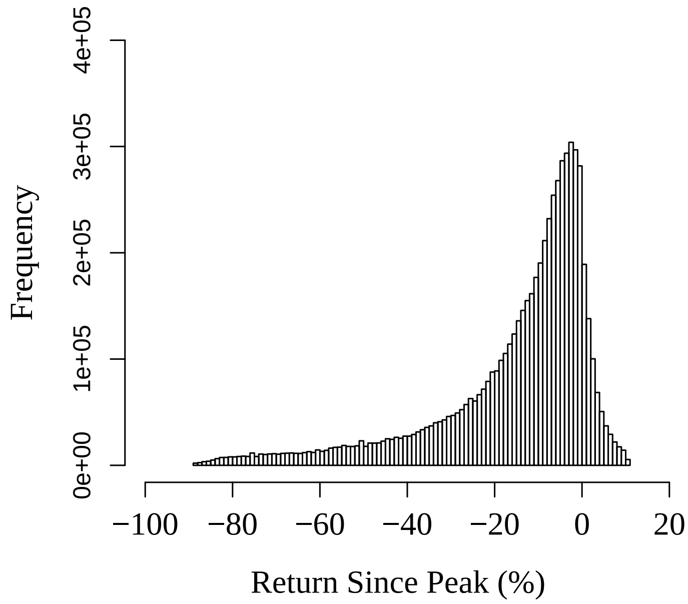
Note: The figure shows the probability of stocks sales against return since purchase and return since peak price. Peak prices use an alternative definition: a peak price remains as the highest price (since purchase) for at least a month, instead of a week. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -50% and 50%. The sample includes all investor × stock × days on which the investor sold at least one stock in his portfolio. Vertical lines represent 95% confidence intervals.

Figure A16: Stock Returns Since Purchase and Returns Since Peak, Login-Day Sample

(A) Stock Returns Since Purchase Date



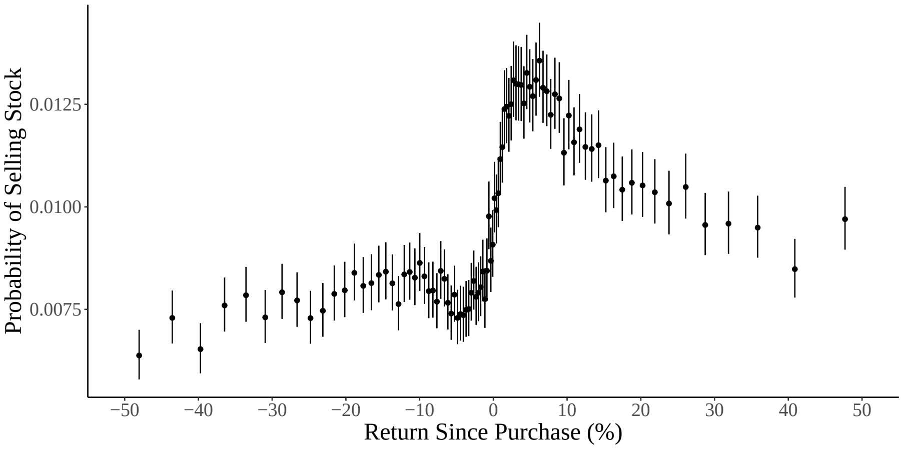
(B) Stock Returns Since Peak



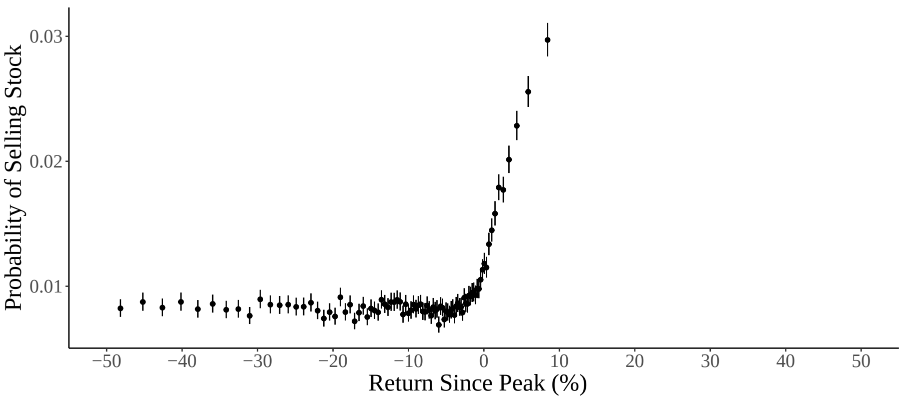
Note: The figure shows the distribution of returns since purchase (top panel) and returns since peak (bottom panel) for the Login-Day sample. Observations include all investor × stock × days for the set of days in which the investor made at least one login to his account. Outliers below the first and above the 99th percentiles of returns are excluded.

Figure A17: Probability of Stock Sale, Returns Since Purchase and Returns Since Peak in the Login-Day Sample

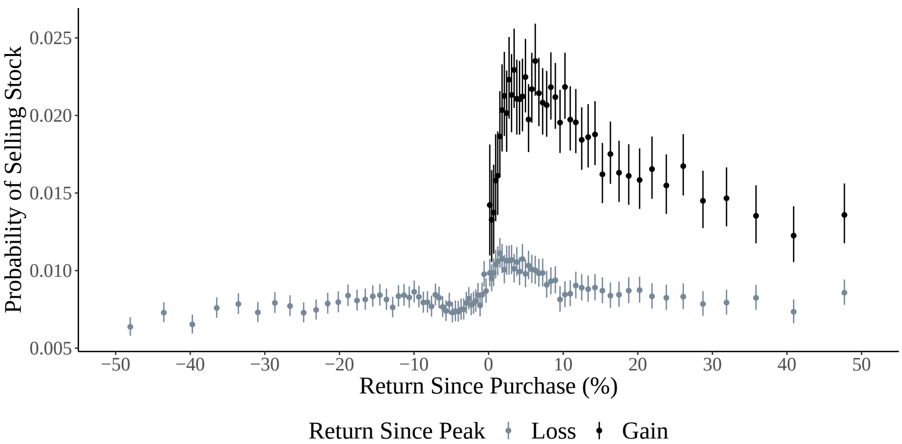
(A) Stock Returns Since Purchase



(B) Stock Returns Since Peak

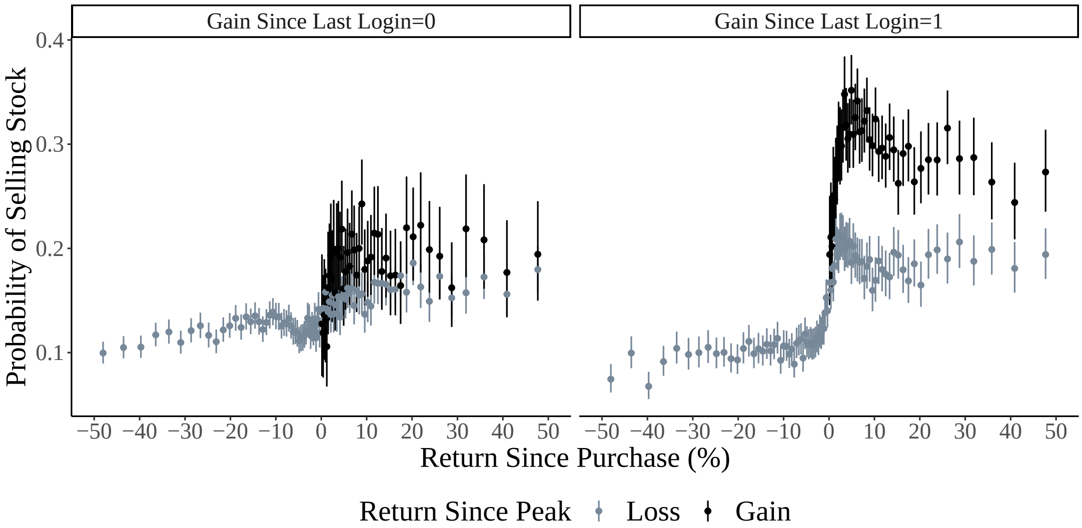


(C) Interaction of Stock Returns Since Purchase and Since Peak



Note: The figure shows the probability of stocks sales against return since purchase and return since peak price for the Login-Day sample. Panels display binscatter plots to illustrate the relationship between the probability of sale and returns since purchase (Panel A), returns since peak price (Panel B) and the interaction between returns since purchase and returns since peak price (Panel C). For visual purposes, returns are restricted to the range of -50% and 50%. The sample includes all investor × stock × days for the set of day in which the investor made at least one login to his account. Vertical lines represent 95% confidence intervals.

Figure A18: Probability of Stock Sale, Returns Since Purchase, Returns Since Peak, and Returns Since Last Login Day



Note: The figure shows the probability of stocks sales against return since purchase, return since peak price, and return since last login day. This figure reproduces Figure A6 in Quispe-Torreblanca et al. (2021). Panels display binscatter plots. The left panel includes stocks in loss since the last login day, whereas the right panel, stocks in gain. For visual purposes, returns are restricted to the range of -50% and 50%. The sample includes all investor × stock × days for the set of day in which the investor sold at least one stock in the portfolio. Vertical lines represent 95% confidence intervals.

Table A1: Example of Trading Strategies for Different Reference Points With Prospect Theory Preferences

		Price at $t = 2$								
		Node -2			Node 0			Node +2		
		PT Value			PT Value			PT Value		
Price at $t = 1$	Reference point at $t = 2$	If sell at $t = 2$	If sell at $t = 3$	Decision at $t = 2$	If sell at $t = 2$	If sell at $t = 3$	Decision at $t = 2$	If sell at $t = 2$	If sell at $t = 3$	Decision at $t = 2$
$P_0 + 1$	$P_0 + 1$	-3.46	-3.41	Don't sell	-2	-1.41	Don't sell	1	0.71	Sell
$P_0 - 1$	P_0	-2.83	-2.73	Don't sell	0	-0.50	Sell	1.41	1.37	Sell

Note: The table illustrates selling strategies for different reference points in the model (illustrated in Figure A1). In the simulation, the investor solves a value function $|p - r|^{\delta}$ for cases where $p - r > 0$ and a value function $-\lambda|p - r|^{\delta}$ for cases where $p - r < 0$. We conservatively choose parameters for risk aversion and loss aversion of $\delta = 0.5$ and $\lambda = 2$. In the model, the reference point is given by $r = \gamma p_1 + (1 - \gamma)p_o$, where γ takes a value of 1 if $p_1 > p_0$ and 0 otherwise.

Table A2: Housing Data Sample Selection

Description	Purchases	Purchases (%)	Properties	Properties (%)	Property × Quarters
Full dataset up to 31 December 2019	25,120,172	100	14,623,011	100	–
Standard price paid entry	24,353,878	96.9	14,185,549	97	–
Price at least £250	24,353,521	96.9	14,185,384	97	–
Complete address	24,326,978	96.8	14,171,258	96.9	–
Sample: 15%	3,646,940	14.5	2,125,688	14.5	–
At least 1/52 year between successive purchases	3,637,530	14.5	2,125,688	14.5	–
Quarterly valuation	3,631,906	14.5	2,125,618	14.5	128,444,588
Both peak and purchase price present	2,403,974	9.6	1,893,273	12.9	72,113,609

Note: The table details the steps in sample selection. Purchases (Column 2) are the number of transactions; Properties (Column 4) are the number of unique properties to which these transactions relate, and Property × Quarters (Column 6) are the number of quarterly valuations calculated thereon. We drop non-standard sales retaining "Standard price paid entries" (as defined by HMLR), which are sales of individual properties at full market price to private individuals and so we exclude, for example, commercial transactions and gifts. We also drop properties sold for a nominal value below £250 and those resold within a month. Properties without full addresses or otherwise cannot be matched to the HPI dataset are necessarily dropped. A 15% random sample is taken of the data and this "Full Sample" of 128.4 million observations is used in in the regression estimates of our baseline specification. Observations without a peak price are necessarily dropped for our "Peak sub-sample" used in the regression estimates of our modified baseline specification.

Table A3: Stockbroking Data Sample Selection

	Accounts	Login-Days	Sells
Starting Sample	13635	12420193	123119
Drop due to:			
Data cleaning			
Unmatched Prices	21	2276860	13210
Unknown Purchase Price (transfers-in)	1175	2465752	16490
Analytical restrictions			
At Least Two Stocks in Portfolio	2232	356532	13250
Missing Demographic Data	2	4	4
Starting Position Days	10	97332	7
Accounts With No Remaining Selling Days	1244	339766	0
Outliers in Returns	196	624903	21295
Baseline sample	8755	6259044	58863

Note: The table details the steps in sample selection. Logins-Days in Column 2 reflect the number of observations at the account × stock × day level for the set of days in which the investors made at least one login to their account. *Sells* in Column 4 include all the stocks' liquidations or partial sells in the data, again at the account × stock × day level. Outliers in returns since purchase and since peak price (week-peak) are excluded (observations below percentile 1 and above percentile 99 of returns). This step also exclude apparent instances in which an stock is in gain since a past peak but in loss since purchase (0.018% of login days). We define peak prices as the highest prices observed (since purchase) that remained as the highest for an interval of time (a week or a month). Because under this definition, peak prices can only be updated after that interval, we excluded the apparent instances of an stock in gain since a past peak but in loss since purchase that occurred when an investor top-up an stock at an expensive price, much higher than a pass peak, but when the peak price has not been updated yet.

Table A4: Housing Sample Summary Statistics (Full Sample)

Panel (A): Full Sample

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Purchase Price (£)	332,859	387,392	108,655	162,637	249,714	391,181	603,215
Time to Sale (Years)	9.55	5.22	3.24	5.32	8.83	13.12	17.14
Property type							
Flat (%)	16.19						
Detached (%)	25.10						
Semi-Detached (%)	29.02						
Terraced (%)	29.69						
New-Build (%)	10.00						
N Property X Quarter	128,444,588						

Panel (B): Peak Sub-Sample

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Purchase Price (£)	338,839	419,202	106,548	161,031	250,396	396,806	615,501
Time to Sale (Years)	11.83	4.75	5.76	8.24	11.49	15.09	18.53
Property type							
Flat (%)	15.78						
Detached (%)	25.91						
Semi-Detached (%)	29.19						
Terraced (%)	29.12						
New-Build (%)	9.73						
N Property X Quarter	72,113,609						

Note: The table presents summary statistics for the housing samples. Panel (A) uses the "Full sample" used in the regression estimates of our baseline specification. Panel (B) uses the "Peak sub-sample" used in the regression estimates of our modified baseline specification. Observations are at the property × quarter level. In our regression analysis, the purchase prices used are actual prices paid, but for the purposes of this table the purchase prices are adjusted by inflation to December 2019 prices to facilitate their aggregation. Time to sale represents duration of ownership before resale. Property types are: flat (apartment); detached (house with no shared walls); semi-detached (house which shares a common wall with a neighbouring property) and terraced (house which shares common walls with neighbouring properties on both sides). New-build are newly developed properties.

Table A5: Geographic Distribution of House Purchases

Panel (A): Full Sample

Region	%
East Midlands	8.25
East of England	11.28
London	13.37
North East	4.48
North West	12.28
South East	16.92
South West	10.64
Wales	4.83
West Midlands	8.98
Yorkshire and the Humber	8.97

Panel (B): Peak Sample

Region	%
East Midlands	8.18
East of England	10.71
London	13.62
North East	4.95
North West	12.61
South East	16.65
South West	10.37
Wales	5.17
West Midlands	8.69
Yorkshire and the Humber	9.05

Note: The table presents the distribution of sampled property purchases by location. Panel (A) includes the "Full sample" used in the regression estimates of our baseline specification. Panel (B) includes the "Peak sub-sample" used in the regression estimates of our modified baseline specification. England and Wales are nations within the United Kingdom, England is further sub-divided into 9 official regions.

Table A6: Stockbroking Accounts Sample Summary Statistics

	Mean	Min	p25	p50	p75	Max
Account Holder Characteristics						
Female	0.146					
Age (years)	48.326	17.000	37.000	47.000	57.000	87.000
Account Tenure (years)	2.259	0.348	1.507	2.219	3.027	3.995
Account Characteristics						
Portfolio Value (£10000)	4.346	0.000	0.366	0.963	2.205	5077.266
Investment in Mutual Funds (£10000)	0.169	0.000	0.000	0.000	0.000	82.147
Investment in Mutual Funds (%)	5.644	0.000	0.000	0.000	0.000	100.000
Number of Stocks	4.376	2.000	2.167	3.125	5.091	55.444
Login days (% all days)	23.346	0.307	7.580	17.229	35.443	76.471
Transaction days (% all market open days)	5.030	0.195	1.649	3.030	5.923	73.913
N Accounts	8755					

Note: The table presents summary statistics of new accounts. Age is measured at 2017. 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 A7: Summary Statistics for Housing Return Since Purchase (Full Sample)

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Return Since Purchase (£)	77,919	163,400	-752	9,059	40,624	100,126	184,644
Return Since Purchase (%)	66.68	82.83	-0.61	7.36	31.79	105.73	187.46
Return Since Purchase >= 0 (%)	88.93						

Note: The table presents summary statistics for returns since purchase in the "Full sample". The sample includes all property × calendar quarters in the baseline sample. Returns are calculated at the calendar quarter level. Returns in the percentiles 1 and 99 are winsorized.

Table A8: Summary Statistics for Housing Return Since Purchase (Peak Sub-Sample)

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Return Since Purchase (£)	105,272	204,608	-66	18,071	64,338	132,152	235,927
Return Since Purchase (%)	87.64	94.29	-0.05	13.22	53.29	147.99	216.55
Return Since Purchase >= 0 (%)	89.95						

Note: The table presents summary statistics for returns since purchase in the "Peak sub sample". The sample includes all property × calendar quarters with a peak price. Returns are calculated at the calendar quarter level. Returns in the percentiles 1 and 99 are winsorized.

Table A9: Summary Statistics for Housing Return Since Peak Price

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Return Since Peak (£)	8,520	72,575	-31,458	-18,781	-5,008	14,783	64,216
Return Since Peak (%)	3.77	26.88	-15.5	-10.56	-2.46	8.06	28.95
Price Peaks Per Property	1.73	0.94	1	1	1	2	3
Return Since Peak >= 0 (%)	40.04						

Note: The table presents summary statistics for returns since peak in the "Peak sub sample". The sample includes all property × calendar quarters with a peak price. Returns are calculated at the calendar quarter level. Returns in the percentiles 1 and 99 are winsorized.

Table A10: Summary Statistics for Stock Returns Since Purchase and Returns Since Peak Price

	Mean	SD	Median
Return Since Purchase			
Return Since Purchase (%)	−4.843	22.642	−2.243
Gain Since Purchase=1	0.423	0.494	0
Return Since Peak			
Returns Since Peak (%)	−16.197	19.197	−9.647
Gain Since Peak=1	0.120	0.325	0
N Investor × Stock × Day	396186		

Note: The table presents summary statistics for returns since purchase and returns since peak price in the sell-day sample and login-day samples. The sell-day sample includes all investor × stock × days on which the investor sold at least one position in the portfolio. Returns are calculated at the daily level. Returns below the percentile 1 and above the percentile 99 are excluded.

Table A11: Summary Statistics for Housing Returns Since Purchase and Returns Since Peak (Two Quarters Definition)

Panel (A): Housing Returns Since Purchase

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Return Since Purchase (£)	99,763	179,616	1,268	17,975	61,144	125,821	222,860
Return Since Purchase (%)	83.71	90.72	1.09	13.37	49.21	140.68	209.49
Return Since Purchase >= 0 (%)	91.22						

Panel (B): Housing Returns Since Peak

			Percentiles				
	Mean	SD	10th	25th	50th	75th	90th
Return Since Peak (£)	5,210	55,555	-29,307	-16,491	-2,749	11,892	49,346
Return Since Peak (%)	3.96	26.39	-14.8	-9.01	-1.39	6.43	23.96
Price Peaks Per Property	2.54	1.59	1	1	2	3	5
Return Since Peak >= 0 (%)	42.06						

Note: The table presents summary statistics for housing returns since purchase (Panel A) and returns since peak (Panel B) under an alternative definition of peaks. A peak price remains the highest price (since purchase) for at least two quarters instead of three quarters. The sample includes all property × calendar quarters with a peak price. Returns in the percentiles 1 and 99 are winsorized.

Table A12: Summary Statistics for Housing Returns Since Purchase and Returns Since Peak (Four Quarters Definition)

Panel (A): Housing Returns Since Purchase

	Mean	SD	Percentiles				
			10th	25th	50th	75th	90th
Return Since Purchase (£)	109,243	213,218	-1,258	18,707	67,081	136,807	244,977
Return Since Purchase (%)	90.85	96.76	-0.92	13.3	57.74	152.33	221.55
Return Since Purchase >= 0 (%)	89						

Panel (B): Housing Returns Since Peak

	Mean	SD	Percentiles				
			10th	25th	50th	75th	90th
Return Since Peak (£)	10,983	89,798	-32,740	-20,122	-7,052	17,394	73,448
Return Since Peak (%)	2.76	23.92	-16	-11.46	-3.64	9.2	30.95
Price Peaks Per Property	1.4	0.66	1	1	1	2	2
Return Since Peak >= 0 (%)	38.57						

Note: The table presents summary statistics for housing returns since purchase (Panel A) and returns since peak (Panel B) under an alternative definition of peaks. A peak price remains the highest price (since purchase) for at least four quarters instead of three quarters. The sample includes all property × calendar quarters with a peak price. Returns in the percentiles 1 and 99 are winsorized.

Table A13: Summary Statistics for Stock Returns Since Purchase and Returns Since Peak Price (Month-Peak)

	Mean	SD	Median
Return Since Purchase			
Return Since Purchase (%)	−6.452	24.348	−3.901
Gain Since Purchase=1	0.393	0.489	0
Return Since Peak			
Returns Since Peak (%)	−18.300	21.001	−12.371
Gain Since Peak=1	0.134	0.340	0
N Investor × Stock × Day	312233		

Note: The table presents summary statistics for returns since purchase and returns since peak price in the sell-day sample and login-day samples. The sell-day sample includes all investor × stock × days on which the investor sold at least one position in the portfolio. Returns below the percentile 1 and above the percentile 99 are excluded.

Table A14: OLS Estimates of the Housing Disposition Effect by Market Liquidity

Panel (A): Above Median Sales Volume

		$Sale_{it}$	
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0064***	0.0078***	0.0051***
	(0.0007)	(0.0007)	(0.0005)
Years From Purchase		0.0083***	0.0085***
		(0.0005)	(0.0005)
Return Since Purchase > 0 (£100,000)			0.0005**
			(0.0002)
Return Since Purchase < 0 (£100,000)			0.0324***
			(0.0033)
Constant	0.0074***	0.0037***	0.0063***
	(0.0003)	(0.0005)	(0.0004)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	64,165,601	64,165,601	64,165,601
R^2	0.0002	0.0021	0.0021

Panel (B): Below Median Sales Volume

		$Sale_{it}$	
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0039***	0.0057***	0.0043***
	(0.0004)	(0.0005)	(0.0004)
Years From Purchase		0.0064***	0.0066***
		(0.0005)	(0.0005)
Return Since Purchase > 0 (£100,000)			0.0004***
			(0.0001)
Return Since Purchase < 0 (£100,000)			0.0125***
			(0.0016)
Constant	0.0067***	0.0033***	0.0047***
	(0.0003)	(0.0003)	(0.0003)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	64,135,150	64,135,150	64,135,150
R^2	0.0002	0.0013	0.0014

Note: The table presents ordinary least squares regression estimates for our baseline specification for separate samples split by liquidity. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added in Columns 2 and 3 correspond to Table 1, Column 2, and Table 2, Column 1, respectively. Observations includes all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A15: OLS Estimates of the Housing Disposition Effect by Market Size

Panel (A): Above Median Stock

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0055***	0.0081***	0.0064***
	(0.0006)	(0.0008)	(0.0007)
Years From Purchase		0.0066***	0.0068***
		(0.0006)	(0.0005)
Return Since Purchase > 0 (£100,000)			0.0004**
			(0.0002)
Return Since Purchase < 0 (£100,000)			0.0153***
			(0.0018)
Constant	0.0067***	0.0026***	0.0043***
	(0.0003)	(0.0005)	(0.0004)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	51,045,213	51,045,213	51,045,213
R^2	0.0003	0.0017	0.0017

Panel (B): Below Median Stock

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0055***	0.0077***	0.0059***
	(0.0006)	(0.0008)	(0.0006)
Years From Purchase		0.0088***	0.0089***
		(0.0007)	(0.0006)
Return Since Purchase > 0 (£100,000)			0.0010***
			(0.0003)
Return Since Purchase < 0 (£100,000)			0.0143***
			(0.0018)
Constant	0.0074***	0.0018***	0.0039***
	(0.0003)	(0.0005)	(0.0004)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	51,042,566	51,042,566	51,042,566
R^2	0.0003	0.0018	0.0019

Note: The table presents ordinary least squares regression estimates for our baseline specification for separate samples split by market size. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added in Columns 2 and 3 correspond to Table 1, Column 2, and Table 2, Column 1, respectively. Observations includes all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A16: OLS Estimates of the Housing Disposition Effect by Leverage

Panel (A): Above Median LTV%

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0031***	0.0039***	0.0024***
	(0.0006)	(0.0007)	(0.0005)
Years From Purchase		0.0058***	0.0059***
		(0.0007)	(0.0007)
Return Since Purchase > 0 (£100,000)			0.0005
			(0.0004)
Return Since Purchase < 0 (£100,000)			0.0157***
			(0.0017)
Constant	0.0073***	0.0028***	0.0043***
	(0.0005)	(0.0006)	(0.0004)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	50,495,217	50,495,217	50,495,217
R^2	0.0001	0.0012	0.0012

Panel (B): Below Median LTV%

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0039***	0.0062***	0.0052***
	(0.0006)	(0.0009)	(0.0008)
Years From Purchase		0.0060***	0.0061***
		(0.0005)	(0.0005)
Return Since Purchase > 0 (£100,000)			0.0005***
			(0.0002)
Return Since Purchase < 0 (£100,000)			0.0076***
			(0.0016)
Constant	0.0065***	0.0012*	0.0024***
	(0.0003)	(0.0007)	(0.0007)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	50,512,021	50,512,021	50,512,021
R^2	0.0002	0.0013	0.0013

Note: The table presents ordinary least squares regression estimates for our baseline specification for separate samples split by leverage. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added in Columns 2 and 3 correspond to Table 1, Column 2, and Table 2, Column 1, respectively. Observations includes all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A17: OLS Estimates of the Housing Disposition Effect by Time Since Purchase

Panel (A): Above Median Time Since Purchase

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0010**	0.0041***	0.0028***
	(0.0004)	(0.0006)	(0.0005)
Years From Purchase		-0.0019	-0.0023
		(0.0032)	(0.0032)
Return Since Purchase > 0 (£100,000)			0.0000
			(0.0001)
Return Since Purchase < 0 (£100,000)			0.0149***
			(0.0020)
Constant	0.0091***	0.0224***	0.0246***
	(0.0003)	(0.0077)	(0.0077)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	64,203,372	64,203,372	64,203,372
R^2	0.0000	0.0009	0.0009

Panel (B): Below Median Time Since Purchase

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0086***	0.0085***	0.0066***
	(0.0006)	(0.0006)	(0.0005)
Years From Purchase		0.0017*	0.0023**
		(0.0009)	(0.0009)
Return Since Purchase > 0 (£100,000)			0.0015**
			(0.0007)
Return Since Purchase < 0 (£100,000)			0.0151***
			(0.0031)
Constant	0.0063***	0.0044***	0.0062***
	(0.0003)	(0.0005)	(0.0005)
Years From Purchase Quintics	NO	YES	YES
Property Characteristics	NO	YES	YES
Observations	64,213,543	64,213,543	64,213,543
R^2	0.0008	0.0021	0.0022

Note: The table presents ordinary least squares regression estimates for our baseline specification for separate samples split by leverage. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added in Columns 2 and 3 correspond to Table 1, Column 2, and Table 2, Column 1, respectively. Observations includes all property × quarters in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A18: OLS Estimates of the Housing Peak and Purchase Disposition Effects by Market Liquidity

Panel (A): Above Median Sales Volume

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0050***		0.0031***
	(0.0006)		(0.0004)
Return Since Purchase > 0 (£100,000)	0.0001		0.0004***
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0152***		0.0100***
	(0.0021)		(0.0021)
Gain Since Peak = 1		0.0039***	0.0036***
		(0.0006)	(0.0005)
Return Since Peak > 0 (£100,000)		-0.0019***	-0.0020***
		(0.0003)	(0.0003)
Return Since Peak < 0 (£100,000)		0.0064***	0.0049***
		(0.0018)	(0.0018)
Years From Purchase	0.0075***	0.0068***	0.0066***
	(0.0010)	(0.0009)	(0.0009)
Constant	0.0012	0.0033***	0.0021*
	(0.0014)	(0.0013)	(0.0012)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	29,673,895	29,673,895	29,673,895
R^2	0.0011	0.0013	0.0014

Panel (B): Below Median Sales Volume

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0030***		0.0020***
	(0.0004)		(0.0003)
Return Since Purchase > 0 (£100,000)	-0.0000		0.0000
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0095***		0.0062***
	(0.0013)		(0.0018)
Gain Since Peak = 1		0.0033***	0.0031***
		(0.0004)	(0.0004)
Return Since Peak > 0 (£100,000)		-0.0017***	-0.0015***
		(0.0003)	(0.0004)
Return Since Peak < 0 (£100,000)		0.0038***	0.0028*
		(0.0014)	(0.0015)
Years From Purchase	0.0047***	0.0046***	0.0044***
	(0.0006)	(0.0006)	(0.0006)
Constant	0.0037***	0.0040***	0.0039***
	(0.0009)	(0.0010)	(0.0008)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	42,352,251	42,352,251	42,352,251
R^2	0.0006	0.0008	0.0008

Note: The table presents ordinary least squares regression estimate for our modified baseline specification for separate samples split by liquidity. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters with a peak price in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A19: OLS Estimates of the Housing Peak and Purchase Disposition Effects by Market Size

Panel (A): Above Median Stock

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0042***		0.0027***
	(0.0006)		(0.0004)
Return Since Purchase > 0 (£100,000)	-0.0001		0.0000
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0097***		0.0058***
	(0.0017)		(0.0020)
Gain Since Peak = 1		0.0045***	0.0041***
		(0.0006)	(0.0006)
Return Since Peak > 0 (£100,000)		-0.0020***	-0.0017***
		(0.0002)	(0.0003)
Return Since Peak < 0 (£100,000)		0.0045***	0.0036**
		(0.0014)	(0.0014)
Years From Purchase	0.0063***	0.0060***	0.0058***
	(0.0009)	(0.0007)	(0.0007)
Constant	0.0002	0.0011	0.0008
	(0.0012)	(0.0012)	(0.0010)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	29,453,534	29,453,534	29,453,534
R^2	0.0008	0.0011	0.0012

Panel (B): Below Median Stock

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0040***		0.0025***
	(0.0006)		(0.0004)
Return Since Purchase > 0 (£100,000)	0.0003		0.0003
	(0.0002)		(0.0002)
Return Since Purchase < 0 (£100,000)	0.0110***		0.0059***
	(0.0015)		(0.0021)
Gain Since Peak = 1		0.0039***	0.0036***
		(0.0007)	(0.0007)
Return Since Peak > 0 (£100,000)		-0.0025***	-0.0024***
		(0.0004)	(0.0004)
Return Since Peak < 0 (£100,000)		0.0061***	0.0049***
		(0.0017)	(0.0017)
Years From Purchase	0.0058***	0.0056***	0.0054***
	(0.0009)	(0.0008)	(0.0007)
Constant	0.0036***	0.0044***	0.0042***
	(0.0013)	(0.0015)	(0.0012)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	29,608,906	29,608,906	29,608,906
R^2	0.0008	0.0010	0.0011

Note: The table presents ordinary least squares regression estimates for our modified baseline specification for separate samples split by market size. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters with a peak price in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A20: OLS Estimates of the Housing Peak and Purchase Disposition Effects by Leverage

Panel (A): Above Median LTV%

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0024***		0.0015***
	(0.0004)		(0.0004)
Return Since Purchase > 0 (£100,000)	-0.0002		-0.0001
	(0.0002)		(0.0002)
Return Since Purchase < 0 (£100,000)	0.0139***		0.0059
	(0.0015)		(0.0043)
Gain Since Peak = 1		0.0021***	0.0020***
		(0.0004)	(0.0004)
Return Since Peak > 0 (£100,000)		-0.0019***	-0.0016***
		(0.0005)	(0.0005)
Return Since Peak < 0 (£100,000)		0.0086***	0.0073**
		(0.0028)	(0.0032)
Years From Purchase	0.0055***	0.0050***	0.0048***
	(0.0009)	(0.0008)	(0.0008)
Constant	0.0027***	0.0045***	0.0040***
	(0.0009)	(0.0009)	(0.0008)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	33,570,287	33,570,287	33,570,287
R^2	0.0007	0.0009	0.0009

Panel (B): Below Median LTV%

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0033***		0.0027***
	(0.0006)		(0.0005)
Return Since Purchase > 0 (£100,000)	0.0002*		0.0002**
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0067***		0.0054***
	(0.0012)		(0.0015)
Gain Since Peak = 1		0.0037***	0.0036***
		(0.0006)	(0.0006)
Return Since Peak > 0 (£100,000)		-0.0012***	-0.0012***
		(0.0003)	(0.0003)
Return Since Peak < 0 (£100,000)		0.0021	0.0013
		(0.0013)	(0.0013)
Years From Purchase	0.0042***	0.0045***	0.0045***
	(0.0007)	(0.0007)	(0.0006)
Constant	0.0031***	0.0035**	0.0034***
	(0.0011)	(0.0014)	(0.0010)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	35,638,330	35,638,330	35,638,330
R^2	0.0007	0.0008	0.0009

Note: The table presents ordinary least squares regression estimates for our modified baseline specification for separate samples split by leverage. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters with a peak price in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A21: OLS Estimates of the Housing Peak and Purchase Disposition Effects by Time Since Purchase

Panel (A): Above Median Time Since Purchase

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	-0.0000		-0.0002
	(0.0015)		(0.0015)
Return Since Purchase > 0 (£100,000)	-0.0002***		-0.0001
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.4304		0.3611
	(0.6581)		(0.6538)
Gain Since Peak = 1		0.0017***	0.0017***
		(0.0002)	(0.0002)
Return Since Peak > 0 (£100,000)		-0.0007***	-0.0006***
		(0.0002)	(0.0002)
Return Since Peak < 0 (£100,000)		0.0033***	0.0032***
		(0.0011)	(0.0011)
Years From Purchase	0.0161*	0.0075	0.0075
	(0.0094)	(0.0078)	(0.0078)
Constant	-0.0311	-0.0057	-0.0054
	(0.0286)	(0.0237)	(0.0237)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	36,041,632	36,041,632	36,041,632
R^2	0.0004	0.0005	0.0005

Panel (B): Below Median Time Since Purchase

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0044***		0.0021***
	(0.0005)		(0.0004)
Return Since Purchase > 0 (£100,000)	0.0005		0.0000
	(0.0003)		(0.0003)
Return Since Purchase < 0 (£100,000)	0.0075***		0.0034
	(0.0015)		(0.0023)
Gain Since Peak = 1		0.0062***	0.0057***
		(0.0007)	(0.0007)
Return Since Peak > 0 (£100,000)		-0.0033***	-0.0029***
		(0.0005)	(0.0007)
Return Since Peak < 0 (£100,000)		0.0059***	0.0043**
		(0.0020)	(0.0021)
Years From Purchase	0.0063*	0.0028	0.0034
	(0.0036)	(0.0029)	(0.0026)
Constant	0.0008	0.0049**	0.0038**
	(0.0026)	(0.0020)	(0.0019)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	36,055,303	36,055,303	36,055,303
R^2	0.0007	0.0012	0.0013

Note: The table presents ordinary least squares regression estimates for our modified baseline specification for separate samples split by leverage. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters with a peak price in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A22: OLS Estimates of the Housing Peak and Purchase Disposition Effects by Time Since Peak

Panel (A): Above Median Time Since Peak

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0033***		0.0023***
	(0.0003)		(0.0002)
Return Since Purchase > 0 (£100,000)	0.0001		0.0004**
	(0.0001)		(0.0002)
Return Since Purchase < 0 (£100,000)	0.0185***		0.0131***
	(0.0015)		(0.0011)
Gain Since Peak = 1		0.0023***	0.0021***
		(0.0004)	(0.0003)
Return Since Peak > 0 (£100,000)		-0.0012***	-0.0015***
		(0.0001)	(0.0003)
Return Since Peak < 0 (£100,000)		0.0068***	0.0056***
		(0.0009)	(0.0009)
Years From Purchase	-0.0022	-0.0001	0.0001
	(0.0032)	(0.0031)	(0.0029)
Constant	0.0210***	0.0146**	0.0153**
	(0.0072)	(0.0074)	(0.0064)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	35,920,785	35,920,785	35,920,785
R^2	0.0007	0.0008	0.0009

Panel (B): Below Median Time Since Peak

	$Sale_{it}$ (1)	(2)	(3)
Gain Since Purchase = 1	0.0052***		0.0031***
	(0.0007)		(0.0005)
Return Since Purchase > 0 (£100,000)	0.0004***		0.0003***
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0071***		0.0036
	(0.0017)		(0.0023)
Gain Since Peak = 1		0.0054***	0.0049***
		(0.0008)	(0.0008)
Return Since Peak > 0 (£100,000)		-0.0037**	-0.0035**
		(0.0017)	(0.0017)
Return Since Peak < 0 (£100,000)		0.0039**	0.0029
		(0.0019)	(0.0020)
Years From Purchase	0.0074***	0.0064***	0.0063***
	(0.0008)	(0.0008)	(0.0007)
Constant	-0.0003	0.0018*	0.0011
	(0.0010)	(0.0010)	(0.0008)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	34,928,352	34,928,352	34,928,352
R^2	0.0010	0.0014	0.0015

Note: The table presents ordinary least squares regression estimates for our modified baseline specification for separate samples split by leverage. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters with a peak price in the baseline sample. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A23: OLS Estimates of the Housing Peak and Purchase Disposition Effects (Two Quarters Definition)

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0051***		0.0032***
	(0.0006)		(0.0004)
Return Since Purchase > 0 (£100,000)	0.0003**		0.0002*
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0131***		0.0078***
	(0.0016)		(0.0020)
Gain Since Peak = 1		0.0044***	0.0040***
		(0.0006)	(0.0006)
Return Since Peak > 0 (£100,000)		-0.0019***	-0.0017***
		(0.0005)	(0.0005)
Return Since Peak < 0 (£100,000)		0.0061***	0.0044***
		(0.0016)	(0.0016)
Years From Purchase	0.0077***	0.0068***	0.0068***
	(0.0008)	(0.0007)	(0.0007)
Constant	0.0013	0.0039***	0.0022***
	(0.0009)	(0.0008)	(0.0007)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	86,792,483	86,792,483	86,792,483
R^2	0.0011	0.0014	0.0015

Note: This table presents ordinary least squares regression estimates for our modified baseline specification under an alternative definition of peaks. A peak price remains the highest price (since purchase) for at least two quarters instead of three quarters. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A24: OLS Estimates of the Housing Peak and Purchase Disposition Effects (Four Quarters Definition)

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.0029***		0.0019***
	(0.0004)		(0.0003)
Return Since Purchase > 0 (£100,000)	-0.0001		0.0001
	(0.0001)		(0.0001)
Return Since Purchase < 0 (£100,000)	0.0108***		0.0072***
	(0.0014)		(0.0017)
Gain Since Peak = 1		0.0033***	0.0031***
		(0.0004)	(0.0004)
Return Since Peak > 0 (£100,000)		-0.0016***	-0.0015***
		(0.0002)	(0.0003)
Return Since Peak < 0 (£100,000)		0.0041***	0.0033**
		(0.0014)	(0.0015)
Years From Purchase	0.0040***	0.0045***	0.0039***
	(0.0007)	(0.0007)	(0.0006)
Constant	0.0043***	0.0038***	0.0046***
	(0.0011)	(0.0013)	(0.0010)
Years From Purchase Quintics	YES	YES	YES
Property Characteristics	YES	YES	YES
Observations	62,965,529	62,965,529	62,965,529
R^2	0.0006	0.0008	0.0008

Note: This table presents ordinary least squares regression estimates for our modified baseline specification under an alternative definition of peaks. A peak price remains the highest price (since purchase) for at least four quarters instead of three quarters. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. The controls added correspond to Table 5. Observations include all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property and year-quarter. *p<0.1; **p<0.05; ***p<0.01.

Table A25: Estimates of the Disposition Effect for Stocks Including Portfolio and Demographic Controls (Month-Peak)

	$Sale_{ijt}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gain Since Purchase=1	0.0624***	0.0648***	0.0705***	0.0720***	0.0686***	0.0696***	0.0695***	0.0699***	0.0698***	0.0759***
	(0.0039)	(0.0038)	(0.0040)	(0.0040)	(0.0038)	(0.0038)	(0.0038)	(0.0037)	(0.0037)	(0.0037)
Gain Since Peak=1	0.0589***	0.0553***	0.0534***	0.0532***	0.0506***	0.0510***	0.0511***	0.0511***	0.0524***	0.0586***
	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0041)	(0.0041)
Days Since Purchase (100 days)		-0.0039***	-0.0074***	-0.0068***	-0.0075***	-0.0065***	-0.0065***	-0.0063***	-0.0028***	0.0013
		(0.0008)	(0.0011)	(0.0011)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Days Since Peak (100 days)			0.0060***	0.0056***	0.0064***	0.0064***	0.0064***	0.0063***	0.0055***	0.0031***
			(0.0013)	(0.0013)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0011)	(0.0011)
Portfolio Value (£10000)				-0.0013***	-0.0006***	-0.0005**	-0.0005**	-0.0005***	-0.0014***	-0.0015***
				(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)
Number of Stocks (10 stocks)					-0.0323***	-0.0330***	-0.0330***	-0.0323***	-0.0075	-0.0074
					(0.0083)	(0.0085)	(0.0084)	(0.0080)	(0.0069)	(0.0069)
Account Tenure (years)						-0.0076***	-0.0074***	-0.0057**		
						(0.0026)	(0.0027)	(0.0025)		
Female=1							-0.0088	-0.0029		
							(0.0055)	(0.0050)		
Age (10 years)								-0.0123***		
								(0.0016)		
Constant	0.0991***	0.1083***	0.1050***	0.1155***	0.1590***	0.1759***	0.1768***	0.2362***		
	(0.0038)	(0.0047)	(0.0046)	(0.0044)	(0.0093)	(0.0129)	(0.0126)	(0.0138)		
Account FE	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Observations	306,015	306,015	306,015	306,015	306,015	306,015	306,015	306,015	306,015	306,015
R^2	0.0168	0.0174	0.0176	0.0238	0.0425	0.0428	0.0429	0.0454	0.1344	0.1583

Note: The table presents ordinary least squares regression estimates of the baseline model with the addition of demographic controls and (daily level) portfolio controls. Peak prices use an alternative definition: a peak price remains as the highest price (since purchase) for at least a month, instead of a week. The sample includes all investor × stock × days on which the investor sold at least one stock. Outliers (investor × stock × days) below the first and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A26: Estimates of the Disposition Effect for Stocks Including Portfolio and Demographic Controls (Login-Days)

	$Sale_{ijt}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gain Since Purchase=1	0.0016***	0.0021***	0.0030***	0.0031***	0.0030***	0.0032***	0.0032***	0.0032***	0.0052***	0.0058***
	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Gain Since Peak=1	0.0088***	0.0073***	0.0071***	0.0071***	0.0070***	0.0071***	0.0071***	0.0071***	0.0066***	0.0068***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Days Since Purchase (100 days)		-0.0011***	-0.0015***	-0.0014***	-0.0014***	-0.0013***	-0.0013***	-0.0013***	0.0000	0.0002***
		(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Days Since Peak (100 days)			0.0007***	0.0007***	0.0007***	0.0007***	0.0007***	0.0007***	0.0005***	0.0003***
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Portfolio Value (£10000)				-0.0001***	-0.0001**	-0.0001**	-0.0001**	-0.0000*	-0.0006***	-0.0006***
				(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Number of Stocks (10 stocks)					-0.0020***	-0.0021***	-0.0021***	-0.0021***	0.0031***	0.0032***
					(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0007)	(0.0007)
Account Tenure (years)						-0.0010***	-0.0010***	-0.0010***		
						(0.0002)	(0.0002)	(0.0002)		
Female=1							-0.0003	-0.0001		
							(0.0004)	(0.0004)		
Age (10 years)								-0.0008***		
								(0.0001)		
Constant	0.0070***	0.0098***	0.0093***	0.0099***	0.0118***	0.0141***	0.0142***	0.0180***		
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0007)	(0.0007)	(0.0009)		
Account FE	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Stock FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Observations	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870	6,133,870
R^2	0.0011	0.0019	0.0019	0.0021	0.0026	0.0026	0.0026	0.0028	0.0360	0.0383

Note: The table presents ordinary least squares regression estimates of the baseline model with the addition of demographic controls and (daily level) portfolio controls. The sample includes all investor × stock × days for the set of days in which the investor made at least one login to his account. Outliers (investor × stock × days) below the first and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A27: Cox Proportional Hazard Model Estimates of the Housing Disposition Effect (Quarter-Peak)

	$Sale_{it}$		
	(1)	(2)	(3)
Gain Since Purchase = 1	0.9485***		0.8404***
	(0.0078)		(0.0085)
Gain Since Peak = 1		0.4171***	0.1731***
		(0.0050)	(0.0055)
Observations	72,113,609	72,113,609	72,113,609
R^2	0.0002	0.0001	0.0002

Note: The table presents Cox Proportional Hazard regression estimates of our baseline model with time varying covariates. The dependent variable takes a value of 1 if the homeowner sold their property and zero otherwise. Coefficients show stratified estimates by property. That is, coefficients are equal across properties but baseline hazard functions are unique to each property. In the model, we count every purchase of a property as the beginning of a new period of ownership which ends on the date of sale. Observations include all property × quarters in the baseline sample with a peak price. Standard errors are clustered by property. *p<0.1; **p<0.05; ***p<0.01.

Table A28: Cox Proportional Hazard Model Estimates of the Stocks Disposition Effect (Week-Peak)

	$Sale_{ijt}$		
	(1)	(2)	(3)
Gain Since Purchase=1	0.5611***		0.3231***
	(0.0110)		(0.0125)
Gain Since Peak=1		0.8608***	0.6702***
		(0.0132)	(0.0149)
Observations	336,472	336,472	336,472
R^2	0.0078	0.0117	0.0137

Note: The table presents Cox Proportional Hazard regression estimates of our baseline model with time varying covariates. The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. Coefficients show stratified estimates by account. That is, coefficients are equal across accounts but baseline hazard functions are unique to each account. In the model, we count every purchase of a stock as the beginning of a new position, and we assume a position ends on the date the investor first sells part or all of his holdings. The sample includes all investor × stock × days on which the investor sold at least one stock in the portfolio. Standard errors are clustered by account. *p<0.1; **p<0.05; ***p<0.01.

Table A29: Estimates of the Stocks Disposition Effect
Excluding Partial Sells

	Complete Sale$_{ijt}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Gain Since Purchase=1	0.0682***		0.0435***	0.0655***		0.0444***
	(0.0040)		(0.0033)	(0.0037)		(0.0028)
Gain Since Peak=1		0.1159***	0.0866***		0.1017***	0.0747***
		(0.0061)	(0.0048)		(0.0057)	(0.0047)
Days from Purchase Day (100 days)	-0.0097***	-0.0067***	-0.0076***	-0.0039***	-0.0018***	-0.0020***
	(0.0007)	(0.0007)	(0.0007)	(0.0005)	(0.0005)	(0.0005)
Constant	0.1031***	0.1121***	0.0989***			
	(0.0043)	(0.0042)	(0.0043)			
Account FE	NO	NO	NO	YES	YES	YES
Observations	396,186	396,186	396,186	396,186	396,186	396,186
R^2	0.0149	0.0175	0.0212	0.1545	0.1556	0.1590

Note: The table presents ordinary least squares regression estimates of our main specification. The dependent variable takes a value of 1 if the investor made a complete sale of the stock and zero otherwise. The sample includes all investor × stock × days on which the investor sold at least one stock in the portfolio. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A30: The Stocks Disposition Effect:
Sub-Sample Analysis, Sell-Day Sample, Week-Peak

	Gain Since Purchase		Gain Since Peak		Constant	
FTSE 100 Index						
Return in $t-1>0$	0.0622***	(0.0041)	0.0996***	(0.0058)	0.1081***	(0.0041)
Return in $t-1<0$	0.0516***	(0.0045)	0.0780***	(0.0065)	0.1193***	(0.0047)
Days Since Peak						
Below Median	0.0306***	(0.0046)	0.0876***	(0.0051)	0.1387***	(0.0050)
Above Median	0.0740***	(0.0044)	0.1148***	(0.0082)	0.0989***	(0.0039)
Days Since Purchase						
Below Median	0.0554***	(0.0051)	0.0929***	(0.0055)	0.1288***	(0.0049)
Above Median	0.0625***	(0.0041)	0.0616***	(0.0060)	0.0983***	(0.0040)

Note: The table presents ordinary least squares regression estimates for separate samples. Each row reports coefficients and standard errors from a single regression in which the dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise, there are two covariates (returns since purchase and returns since peak) and an intercept term. The sample includes all investor × stock × days on which the investor sold at least one stock. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A31: The Stocks Disposition Effect:
Demographics Sub-Sample Analysis, Sell-Day Sample, Week-Peak

	Gain Since Purchase		Gain Since Peak		Constant	
Gender						
Female	0.0659***	(0.0101)	0.1117***	(0.0116)	0.0938***	(0.0099)
Male	0.0555***	(0.0041)	0.0867***	(0.0052)	0.1172***	(0.0046)
Age						
Below Median	0.0651***	(0.0046)	0.0953***	(0.0057)	0.1178***	(0.0052)
Above Median	0.0373***	(0.0071)	0.0788***	(0.0083)	0.1002***	(0.0060)
Account Tenure						
Below Median	0.0634***	(0.0056)	0.0914***	(0.0065)	0.1100***	(0.0062)
Above Median	0.0509***	(0.0052)	0.0895***	(0.0067)	0.1176***	(0.0051)
Portfolio Value						
Below Median	0.0880***	(0.0055)	0.1078***	(0.0064)	0.1538***	(0.0050)
Above Median	0.0377***	(0.0039)	0.0587***	(0.0057)	0.0709***	(0.0043)
Number of Stocks						
Below Median	0.0811***	(0.0044)	0.1078***	(0.0062)	0.1715***	(0.0032)
Above Median	0.0350***	(0.0036)	0.0430***	(0.0054)	0.0519***	(0.0031)

Note: The table presents ordinary least squares regression estimates for separate samples split by gender, age, trading experience and portfolio value. Each row reports coefficients and standard errors from a single regression in which the dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise, there are two covariates (returns since purchase and returns since peak) and an intercept term. The sample includes all investor × stock × days on which the investor sold at least one stock. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A32: Estimates of the Stocks Disposition Effect
Sub-samples by FTSE100 Returns Since Purchase (Week-Peak), Sell-Day Sample

	Market in Loss Since Purchase & Market in Loss Since Peak Sample			Market in Loss Since Purchase & Market in Gain Since Peak Sample		
		$Sale_{ijt}$			$Sale_{ijt}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Gain Since Purchase=1	0.0841***		0.0600***	0.0849***		0.0609***
	(0.0056)		(0.0050)	(0.0085)		(0.0087)
Gain Since Peak=1		0.1572***	0.1117***		0.1040***	0.0745***
		(0.0091)	(0.0075)		(0.0105)	(0.0108)
Days from Purchase Day (100 days)	-0.0091***	-0.0058***	-0.0071***	-0.0115***	-0.0077***	-0.0096***
	(0.0010)	(0.0010)	(0.0010)	(0.0027)	(0.0026)	(0.0027)
Constant	0.1335***	0.1427***	0.1295***	0.1299***	0.1559***	0.1271***
	(0.0055)	(0.0054)	(0.0055)	(0.0078)	(0.0077)	(0.0078)
Observations	184,423	184,423	184,423	15,203	15,203	15,203
R^2	0.0147	0.0147	0.0200	0.0138	0.0138	0.0191

Note: The table presents ordinary least squares regression estimates of our main specification for separate samples split by market movements.The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. The sample includes all investor × stock × days on which the investor sold at least one stock in the day. However, Columns 1 to 3 restrict the sample to days when the market was in loss since purchase and since past peak price; and Columns 4 to 6, to days when the market was in loss since purchase but in gain since past peak price. Standard errors are clustered by account and day. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table A33: Estimates of the Stocks Disposition Effect
Sub-samples by FTSE100 Returns Since Purchase (Week-Peak), Sell-Day Sample

	Market in Gain Since Purchase & Market in Loss Since Peak Sample			Market in Gain Since Purchase & Market in Gain Since Peak Sample		
		$Sale_{ijt}$			$Sale_{ijt}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Gain Since Purchase=1	0.0515***		0.0366***	0.0996***		0.0727***
	(0.0049)		(0.0046)	(0.0053)		(0.0045)
Gain Since Peak=1		0.0909***	0.0760***		0.1179***	0.0688***
		(0.0082)	(0.0079)		(0.0071)	(0.0057)
Days from Purchase Day (100 days)	-0.0055***	-0.0034***	-0.0040***	-0.0076***	-0.0049***	-0.0055***
	(0.0012)	(0.0012)	(0.0012)	(0.0011)	(0.0011)	(0.0011)
Constant	0.1347***	0.1521***	0.1313***	0.1225***	0.1414***	0.1186***
	(0.0060)	(0.0054)	(0.0060)	(0.0056)	(0.0054)	(0.0056)
Observations	57,757	57,757	57,757	138,803	138,803	138,803
R^2	0.0055	0.0078	0.0099	0.0212	0.0176	0.0250

Note: The table presents ordinary least squares regression estimates of our main specification for separate samples split by market movements.The dependent variable takes a value of 1 if the investor made a sale of the stock and zero otherwise. The sample includes all investor × stock × days on which the investor sold at least one stock in the day. However, Columns 1 to 3 restrict the sample to days when the market was in gain since purchase but in loss since past peak price; and Columns 4 to 6, to days when the market was in gain since purchase and since past peak price. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A34: Stock Top-Up Behaviour When Stocks are in Loss Since Purchase: OLS and Individual Fixed Effects Estimates

	$Top-Up_{ijt}$		
	(1)	(2)	(3)
Return Since Purchase < 0 (%)	0.0001***	0.0001***	0.0002***
	(0.0000)	(0.0000)	(0.0000)
Days Since Purchase (100 days)		-0.0007***	-0.0001**
		(0.0001)	(0.0001)
Portfolio Value (£10000)		0.0001***	0.0000
		(0.0000)	(0.0000)
Number of Stocks (10 stocks)		-0.0016***	-0.0008**
		(0.0005)	(0.0004)
Account Tenure (years)		-0.0006**	
		(0.0002)	
Female=1		-0.0017***	
		(0.0004)	
Age (10 years)		-0.0005***	
		(0.0001)	
Constant	0.0086***	0.0153***	
	(0.0003)	(0.0009)	
Account FE	NO	NO	YES
Stock FE	NO	NO	YES
Observations	3,374,734	3,306,124	3,306,124
R^2	0.0005	0.0015	0.0313

Note: The table presents ordinary least squares regression estimates for the likelihood to top-up an stock as a function of the return since purchase. Peaks are defined since the purchase of the stock. The dependent variable takes a value of 1 if the investor topped-up the stock and zero otherwise. The sample includes all investor × stock × days on which the investor made at least one login to his account and the stock had negative returns since purchase. Outliers (investor × stock × days) below the first and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A35: Top-Up Behaviour When Stocks are in Loss Since Past Peak Price: OLS and Individual Fixed Effects Estimates

	$Top - Up_{ijt}$		
	(1)	(2)	(3)
Return Since Peak < 0 (%)	-0.0001***	-0.0002***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)
Days Since Peak (100 days)		-0.0015***	-0.0011***
		(0.0001)	(0.0001)
Portfolio Value (£10000)		0.0001***	0.0000
		(0.0000)	(0.0000)
Number of Stocks (10 stocks)		-0.0014***	-0.0009**
		(0.0004)	(0.0004)
Account Tenure (years)		-0.0007***	
		(0.0002)	
Female=1		-0.0010***	
		(0.0003)	
Age (10 years)		-0.0003***	
		(0.0001)	
Constant	0.0046***	0.0104***	
	(0.0002)	(0.0007)	
Account FE	NO	NO	YES
Stock FE	NO	NO	YES
Observations	5,587,106	5,475,583	5,475,583
R^2	0.0003	0.0018	0.0248

Note: The table presents ordinary least squares regression estimates for the likelihood to top-up as a function of the return since peak price. Peaks are defined since the purchase of the stock. The dependent variable takes a value of 1 if the investor topped-up the stock and zero otherwise. The sample includes all investor × stock × days on which the investor made at least one login to the account and the stock has negative returns since past peak price. Outliers (investor × stock × days) below the first and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.

Table A36: Top-Up Behaviour When Stocks are in Loss Since Past Peak Price: Placebo Test (Peaks defined for the Past Year)

	$Top-Up_{ijt}$						
	No Holding Stock on Past Peak			Holding Stock on Past Peak			All Sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Return Since Peak < 0 (%)	-0.0001***	-0.0002***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Holding Stock During Past Peak=1							-0.0007***
							(0.0002)
Days Since Peak (100 days)		-0.0005***	-0.0002		-0.0012***	-0.0008***	-0.0009***
		(0.0001)	(0.0001)		(0.0001)	(0.0001)	(0.0001)
Days Since Purchase (100 days)		-0.0042***	-0.0030***		-0.0002***	-0.0001***	-0.0004***
		(0.0002)	(0.0002)		(0.0000)	(0.0000)	(0.0000)
Portfolio Value (£10000)		0.0002***	0.0001		0.0001***	0.0001***	0.0001
		(0.0000)	(0.0001)		(0.0000)	(0.0000)	(0.0001)
Number of Stocks (10 stocks)		-0.0019***	-0.0012**		-0.0012***	-0.0007***	-0.0010**
		(0.0005)	(0.0006)		(0.0004)	(0.0003)	(0.0004)
Account Tenure (years)		-0.0006**			-0.0005***		
		(0.0003)			(0.0002)		
Female=1		-0.0016***			-0.0009***		
		(0.0005)			(0.0003)		
Age (10 years)		-0.0003**			-0.0003***		
		(0.0001)			(0.0001)		
Return Since Peak < 0 (%) × Holding Stock During Past Peak=1							-0.0000
							(0.0000)
Constant	0.0053***	0.0142***		0.0030***	0.0090***		
	(0.0003)	(0.0011)		(0.0002)	(0.0007)		
Account FE	NO	NO	YES	NO	NO	YES	YES
Stock FE	NO	NO	YES	NO	NO	YES	YES
Observations	2,788,283	2,730,549	2,730,549	2,971,126	2,913,287	2,913,287	5,643,836
R^2	0.0008	0.0034	0.0340	0.0005	0.0015	0.0301	0.0274

Note: This table presents ordinary least squares regression estimates for the likelihood to top-up an stock as a function of return since peak. Peaks are defined over the past year (rather than since purchase). The dependent variable takes a value of 1 if the investor topped-up the stock and zero otherwise. The sample includes all investor × stock × days on which the investor made at least one login to the account and the stock has negative returns since past peak price. Columns 1 to 3 subset the data to observation when the investor have not held the stock during the past peak. Columns 4 to 6, to observation when the investor held the stock in the past peak. Column 7 includes all observations and adds the interaction with the returns since past peak and the holding stock dummy. Outliers (investor × stock × days) below the first and above the 99th percentiles of daily portfolio values are excluded. Account tenure, gender and age (calculated from decades of birth) are within individual time invariant. Standard errors are clustered by account and day. *p<0.1; **p<0.05; ***p<0.01.