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Who Buys When Rates Rise? Diverging Reactions of Institutional and Private Investors

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Contents

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Abstract

This thesis investigates how institutional and private investors in Germany's residential real estate market respond differently to monetary policy shocks. Drawing on a German transaction-level dataset and high-frequency identification of central bank policy surprises, the analysis reveals that institutional investors significantly adjust their purchasing behavior, whereas private households show no significant adjustment to their behavior. These findings underscore the importance of investor heterogeneity in the transmission of monetary policy and suggest meaningful implications for central banks in implementing such policies.

Zusammenfassung

Diese Masterarbeit untersucht, wie institutionelle und private Käufer auf dem deutschen Wohnimmobilienmarkt unterschiedlich auf geldpolitische Schocks reagieren. Grundlage der Analyse ist ein neuartiger deutscher Transaktionsdatensatz sowie die Identifikation geldpolitischer Überraschungen mithilfe hochfrequenter Finanzmarktdaten. Die Ergebnisse zeigen, dass institutionelle Investoren ihr Kaufverhalten deutlich anpassen, während private Haushalte weitgehend unbeeinflusst bleiben. Damit wird die zentrale Bedeutung der Anlegerheterogenität für die geldpolitische Transmission unterstrichen und auf wichtige Implikationen für die Gestaltung und Wirksamkeit geldpolitischer Maßnahmen hingewiesen.

1. Introduction

Monetary unions, such as the Euro Area (EA), are characterized by significant heterogeneity in housing markets across member countries. Ownership rates and the prevalence of variable-rate mortgages are just a few examples of the structural differences that shape housing market heterogeneity. Such variations influence how monetary policy is transmitted, potentially resulting in asymmetric responses to conventional policy shocks. Residential real estate markets exhibit significant heterogeneity across the EA. In recent years, the growing presence of institutional investors in housing markets has attracted considerable public attention. Despite growing public interest, academic research on the impact of large-scale investors in this segment remains limited. One key reason for this gap is the scarcity of transactional datasets that accurately identify purchaser types. The few studies that have been able to exploit such data find that institutional investors can significantly influence housing market dynamics, including transaction prices, rent prices, and demand dynamics (Allen, Rutherford, Rutherford, & Yavas, 2018; Bandoni, De Nora, Giuzio, Ryan, & Storz, 2025; McCarthy, 2024). The study by Bandoni et al. (2025) also investigates how institutional investors in the EA adjust their purchasing behavior following an accommodating change in the monetary policy. By estimating impulse response functions using a vector autoregression model, the paper finds that institutional investors statistically significantly increase the number of residential properties purchased.

This thesis builds on existing findings by utilizing a novel micro-level transaction dataset from Germany that enables a clear distinction between private households and institutional investors. This distinction enables an empirical assessment of how these two investor types respond to changes in lending rates. In particular, the analysis investigates whether the presence of institutional investors leads to heterogeneous effects of monetary policy on housing demand. To the best of my knowledge, this is the first academic study to compare the impulse response functions of private households and large-scale investors in terms of their purchase activity in the residential real estate market.

The empirical analysis employs the local projection method, which was first introduced by Jordà (2005). High-frequency data from Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019) is used to identify exogenous monetary policy shocks. Finding increased numbers of transactions carried out by institutional investors following a decrease in the interest rate, this thesis validates the findings by Bandoni et al. (2025). Results from this thesis also show a decrease in transactions from institutional investors when monetary policy is tightened. Moreover, it can be shown that a decrease in the lending rate has a larger but lagged effect on the number of purchases compared to an increase. Private investors, on the other hand, do not change their buying behavior to neither policy tightening nor loosening. Differences between the two investor types are however only statistically significant when the interest rate is hiked by the central bank. Particularly in this scenario, a varying presence of large-scale investors influences demand in the residential real estate market and consequently for the transmission of monetary policy.

The thesis proceeds by providing an overview of the transmission of monetary policy through housing and the current findings on institutional investors in the housing segment. In Chapter 3 the underlying transaction dataset is described along with the data on exogenous monetary policy shocks. Followed by Chapter 4 which elaborates on the economic framework of the thesis. Chapter 5 provides the empirical findings of the base model. In Chapter 6, those findings are tested with robustness checks. Concluding remarks of the overall thesis can be found in Chapter 7.

2. Related Literature

The housing market represents a fundamental component of the economy, shaping socioeconomic structures, influencing patterns of household financial behavior, and serving as a key driver of macroeconomic performance and stability. In addition, the housing market plays a central role in the transmission of monetary policy, particularly through the housing transmission channel. Changes in conventional monetary policy significantly affect the housing market, which, in turn, transmits these effects to the broader economy. In a heterogeneous real estate market such as that of the Euro Area, it is crucial to understand how structural differences across member states alter the dynamics of the monetary policy transmission mechanism. Recently, increasing attention has been directed toward the growing involvement of institutional investors in the residential real estate (RRE) market. The following chapters elaborate on the interaction between housing and monetary policy, the broader economic implications of housing dynamics, and the implications of the rising presence of institutional investors in the RRE sector (Bandoni et al., 2025; Jarociński & Smets, 2008; Jordà, Schularick, & Taylor, 2015; Mishkin, 2007).

2.1. Monetary policy and housing

First, the different mechanisms through which central bank decisions are transmitted to the broader economy are outlined. Monetary policy operates through various channels, including the housing market. One can distinguish between direct and indirect effects of changes in the lending rate, which influence the housing market, investment decisions and ultimately broader economic activities.

Direct effects. Monetary policy tightening by the European Central Bank (ECB) tends to also increase borrowing costs for market participants. Increased costs decrease demand for residential housing, which has a negative effect on house prices. Moreover, even the anticipation of a future change in the policy rate and therefore the dampening effect on house price growth also lowers demand. On the other hand, an increase in the cost of borrowing also affects the construction of housing and therefore lowers the supply. Such weakening demand and supply therefore have a real impact on the aggregate economy through its direct effects (Mishkin, 2007).

Indirect effects. The transmission of conventional central bank policies is also shaped by indirect effects, which operate through the household balance sheet. A decrease in the lending rate is associated with an appreciation in the price of residential real estate. This does lead to an upward revaluation of the asset side of a household's balance sheet and thus can lead to a significant wealth effect for homeowners. Higher values of collateral, along with an easing in credit constraints can foster household borrowing and consumption (Mishkin, 2007).

These mechanisms have been also shown empirically. Jordà et al. (2015) show that expansionary monetary policy in fact leads to an increase in house prices, studies like Mian and Sufi (2011) are able to show that an increase in the same dynamic leads to an increase in credit indicating a relaxation of the borrowing constraints. Moreover, the positive effect on private consumption as a result of an increase in household wealth has been shown multiple times and arguably has a larger effect when the wealth accumulation comes from housing compared to other equity types. The recent recession in European house prices may have also dampened the private consumption considerably according to a study by the International Monetary Fund (Case, Quigley, & Shiller, 2005; Cevik & Naik, 2023).

When evaluating the different channels of monetary transmission, most studies have focused on the price effect, as a mechanism of monetary policy transmission. It is however not clear if prices accurately depict the demand for housing in the market, alternatively turnover might offer additional information. Garriga and Hedlund (2020) show that housing liquidity also is contributing to the ability to transmit changes in the lending rate via the household balance sheet. The paper evaluates how the volume of transactions change in response to a monetary policy shock. Hence, only taking both metrics together can represent the current housing dynamics. This thesis also contributes to this strand of literature by investigating how transaction volumes change in response to changes in conventional monetary policy by the ECB.

The wealth effect through the household balance sheet is especially large in countries in which RRE accounts for a large share of the total assets of households. According to the OECD real estate[1] accounts for around 64 percent of overall assets in Germany. For households in the middle and lower brackets of the wealth distribution the share of owner-occupied housing is even more significant than those of the wealthiest households. Individuals on the lower end of the wealth distribution are also those with the highest marginal propensity to consume, thus are more likely to consume additional gains. However, the share of ownership as well as the proportion of overall assets varies strongly between the different states in the Euro Area (EA) (Organisation for Economic Co-operation and Development, 2022). That said, the ECB conducts monetary policy within a single monetary union comprising member states with diverse structural and economic characteristics. Those above mentioned differences contribute to unequal sensitivities of house prices in response to monetary policy (Nocera & Roma, 2017). Consequently, shifts in housing market dynamics and structural features may significantly affect the transmission of policy rate adjustments across the Euro Area. One of those structural features is the composition of who owns and buys property in the RRE sector.

2.2. Institutional investors in the residential housing market

Recent public debates have emerged about the role of institutional investors in the housing market. Yet the academic literature is rather limited in investigating the effects of professional investors participating in the housing market. Until now the majority of available papers have focused on the United States and only limited research is available for European markets. The available literature shows that the presence of institutional real estate investors has been growing very stark in the years before the global financial crisis and has significantly contributed to the boom-bust cycle. In the years after the crisis the activity of large-scale investors has flourished again (Alter & Dernaoui, 2020). Moreover, the presence of those investors in the housing market does contribute to the stark rise in transaction prices (Allen et al., 2018; Lambie-Hanson,

[1]Owner-occupied housing accounts for 43 percent and secondary real estate for 21 percent according to OECD numbers from 2019.

Li, & Slonkosky, 2019). Even if households do not own property and decide to rent their accommodation, they might be affected by the increasing numbers of RRE purchases by professional investors. McCarthy (2024) has shown that such dynamics also lead to increased rent prices in cities. One of the few studies on the European housing market is a recent ECB working paper by Bandoni et al. (2025). Exploring an European transactional data set that captures the presence of institutional investors in eight countries, the authors find similar results as the aforementioned but for the EA. After the financial crisis the number of transactions carried out by large-scale investors has risen sharply. Such presence also leads to an increase in house prices in the Euro Area and decouples those prices from local underlying economic conditions. Using a Bayesian vector autoregression (VAR) model the paper shows that institutional investors do significantly increase the number of residential real estate bought in response to a loosening in the ECB's policy rate. Therefore, those results indicate that the presence of large-scale investors does play a role in the transmission of the European Central Banks monetary policy and moreover the heterogeneity in terms of such presence might be of importance to the decisions undertaken by the ECB.

This thesis builds on those recent findings and contributes to the literature on monetary policy transmission by leveraging a novel dataset of real estate transactions in Germany. By distinguishing between households and institutional investors, the analysis not only examines how monetary policy decisions affect transaction volumes, but also investigates whether these two investor types differ in the magnitude of their responses. Thereby shedding light on the transmission mechanism and how it might differ in regions with a high presence of professional investors. In contrast to Bandoni et al. (2025), the empirical approach does not rely on a VAR framework. Instead, it employs monetary policy surprise shocks to estimate impulse response functions using local projections. This allows for a more flexible analysis and contributes to the growing body of research examining heterogeneity in monetary transmission, particularly in regions with a significant presence of corporate investors. Moreover, the study provides insight into the role of non-bank actors in the transmission process, an area often overshadowed by the focus on household behavior. Finally, uncovering differential responses between individual and institutional investors may yield implications for financial stability.

3. German data on housing and monetary policy

The empirical analysis uses two main data sources. To identify the transactions and their corresponding investors a novel German dataset from 2002 to 2024 is used. Monetary policy shocks need to be exogenous and therefore high-frequency data around the European Central Bank announcement is used to derive surprise shocks.

3.1. Transaction data

Data on residential real estate transactions are obtained through a novel dataset that is derived from administrative records. Micro-level data is available for multiple German cities and few additional administrative districts over multiple decades. In Germany notaries are obligated by law to register purchases of apartments and houses with administrative real estate committees (*Gutachterausschüsse*). Along with the date of purchase, property price and size of the property other characteristics like the type of buyer and seller are recorded in this registry. In a research effort this data was collected from the different committees and was first introduced by Amaral, Dohmen, Schularick, and Zdrzalek (2023). The dataset is further screened and cleaned for transactions that are considered to not represent true market prices as well as outliers in terms of characteristics such as price and size. Not all *Gutachterausschüsse* declare the type of investor that engages in the transaction, which limits the number of cities that can be used for this analysis. Table 1 gives an overview over the cities and regions, along with their time horizons, that are included in the analysis. Moreover, this analysis mainly focuses on apartments rather than single or multi-family houses.

Table 1.: Observation periods and investor structure for apartments by location.

Location	Start Quarter	End Quarter	Transactions	Private (%)	Institutional (%)
Berlin	2002Q1	2024Q1	277,543	95.6	4.4
Bocholt	2009Q1	2024Q2	3,152	91.5	8.5
Bonn	2002Q1	2024Q4	7,040	96.6	3.4
Chemnitz	2002Q1	2024Q4	20,747	83.0	17.0
Dresden	2002Q1	2024Q4	47,353	91.3	8.7
Duisburg	2002Q1	2024Q4	16,769	94.2	5.8
Frankfurt am Main	2002Q1	2024Q4	127,837	97.1	2.9
Hamburg	2002Q1	2024Q4	113,657	96.4	3.6
Karlsruhe	2002Q1	2024Q4	63,275	93.5	6.5
Lübeck	2002Q1	2024Q4	9,309	97.0	3.0
Kreis Mettmann	2002Q1	2024Q4	23,378	96.1	3.9
Rhein-Erft-Kreis	2010Q1	2024Q4	12,398	97.9	2.1
Wiesbaden	2002Q1	2024Q4	29,789	96.0	4.0

Notes: Only real estate that was bought by private individuals or institutional investors is included in the number of transactions. The columns Private (%) and Institutional (%) represent the share of the overall transactions in the corresponding city and time horizon.

3.2. Identification of institutional investors

A key challenge in studying the activities of institutional investors is accurately identifying them. Different definitions across studies make it hard to compare results. For example, Bandoni et al. (2025) use data from Morgan Stanley Capital International and consider non-financial corporations, insurance groups, pension funds, and investment funds as institutional investors. This study differentiates between private individuals and legal entities. In order to justify legal entities as institutional investors, buyers clearly outside this definition are removed. This includes, but is not limited to, public entities, construction companies and social housing associations. A more detailed list on how the type of investor is classified, can be found in the Appendix A. Table 5 in the Appendix gives an overview of which buyers do qualify as private or institutional buyers. Table 6 provides an overview for all investors that did not fit into either category. In all of the following study only private and institutional buyers will be analyzed, however the two types do account for around 98.9 percent of all transactions in the period between 2002 and 2024. However, two limitations remain. On the one hand, *Gutachterausschüsse* often have a different classification system. Some authorities have more granular descriptions than others, they use different groupings and descriptions. On the other hand one large portion of the data is simply classified as legal entity. Even if there is detailed information on other entity types, there is no certainty that private individuals formed a legal entity to purchase an apartment.

3.3. Exploring the novelty of the dataset

In this section the novelty of the dataset will be explored further. Particularly the historical and contemporary dynamics of private individuals and large-scale investors will be examined. Figure 1 displays the spatial distribution of the available transactions. With Berlin, Hamburg and Frankfurt am Main three of the five largest cities in Germany are represented in this sample. The eleven cities and two rural districts represent around 11.5 percent of the overall population of Germany.

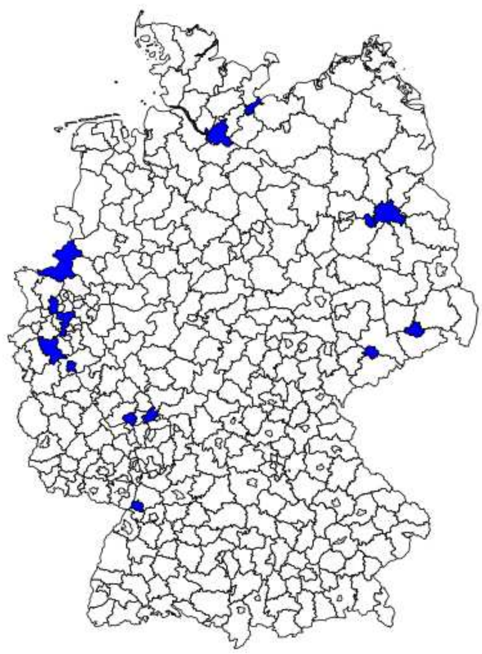


Figure 1.: Geographical distribution of the observations.[2]

Focusing mainly on cites might neglect the dynamics that unfold in more rural areas of the country. However other studies also find that the majority of the large-scale investor activity focuses on large cities (McCarthy, 2024). The paper by Bandoni et al. (2025) also confirms this for

[2] In this depiction, Bocholt is represented by the entire rural district of Borken.

Germany along with the fact that the concentration of institutional buyers is larger in the north than in the south. One exception being the city of Munich. This novel dataset shows a particularly high presence of institutional buyers in East Germany, which is represented with the cities of Chemnitz and Dresden. Looking at the historical development of transactions in the housing market, one can draw the same picture as already described in the literature part of this paper. Purchases by private individuals have seen a steady growth until 2016, with a following decline until the second quarter of 2020. Afterwards the transaction volume increased rapidly after the COVID-19 pandemic and then declined even more sharply as funding costs increased. Over the last two years, transaction volumes remained low, coinciding with a decline in residential real estate prices in Germany.

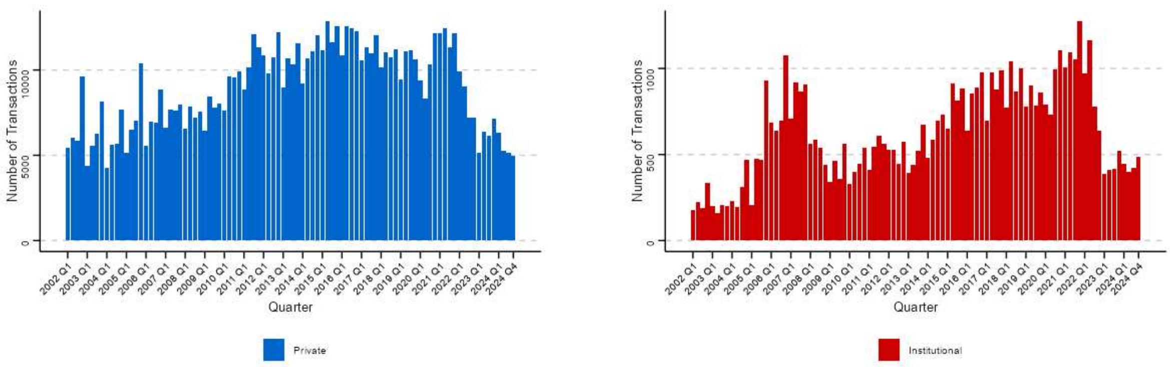


Figure 2.: Quarterly purchases of residential apartments by investor type.

Transactions carried out by institutional investors have been more dynamic over the years. In the first years of the time series the number of purchases was quite low, however during the build-up of the global financial crisis legal entities increased their activity on the housing market. In the aftermath the number of transactions decreased significantly and since then steadily rose again. Around the 2021 and 2022 purchases by professional investors reached a new all time high, which quickly turned into a downturn as borrowing costs rose again. Figure 2 illustrates how institutional buyers reaction was pronounced during large events like the mortgage crisis in the beginning of this century. Both types of buyers have reacted to the recent hike in interest rates, however the reduction in purchases is more pronounced for large-scale investors. This trend is also true for the share of overall transactions as visible in Figure 3. Before the housing bubble collapsed, which resulted in the great financial crisis, institutional investors accounted for more than ten percent of the overall apartments being purchased. As a consequence of the recession, the share halved in a short period and then also started to rise continuously after 2013. In line with the total numbers of apartments being purchased by professional investors, the share also decreased massively, when the European Central Bank increased borrowing costs. The change in relative purchases is due to the fact that institutional buyers reacted more strongly during those times. During the most recent quarters the share rose again, as the total purchases by professional investors were stagnant and private households even bought less real estate.

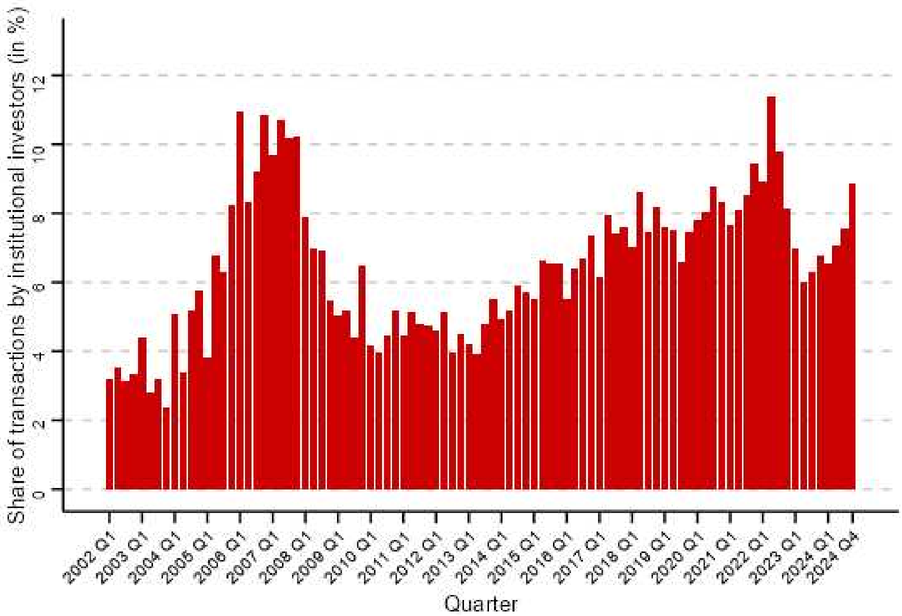


Figure 3.: Quarterly share of apartments being purchased by institutional investors. The share is calculated as the percentage of purchases by institutional investors relative to total private and institutional transactions.

Volatility in quarterly purchases is not the only aspect in which the two investor types differ. The average home that a private individual bought over the sample period is between 83.6 m^2 and 123.7 m^2. This is by far larger than their large-scale counterpart which buy on average apartments between 56.4 m^2 and 79.3 m^2. Both groups experience a trend towards smaller apartments being purchased over the years. On a price-per-square-meter basis both investor types spend more over the years, however this trend is mainly driven by the strong increase in market prices. Yet, when examining the price per square meters it is very apparent, that private investors seem to pay a premium on average. However, as this analysis does not take into account the condition of the apartment, the amenities or other characteristics, it is not possible to make any conclusive analysis around a price premium.

Figure 4.: Despite the volatility in the data for institutional investors, private individuals seem to pay more per square meter on average.

To compare how the number of transactions have evolved together with the development over time, Figure 5 uses for the charts on top the German Real Estate (GREIX) index. This index is provided by the Kiel Institute for the World Economy and is computed as a hedonic price index which utilizes the same transaction dataset as this thesis.[3] The number of apartments purchased by institutional investors seem to follow the same trend as the price index after the great financial crisis, through which prices were rather stagnant. Moreover, purchase volumes by institutional investors are more strongly correlated with apartment prices than those by private individuals. From the two figures on the bottom, it is clearly visible that interest rates and thus financing costs do play an important role in the housing market. Especially the low interest rate environment since 2014 was accompanied by a rise in in the number of transactions as well as apartment prices.

However, transaction volume are not only influenced by interest rates and interest rates are also influenced by the overall market dynamics. Hence, it is not possible to make causal interpretations from looking at how interest rates move together with housing liquidity. Thus, the

[3]More information on the GREIX and how the hedonic index is constructed can be found under www.greix.de.

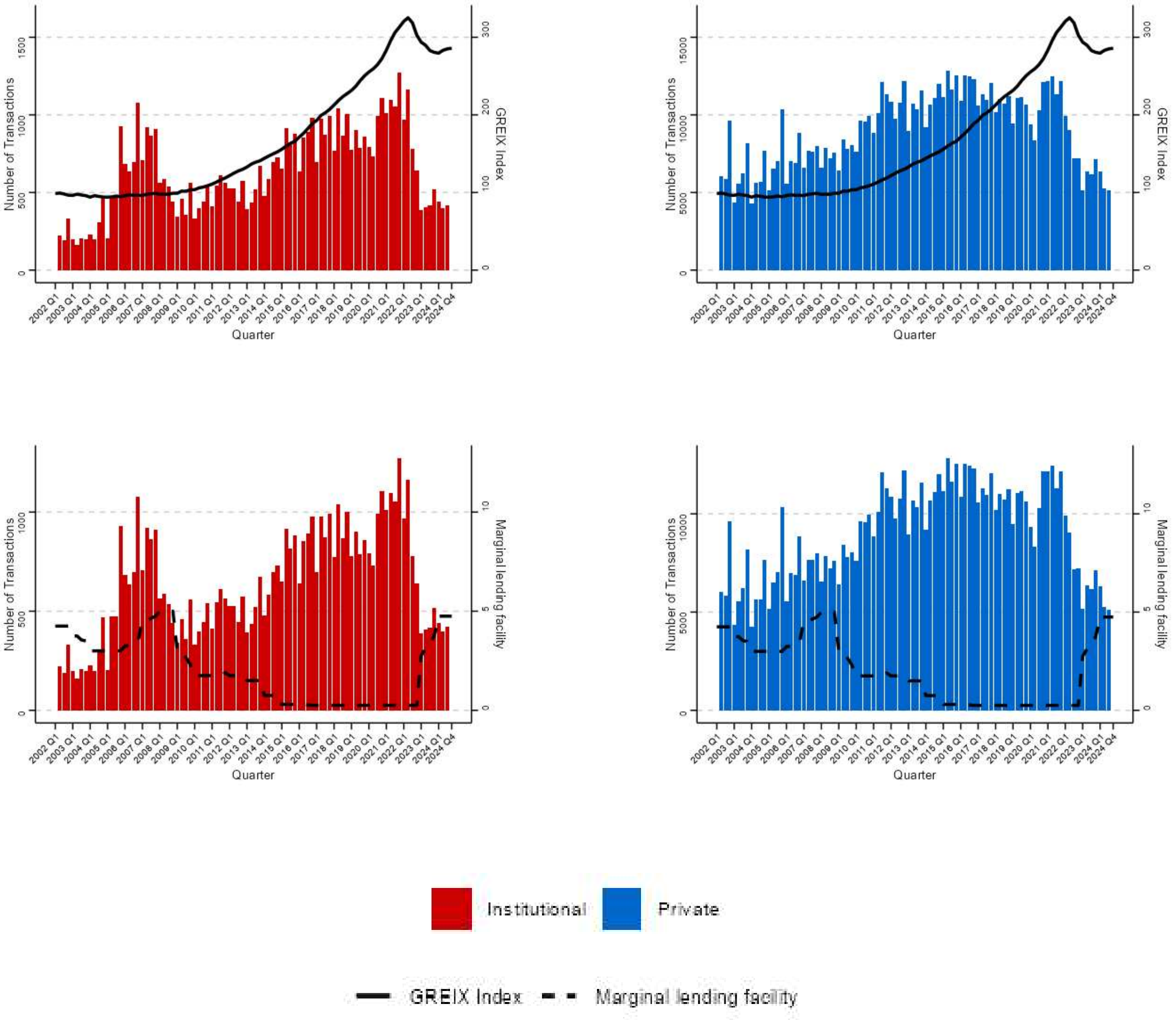


Figure 5.: Comparing the number of transactions with the growth of apartment prices in Germany on the top. The dashed line on the bottom represents the marginal lending rate (quarterly averaged) by the European Central Bank.

next section introduces data on monetary policy surprise shocks, which are orthogonal to the number of transactions, which can therefore be utilized in the local projection analysis.

3.4. Monetary policy surprise data

The European Central Bank is likely to take developments in the housing market into account when setting monetary policy. This interdependence may give rise to endogeneity concerns in the empirical analysis. To address this issue, the identification strategy employs high-frequency financial market data to isolate monetary policy surprise shocks, which are plausibly exogenous.

This approach builds on a well-established literature using high-frequency identification techniques to capture unexpected components of monetary policy decisions (Gertler & Karadi, 2015; Kuttner, 2001). One of the most prominent datasets on high-frequency data is from Altavilla et al. (2019), in which changes to different asset prices in a 30 minute period around the monetary policy announcement is measured. These changes are then termed monetary surprise shock, as this reaction captures the degree to which the change in the interest rate was not already reflected by the markets. In this thesis, data from Jarociński and Karadi (2020) is used, who build on the policy shocks of Altavilla et al. (2019). To capture monetary policy surprises across multiple maturities rather than focusing on a single asset horizon, the authors construct a composite surprise measure based on changes in overnight index swap (OIS) rates of varying maturities.[4] To combine the different maturities into a single measure, a weighted average is computed using principal component analysis. The authors then disentangle the surprise shock into a pure monetary policy shock and an information shock, adding to Nakamura and Steinsson (2018) who argue that policy announcement might contain information about the economic situation. Bauer and Swanson (2023) however argue that surprises reflect solely monetary policy shocks. Besides that, Nakamura and Steinsson (2018) assume that even without accounting for the information shock the monetary policy surprise identified by high-frequency data is orthogonal to information conveyed by central banks. Therefore this study also uses the general policy surprise as the shock for the local projection. Data from Jarociński and Karadi (2020) is provided on a daily basis on which a General Council meeting was conducted. This analysis is done on a quarterly basis, hence the shocks are aggregated by weighting them depending on the day the General Council meeting took place. This approach follows Ottonello and Winberry (2020) and exact aggregation formula is outlined in Meier and Reinelt (2024) as

$$\varepsilon_t^{\mathsf{MP}} = \sum_{\tau \in D(t)} \phi(\tau)\, \varepsilon_\tau^{\mathsf{MP}} + \sum_{\tau \in D(t-1)} \left(1 - \phi(\tau)\right)\, \varepsilon_\tau^{\mathsf{MP}}, \tag{1}$$

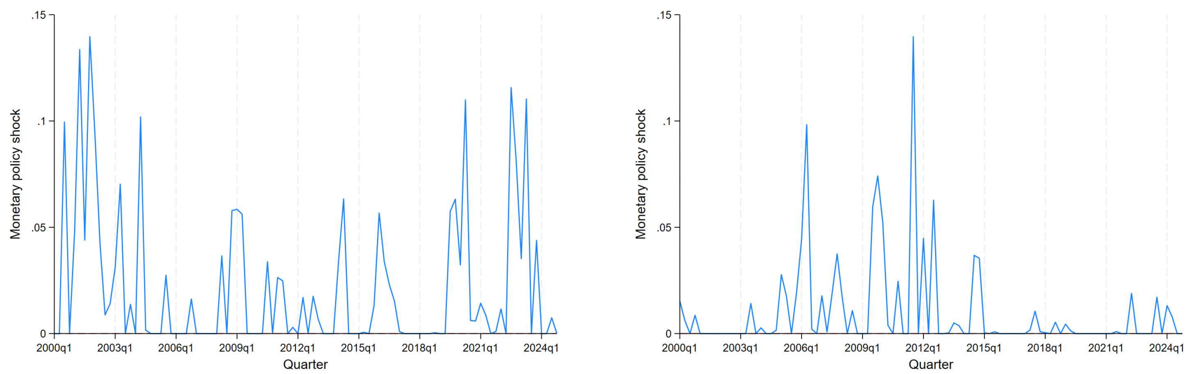
where ϵ_t^{MP} indicates the quarterly monetary shock. The shock on the day of the meeting is denoted by $\epsilon_\tau^{\mathsf{MP}}$. The number of days in quarter t is denoted by $D(t)$. Each shock is therefore

[4] Jarociński and Karadi (2020) incorporate OIS rates with maturities of one, three, and six months, as well as one year.

weighted by $\phi(\tau)$, which is defined as

$$\phi(\tau) = \frac{\text{remaining number of days in quarter } t \text{ after announcement in } \tau}{\text{total numbers of days in quarter } t}. \tag{2}$$

Figure 13 in Appendix A shows the quarterly monetary policy surprise shock in the Euro Area between the first quarter of 2000 and the fourth quarter of 2024. The blue line depicts the simple surprise in the policy indicator for the time window around the monetary event window and the red line the surprise for which the information effect is removed. Aastveit and Anundsen (2022) find evidence that monetary tightening has a much smaller effect on house prices compared to a loosening in financial conditions. Other studies find rather contradictory effects in terms of the monetary policy shock direction. Angrist, Jordà, and Kuersteiner (2018) suggest in their paper that a decrease in the policy rate has a weaker effect on the economic activity compared to a hike in interest rate and its dampening effect. Nevertheless, both findings indicate an asymmetric effect in the nature of central bank policy changes. Therefore this asymmetry should also be accounted for in this analysis. Hence, the monetary policy shock will be disentangled into a positive and a negative shock series. This implies that shocks with the opposite sign are replaced with zero. Figure 6a depicts the time series for the positive shocks and Figure 6b illustrates the negative shocks.



(a) Positive monetary surprise shocks.

(b) Negative monetary surprise shocks.

Figure 6.: Monetary surprise shocks based on high-frequency data.

4. Methodology

The econometric framework employed in this analysis builds on the methodology introduced by Jordà (2005), who proposes estimating impulse response functions through local projections. This approach entails running separate regressions for each forecast horizon. In contrast to vector autoregressive (VAR) models, local projections offer increased robustness to model misspecification and provide greater flexibility in accommodating nonlinearities and state-dependent dynamics. Although the estimation techniques of local projections and VARs differ, Plagborg-Møller and Wolf (2021) show that, under correct specification, both approaches yield asymptotically equivalent impulse responses. This study exploits this framework by using orthogonalized Euro Area monetary policy shocks as an exogenous treatment to identify the dynamic response of different investor types with respect to transaction volume. To capture heterogeneity across buyer groups, the analysis employs a state-dependent local projection specification of the following form:

$$
\begin{aligned}
\ln(y_{i,t+h}) - \ln(y_{i,t-1}) = c_i^h + \sum_{k=0}^{K} \left[\beta_k^h \hat{p}_{t-k}^{MP}(1 - g_{i,t-k}) + \gamma_k^h \hat{p}_{t-k}^{MP} g_{i,t-k}\right] \\
+ \sum_{k=1}^{K} \alpha_k^h \ln(y_{i,t-k}) + \delta^h X_{i,t}' + \varepsilon_{i,t+h}^h
\end{aligned}
\tag{1}
$$

The outcome variable of interest is the cumulative difference in the number of transactions since the shock occurred. Hence, the independent variable is given by $\ln(y_{i,t+h}) - \ln(y_{i,t-1})$. City fixed effects are represented by c_i^h and the monetary surprise shocks are given by $\hat{p}_t^{MP}$. To differentiate between the type of buyer the dummy variable $g_{i,t}$ is included. This variable equals zero for institutional investors and one for households. Hence, β^h represents the effect of monetary policy on the purchase volume of legal entities and γ^h the effect for private individuals. As control variables, the model includes the lagged number of transactions to control for recent trends and the control variable matrix $X_{i,t}$, which includes an apartment price index[5] and long-term future interest rate expectations[6]. An indicator for the corresponding quarter is incorporated to account for seasonal effects and corresponding tax advantages, which might affect the timing when properties are being bought. Important to mention is that the control variables contribute only marginally to the regression, as the monetary policy shocks are orthogonal to the transaction volumes of both buyer types. The number of lags[7] are represented by $k = 4$, which is equivalent to one year and the horizon length[8] is given by $h = 0, ..., 12$. For the robustness checks, alternative specifications will be considered with regard to time horizons, the time span of the underlying data. These adjustments will be discussed in greater detail in the respective section.

[5] German Real Estate Index
[6] 10-year yield of AAA-rated Euro Area bonds
[7] Expressed in quarters
[8] Expressed in quarters

5. Empirical results

To analyze the impact of monetary policy on transaction volumes for each investor type, impulse responses are estimated using local projections. As discussed in Chapter 3 a positive and a negative shock of one percentage point in the interest rate is being simulated. Results that are presented in this section are referred to as the base model results, as they serve as the foundation for the analysis.

Figure 7 shows the cumulative impact of a positive monetary policy shock on the left-hand side. Private households are represented by the blue dashed line, while the red solid line represents legal entities. These functions depict the cumulative percentage change in the number of transactions.

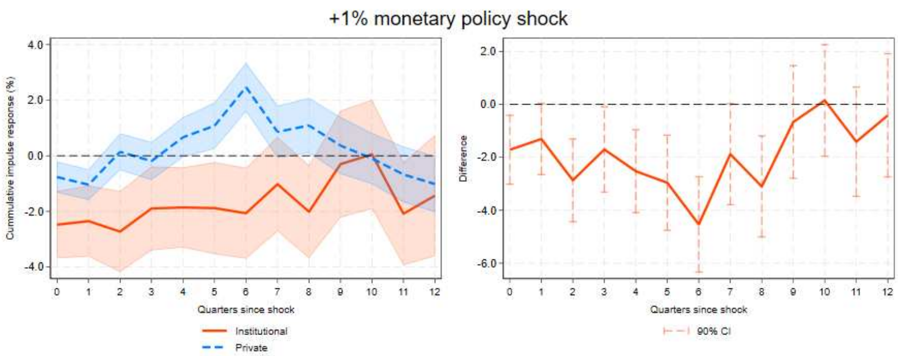


Figure 7.: Impulse response functions for a 1% increase in the exogenous monetary policy rate. The shaded area represents the 90% confidence interval.

The results for private households are generally statistically insignificant and fluctuate around the horizontal zero-percent line. Institutional investors, on the other hand, react immediately to a rise in funding costs. This impact can be quantified at above two percent and gradually decreases over the subsequent time horizons. Effects for institutional investors are statistically significant up to the sixth horizon, which corresponds to one and a half years after the shock. This indicates that institutional investors respond to increases in the borrowing rate set by the European Central Bank. In contrast, private individuals purchasing apartments appear not to react to such a hike in interest rates. On the right-hand side of Figure 7, the difference between the two investor types is displayed. Up to the eighth horizon, most of these differences are statistically significant at the 90 percent confidence level. This suggests a statistically meaningful divergence in behavior between the two groups of buyers. As illustrated in Figure 8, a one percentage point expansionary monetary policy shock leads to a similar pattern.

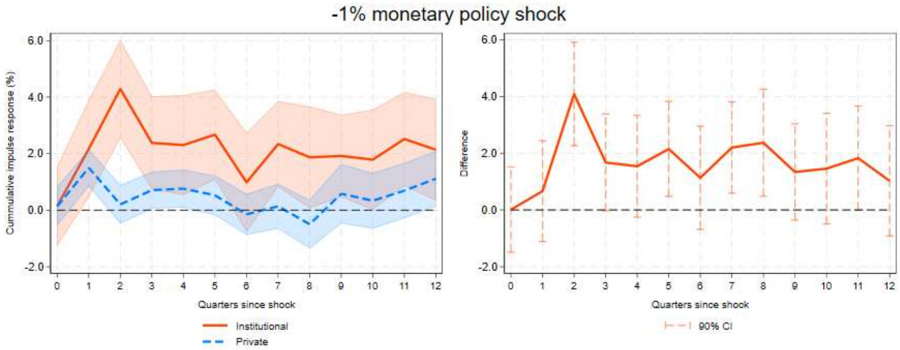


Figure 8.: Cumulative impulse response functions for a 1% decrease in the exogenous monetary policy rate. The shaded area represents the 90% confidence interval.

On the left hand side we can again observe that the line indicating the cumulative change in the number of apartments purchased by households is again largely insignificant over the span of three years after the shock. Therefore, it can be concluded that individuals do not react to a decrease in the borrowing costs. Legal entities that invest in German apartments, however, increase the volume of transactions in response. Different from the scenario of monetary tightening, the immediate response is close to zero and not significant. In the subsequent time horizons the cumulative effect amplifies to over four percent and is statistically significant. This is followed by a continuous decrease in the response magnitude. The right-hand plot shows, however, that the difference between the groups is not statistically significant.

The main effects of the local projection across all time horizons are presented in Table 2 and Table 3. Full regression output tables for the base model, including control variables, can be found in Appendix B, specifically in Tables 10–22. In summary, the findings from both impulse response functions lead to the following conclusions. Private households tend not to react to

Table 2.: Base Model Summary: Horizons 0–6

Variable	H=0	H=1	H=2	H=3	H=4	H=5	H=6
Positive shock$_t$	-0.76**	-1.04***	0.15	-0.19	0.67	1.08**	2.47***
Buyer type	0.16***	0.21***	0.27***	0.27***	0.31***	0.30***	0.29***
Positive shock$_t$ × Buyer type	-1.71**	-1.31	-2.87***	-1.71*	-2.53***	-2.96***	-4.53***
Positive linear combination	-2.47***	-2.35***	-2.72**	-1.90*	-1.86**	-1.88**	-2.06***
Negative shock$_t$	0.13	1.50***	0.21	0.71*	0.76*	0.53	-0.15
Negative shock$_t$ × Buyer type	0.01	0.66	4.09***	1.67	1.54	2.15**	1.13
Negative linear combination	0.14	2.16**	4.30***	2.38*	2.30**	2.68***	0.98
Observations	2130	2104	2078	2052	2026	2000	1974
R-squared	0.36	0.34	0.35	0.30	0.35	0.36	0.37

Notes: The coefficients of the main effects and their linear combinations are displayed.
Linear combinations: Positive = Positive shock$_t$ + Positive shock$_t$ × Buyer type; Negative = Negative shock$_t$ + Negative shock$_t$ × Buyer type.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 3.: Base Model Summary: Horizons 7–12

Variable	H=7	H=8	H=9	H=10	H=11	H=12
Positive shock$_t$	0.86	1.09*	0.37	-0.10	-0.67	-1.01*
Buyer type	0.26***	0.27***	0.30***	0.34***	0.45***	0.50***
Positive shock$_t$ × Buyer type	-1.88	-3.10***	-0.67	0.15	-1.41	-0.42
Positive linear combination	-1.01	-2.01**	-0.30	0.05	-2.08**	-1.43*
Negative shock$_t$	0.14	-0.50	0.58	0.34	0.69	1.12*
Negative shock$_t$ × Buyer type	2.20**	2.37**	1.34	1.45	1.83*	1.02
Negative linear combination	2.34**	1.87	1.92	1.79	2.52**	2.14**
Observations	1948	1922	1896	1870	1844	1818
R-squared	0.33	0.37	0.41	0.39	0.39	0.41

Notes: The coefficients of the main effects and their linear combinations are displayed.
Linear combinations: Positive = Positive shock$_t$ + Positive shock$_t$ × Buyer type; Negative = Negative shock$_t$ + Negative shock$_t$ × Buyer type.
Significance levels: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

changes in conventional monetary policy, regardless of the shock direction. Institutional investors in Germany, on the other hand do adjust their buying behavior in the residential real estate market following changes in the ECB's lending rate. Legal entities do so by increasing (decreasing) the transaction volume after an expansionary (restrictive) monetary policy shock. Additionally the findings quantify those changes and show that large-scale investors do react more strongly to a loosening of conventional monetary policy. At its peak, the cumulative change is nearly twice as large compared to the case of a positive shock. However, although the overall cumulative reaction is more pronounced, different to positive shock, the effect of accommodative monetary policy is not immediate.

6. Robustness check

To ensure the robustness of the results, a different shock series is first computed. In Chapter 3 the construction of the monetary policy shocks is outlined. Jarociński and Karadi (2020) use the overnight index swaps with different maturities, which represent lending over a rather short time period. Institutional investors, as well as other residential property buyers, generally finance acquisitions over longer horizons. Government bond yields do reflect such long term interest rate horizons. Hence, changes in German government bond yields may serve as an alternative measure for constructing monetary policy shocks. Using the dataset from Altavilla et al. (2019) such an alternative metric is constructed. Weighted averages of the two-, five-, ten-, and twenty-year yields are constructed, with weights derived from a principal component analysis, following the methodology of Jarociński and Karadi (2020).

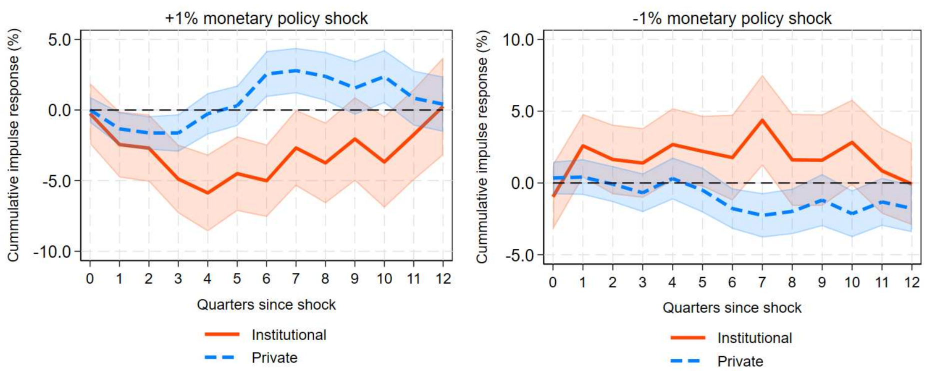


Figure 9.: Visualization of local projection estimates using monetary policy shocks identified through variations in German government bond yields. Shaded area represents the 90% confidence interval.

Figure 9 illustrate the results with the high-frequency data of German bond yields. Private individuals again do not react significantly to either the loosening or the tightening of monetary policy. Institutional investors decrease the transaction amount after a rate hike significantly over multiple horizons. Interestingly this response is even more pronounced than in the base model, although the effect is not immediate following the policy change. However, the right-hand panel shows that a decrease in the ECB's policy rate does not lead to a statistically significant increase in the transaction volume of institutional investors.

Another robustness check is performed around the type of residential housing. Thus far, the analysis has focused on apartments, as this is the most prominent type of property in cities and therefore the primary focus of institutional investors in Germany. To control for other segments this robustness check also includes transactions of multi-family (MFH) and single-family houses (SFH). Figure 10 depicts the local projection results after combining all three property types. Moreover, in the Appendix C a combined result for MFH and SFH is depicted. From examining both results, it is clear that while an increase in the monetary policy rate decreases the number of transactions, in the case of monetary loosening, the results are significant only for some horizons. Again, private individuals do not react to either a positive nor a negative shock in the interest rate set by the ECB.

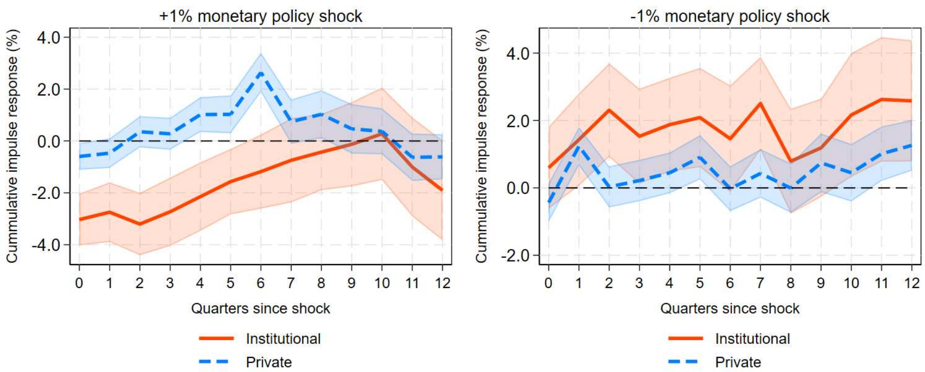


Figure 10.: Local projection estimation based on transactions of all housing segments (apartments, single-family and multi-family houses). Shaded area represents the 90% confidence interval.

To also check for differences over time, two time periods are chosen, for which local projections are estimated separately. The first period starts in 2002 and ends in 2014, which includes the great financial crisis, while excluding the COVID-19 and the inflationary period of the recent years. The second time frame is overlapping, starting in 2012 and ending in 2024.

Across all four regression models, the results consistently indicate that private investors do

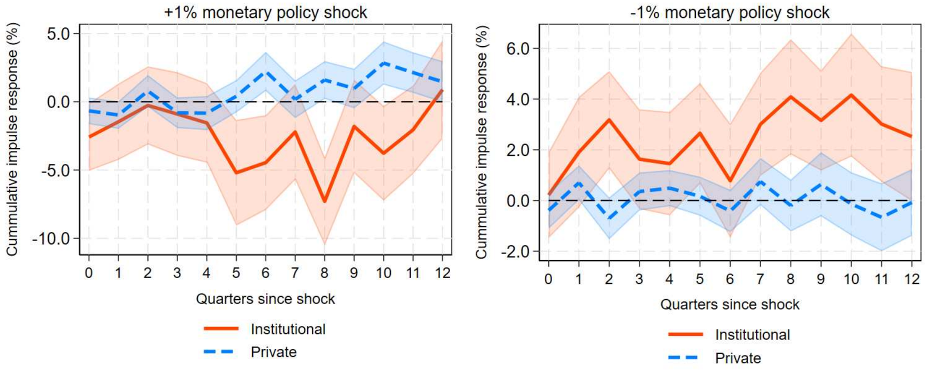


Figure 11.: Local projection estimation based on data from 2002-2014. Shaded area represents the 90% confidence interval.

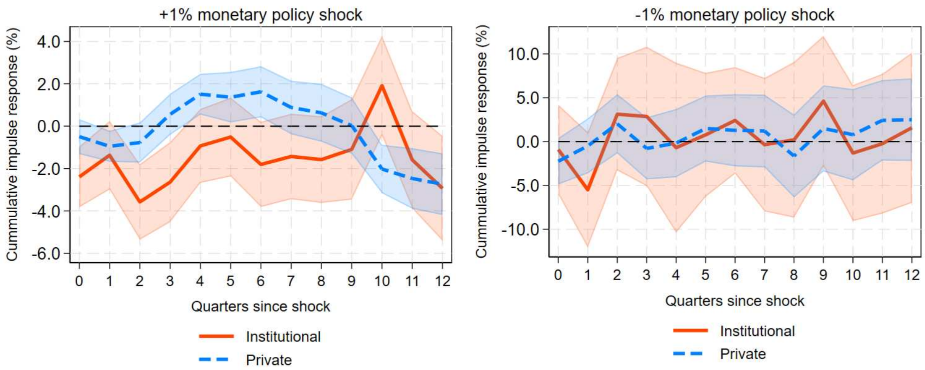


Figure 12.: Local projection estimation based on data from 2012-2024. Shaded area represents the 90% confidence interval.

not adjust their purchasing behavior in response to monetary policy shocks, regardless of the time horizon. Institutional investors, in contrast, show some sensitivity to changes in interest rates, although these effects are only statistically significant in the earlier period. As shown in Figure 12, even institutional investors exhibited no significant response to monetary policy changes between 2012 and 2024. This lack of significance compared to the baseline model may be attributed to the smaller sample size. The weaker reactions observed in the later period—particularly in response to accommodative shocks—likely reflect the low interest rate environment that prevailed between 2014 and 2022, when policy rates were constrained by the effective lower bound, and overall financing conditions remained favorable. These findings suggest that both the timing of monetary shocks and the broader interest rate regime in which they occur influence investor responses. Future research should explore how transmission mechanisms vary under different monetary policy conditions.

Overall, the robustness checks support the core findings. Private households do not react and although the responses are mutated, delayed, or institutional investors do alter the number of transactions in response to monetary policy decisions. Thus, institutional investors drive the asymmetric transmission of monetary policy.

7. Conclusion

This thesis examined how different types of investors respond to changes in conventional monetary policy in the German residential real estate market. Transactional micro-data from the German housing market makes it possible to identify the buyer types. Leveraging those observations together with exogenous monetary policy shocks from Altavilla et al. (2019), impulse response functions are estimated by using local projections as introduced by Jordà (2005). The analysis finds statistically significant evidence that institutional investors modify the number of residential real estate transactions. Expansionary monetary policy leads to an increase in purchases, while a hike in the policy rate leads large-scale investors to retract from investing in residential property. Furthermore, the accumulated effect is even more pronounced in the case of accommodative policy events. In contrast, private investors in Germany do not adjust the number of transactions in response to changes in the European Central Bank's interest rate, whether the shock is positive or negative. These findings suggest that, unlike institutional investors, private households do not view real estate purely as an investment asset. Moreover, the results contradict the transmission mechanism literature in the case of private buyers, as interest rate changes do not appear to increase or decrease their demand. For institutional investors, however, this relationship holds, highlighting a clear heterogeneity in behavior between the two groups. Therefore, this thesis contributes to the literature on monetary policy transmission through the housing market, with a particular focus on the amplifying effect that the growing presence of institutional investors may have. This is especially relevant when considering how these large-scale investors can influence demand for residential real estate through the direct interest rate channel of monetary policy transmission. Moreover, the findings of this thesis are consistent with those of Bandoni et al. (2025), who use an Euro Area dataset. Using a vector autoregression model, the authors also find that a drop in the policy rate leads to an increase in the number of transactions by institutional investors. The novelty of this thesis lies in its comparison between professional investors and private households. While the differences are not statistically significant across all time horizons, the results clearly show that institutional investors adjust the number of apartments they purchase, whereas private households do not change their buying behavior.

The policy implications of these findings are far reaching. When evaluating how monetary policy is transmitted, central banks should take into account who is actually active in the real estate market and how that mix is changing. Due to the high degree of heterogeneity in the Euro Area, in which the presence of institutional investors has risen strongly, this is especially important for the European Central Bank. For instance, a monetary tightening may disproportionately reduce housing market activity if institutional investors retreat rapidly, potentially exacerbating economic downturns. Additionally, this dataset has shown the growing presence of legal entities in the residential real estate market. Funding for those investors often stem from non-bank lending and therefore is not subject to loan-to-value regulations (Muñoz, 2020). Central banks will be tasked to mitigate systemic risks by potentially implementing macroprudential policies, particularly if the share of large-scale investors rises.

Looking ahead, future research could benefit from expanding the geographic scope to more regions in Germany. Especially the differences between metropolitan areas and rural regions in terms of institutional investor presence would be insightful. The robustness checks of this thesis did not find significant results during the 2012-2024 subsample, which is characterized by the low interest rate environment. Hence, research could look into the differences during different interest rate regimes.

In conclusion, this thesis shows that the housing market does not respond uniformly to changes in monetary policy. Institutional investors tend to amplify these effects, while private households remain relatively unresponsive. Acknowledging and accounting for this behavioral divide is crucial for designing effective policies in both the housing and financial markets.

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A. Appendix: Data

This section of the appendix describes the data in more detail. Table 4 describes the sources of data that was used for the estimation of the impulse response function. Table 5 and Table 6 provide and overview of how buyers were classified into private and institutional investors. Table 7 summarizes the data and Figure 13 is a graph of the monetary policy shocks, without deconstructing them into positive and negative shocks.

Table 4.: Overview of data sources

Variable	**Source and Description**
Number of transactions	Derived from the micro-dataset of residential real estate transactions in Germany and was first introduced by Amaral et al. (2023). For the local projection this variable is logarithmized.
Buyer type	Differentiates between private buyer and institutional investor for each transaction in the micro-dataset introduced by Amaral et al. (2023). Detail on how the category institutional investors, was defined can be found in Table 5.
Monetary policy shock	Changes in market variables from Altavilla et al. (2019) and principal component of shock calculated as in Jarociński and Karadi (2020). For the base model overnight index swaps of maturity 1, 3, 6 month and 1 year is used.
Apartment price index	German Real Estate Index (GREIX) is a hedonic transaction price index, which is described in Amaral et al. (2023).
Euro Area bond yields	AAA rated government bond yield from the Euro Area with 10-year maturity. Obtained from the European Central Bank Data Portal.

Notes: More information on the policy shocks can be found in the following GitHub repository: `https://github.com/marekjarocinski/jkshocks_update_ecb`. Data on the GREIX can be downloaded under: `https://greix.de/`. Link to the Data on EA bond yields: `https://data.ecb.europa.eu/data/datasets/YC/YC.B.U2.EUR.4F.G_N_A.SV_C_YM.SR_10Y`

Table 5.: Overview of how private buyers and institutional investors were classified

Final classification	Original classification	Region/City
Private	Privat	Berlin, Bocholt, Bonn, Chemnitz, Dresden, Duisburg, Frankfurt am Main, Rhein-Erft-Kreis
Private	Natürliche Person	Frankfurt am Main, Hamburg, Karlsruhe, Leipzig, Lübeck, Kreis Mettmann, Wiesbaden
Institutional investor	Wohnungsunternehmen	Berlin, Bonn, Chemnitz, Frankfurt am Main, Hamburg, Leipzig, Lübeck, Kreis Mettmann, Rhein-Erft-Kreis, Wiesbaden
Institutional investor	Wohnungsgesellschaft	Bocholt, Dresden, Duisburg, Frankfurt am Main, Rhein-Erft-Kreis
Institutional investor	Freies Wohnungsunternehmen	Bocholt, Karlsruhe
Institutional investor	Versicherung	Berlin, Bocholt, Dresden, Duisburg, Rhein-Erft-Kreis
Institutional investor	Bank	Bocholt, Dresden, Duisburg, Frankfurt am Main, Rhein-Erft-Kreis
Institutional investor	Immobilienfond	Berlin, Bonn, Bocholt, Frankfurt am Main
Institutional investor	Firma	Bocholt, Bonn, Dresden, Duisburg, Frankfurt am Main, Rhein-Erft-Kreis
Institutional investor	Juristische Person des privaten Rechts	Chemnitz, Leipzig, Lübeck, Kreis Mettmann, Wiesbaden
Institutional investor	Sonstige juristische Person	Frankfurt am Main, Hamburg, Karlsruhe, Leipzig, Lübeck, Kreis Mettmann, Rhein-Erft-Kreis, Wiesbaden
Institutional investor	Körperschaft des privaten Rechts	Rhein-Erft-Kreis

Notes: All original classifications are cleaned and aggregated for spelling mistakes and are written in German. Translation to English can be found here: Privat = private; Natürliche Person = Natural person; Wohnungsunternehmen = Housing company; Wohnungsgesellschaft = Housing association; Freies Wohnungsunternehmen = Independent housing company; Versicherung = Insurance group; Bank = Bank; Immobilienfond = Real estate fund; Firma = corporation; Juristische Person des privaten Rechts = Legal entity under private law; Sonstige juristische Person = Other legal entity; Körperschaft des privaten Rechts = Corporation under private law

Table 6.: Types of buyers that were excluded in the analysis, as they did not fit into either the private nor institutional investor category.

Buyer Type (English)	Original (German)
Civil-law partnership	Gesellschaft bürgerlichen Rechts
Federal government	Bund
Federal state	Land
District (Landkreis)	Landkreis
City	Stadt
Municipality	Kommune
Municipality	Gemeinde
District (Kreis)	Kreis
Public Berlin entity	Untern. an denen Land Berlin unmittelbar beteiligt ist
Other public authority	Sonstige öffentliche Hand
Municipality association	Gemeinde oder Gemeindeverband
Public authority	öff.Hand
Other federal state	Sonstiges Bundesland
State-owned housing company	Landeseigene Wohnungsunternehmen
County/municipal association	Kreis, Gemeinde oder Gemeindeverband
Public sector	Öffentliche Hand
Agricultural cooperative	Agrargenossenschaft
Development agency	Entwicklungsgesellschaft
Heirs' association	Erbengemeinschaft
Church	Kirche
Religious or philanthropic foundation	Kirche(n), Religionsgemeinschaften, Stiftung(en)
Association	Verein
Neighbor	Nachbar
Other	Sonstige
Other public corporation	sonstige Körperschaft d. öffentl. Rechts
Non-profit housing company	Gemeinnütziges Wohnungsunternehmen
Non-profit housing company	Gemeinnützige Wohnbaugesellschaft
Natural and legal persons	Natürliche und juristische Personen
Tenant/leaseholder	Pächter
Religious/charitable institutions	Stiftungen, Kirchen
Housing cooperative	Wohnungsgenossenschaft
Procedural carrier	Verfahrensträger
Diplomatic mission	Diplomatische Vertretung
Heavy industry	Großindustrie
Insolvency administrator	Konkursverwalter
Housing developer	Bauträger

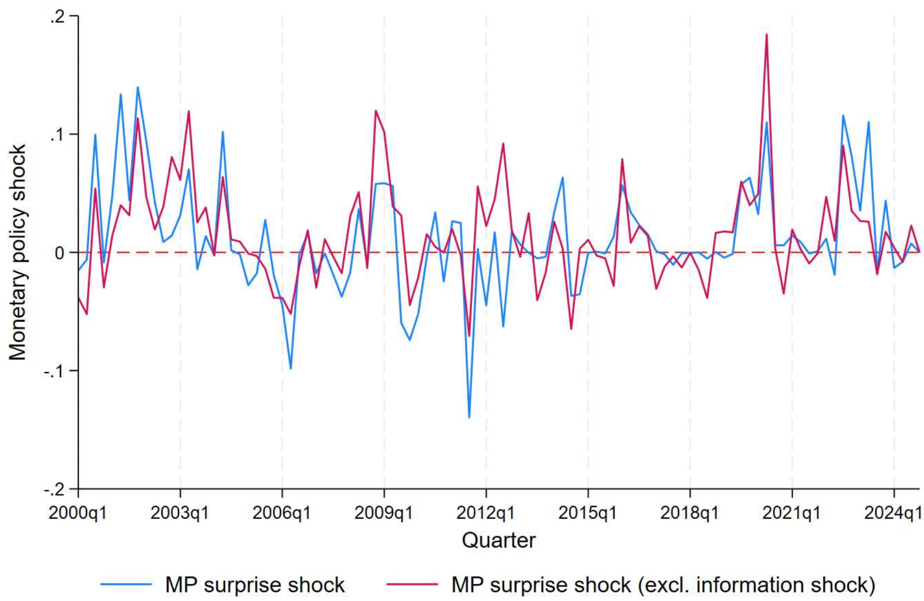
Notes: Spelling errors have been corrected, and similar classifications have been aggregated where doing so does not alter the overall interpretation or introduce ambiguity. Majority of those observations where clearly not part of private nor institutional buyers, for others the classification was not clear and had therefore be removed.

Table 7.: Summary statistics of the panel dataset

Variable	N	Mean	Median	SD	Min	Max
Number of transactions	2,260	332.85	76.5	687.17	1	5,381
Number of transactions (institutional)	1,130	31.63	10	48.81	1	404
Number of transactions (private)	1,130	633.01	270	871.96	6	5,381
Monetary policy shock (positive)	2,260	0.019	0.001	0.029	0	0.116
Monetary policy shock (negative)	2,260	-0.010	0	0.023	-0.140	0
GREIX	2,260	171.09	144.07	76.70	93.99	325.09
10-year Yield	2,260	2.02	1.90	1.66	-0.534	5.17

Notes: This table shows summary statistics for the main variables used in the analysis. SD = Standard deviation. GREIX = German Real Estate Index. The summary statistic represents the panel dataset, where there are two entries (institutional, private) per city and quarter.

Figure 13.: ECB's General Council meeting monetary policy surprise.



B. Appendix: Base model

This section of the appendix provides the detailed results of the base impulse response function that is outlined in Chapter 4.Tables Table 8 and Table 9 present the combined effects of positive and negative shocks, respectively, on institutional buyers. Table 10 to Table 22 give a more detailed overview of the regression results for each time horizon. Those results give a detailed overview of what is discussed in Chapter 5 and Chapter 7, showing that institutional investors do react to monetary policy shocks, while households do not adjust their buying behavior.

Table 8.: Linear Combinations: Positive Shocks

Linear Combination	**Coefficient**	**Std. Error**	**t**	**p-value**	**90% CI**
$\text{PosSh}_{h=0} + \text{PosSh}_{h=0} \times \text{BType}$	-2.476***	(0.734)	-3.37	0.001	[-3.684, -1.267]
$\text{PosSh}_{h=1} + \text{PosSh}_{h=1} \times \text{BType}$	-2.347***	(0.777)	-3.02	0.003	[-3.626, -1.068]
$\text{PosSh}_{h=2} + \text{PosSh}_{h=2} \times \text{BType}$	-2.723***	(0.885)	-3.08	0.002	[-4.180, -1.267]
$\text{PosSh}_{h=3} + \text{PosSh}_{h=3} \times \text{BType}$	-1.892**	(0.917)	-2.06	0.039	[-3.402, -0.383]
$\text{PosSh}_{h=4} + \text{PosSh}_{h=4} \times \text{BType}$	-1.856**	(0.876)	-2.12	0.034	[-3.296, -0.415]
$\text{PosSh}_{h=5} + \text{PosSh}_{h=5} \times \text{BType}$	-1.879*	(1.007)	-1.87	0.062	[-3.537, -0.222]
$\text{PosSh}_{h=6} + \text{PosSh}_{h=6} \times \text{BType}$	-2.064**	(0.995)	-2.08	0.038	[-3.701, -0.427]
$\text{PosSh}_{h=7} + \text{PosSh}_{h=7} \times \text{BType}$	-1.018	(1.033)	-0.99	0.325	[-2.719, 0.683]
$\text{PosSh}_{h=8} + \text{PosSh}_{h=8} \times \text{BType}$	-2.010**	(1.016)	-1.98	0.048	[-3.682, -0.338]
$\text{PosSh}_{h=9} + \text{PosSh}_{h=9} \times \text{BType}$	-0.298	(1.169)	-0.25	0.799	[-2.223, 1.626]
$\text{PosSh}_{h=10} + \text{PosSh}_{h=10} \times \text{BType}$	0.053	(1.194)	0.04	0.964	[-1.911, 2.018]
$\text{PosSh}_{h=11} + \text{PosSh}_{h=11} \times \text{BType}$	-2.080*	(1.126)	-1.85	0.065	[-3.933, -0.227]
$\text{PosSh}_{h=12} + \text{PosSh}_{h=12} \times \text{BType}$	-1.430	(1.324)	-1.08	0.280	[-3.609, 0.749]

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. **PosSh** = Positive Shock, **BType** = Buyer Type, if the investor is institutional.

Table 9.: Linear Combinations: Negative Shocks

Linear Combination	**Coefficient**	**Std. Error**	**t**	**p-value**	**90% CI**
$\text{NegSh}_{h=0} + \text{NegSh}_{h=0} \times \text{BType}$	0.146	(0.863)	0.17	0.865	[-1.275, 1.567]
$\text{NegSh}_{h=1} + \text{NegSh}_{h=1} \times \text{BType}$	2.167**	(1.052)	2.06	0.040	[0.435, 3.899]
$\text{NegSh}_{h=2} + \text{NegSh}_{h=2} \times \text{BType}$	4.291***	(1.058)	4.05	0.000	[2.549, 6.033]
$\text{NegSh}_{h=3} + \text{NegSh}_{h=3} \times \text{BType}$	2.382**	(1.001)	2.38	0.017	[0.735, 4.030]
$\text{NegSh}_{h=4} + \text{NegSh}_{h=4} \times \text{BType}$	2.304**	(1.074)	2.14	0.032	[0.536, 4.072]
$\text{NegSh}_{h=5} + \text{NegSh}_{h=5} \times \text{BType}$	2.676***	(0.966)	2.77	0.006	[1.086, 4.265]
$\text{NegSh}_{h=6} + \text{NegSh}_{h=6} \times \text{BType}$	0.986	(1.067)	0.92	0.355	[-0.769, 2.742]
$\text{NegSh}_{h=7} + \text{NegSh}_{h=7} \times \text{BType}$	2.340**	(0.924)	2.53	0.011	[0.820, 3.859]
$\text{NegSh}_{h=8} + \text{NegSh}_{h=8} \times \text{BType}$	1.872*	(1.094)	1.71	0.087	[0.072, 3.672]
$\text{NegSh}_{h=9} + \text{NegSh}_{h=9} \times \text{BType}$	1.919**	(0.886)	2.17	0.030	[0.461, 3.378]
$\text{NegSh}_{h=10} + \text{NegSh}_{h=10} \times \text{BType}$	1.789*	(1.074)	1.66	0.096	[0.021, 3.557]
$\text{NegSh}_{h=11} + \text{NegSh}_{h=11} \times \text{BType}$	2.519**	(1.012)	2.49	0.013	[0.853, 4.185]
$\text{NegSh}_{h=12} + \text{NegSh}_{h=12} \times \text{BType}$	2.139**	(1.092)	1.96	0.050	[0.342, 3.936]

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. **NegSh** = Negative Shock, **BType** = Buyer Type, if the investor is institutional.

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-0.762**	(0.342)	-2.23	0.026	[-1.432, -0.092]
Buyer type	0.161***	(0.043)	3.78	0.000	[0.077, 0.244]
Positive shock$_t$ × Buyer type	-1.714**	(0.790)	-2.17	0.030	[-3.263, -0.164]
Negative shock$_t$	0.134	(0.424)	0.32	0.752	[-0.697, 0.965]
Negative shock$_t$ × Buyer type	0.012	(0.913)	0.01	0.989	[-1.779, 1.803]
GREIX$_t$	-0.001***	(0.000)	-3.92	0.000	[-0.00125, -0.00042]
10y yield$_t$	-0.018	(0.011)	-1.62	0.106	[-0.0389, 0.0037]
Quarter 2	0.174***	(0.036)	4.85	0.000	[0.104, 0.244]
Quarter 3	0.172***	(0.035)	4.86	0.000	[0.103, 0.241]
Quarter 4	0.256***	(0.035)	7.40	0.000	[0.188, 0.324]
Log(Transactions)$_{t-1}$	-0.681***	(0.036)	-18.95	0.000	[-0.751, -0.610]
Log(Transactions)$_{t-2}$	-0.447***	(0.037)	-12.03	0.000	[-0.520, -0.374]
Log(Transactions)$_{t-3}$	-0.253***	(0.038)	-6.71	0.000	[-0.327, -0.179]
Log(Transactions)$_{t-4}$	-0.089***	(0.032)	-2.73	0.006	[-0.152, -0.025]
Positive shock$_{t-1}$	-0.898***	(0.294)	-3.05	0.002	[-1.475, -0.321]
Positive shock$_{t-2}$	0.588*	(0.335)	1.76	0.079	[-0.068, 1.245]
Positive shock$_{t-3}$	0.303	(0.347)	0.87	0.382	[-0.377, 0.984]
Positive shock$_{t-4}$	0.844***	(0.309)	2.73	0.006	[0.238, 1.450]
Positive shock$_{t-1}$ × Buyer type	-0.232	(0.730)	-0.32	0.750	[-1.663, 1.198]
Positive shock$_{t-2}$ × Buyer type	-1.211	(0.845)	-1.43	0.152	[-2.868, 0.446]
Positive shock$_{t-3}$ × Buyer type	-0.044	(0.775)	-0.06	0.955	[-1.564, 1.477]
Positive shock$_{t-4}$ × Buyer type	-0.867	(0.737)	-1.18	0.239	[-2.312, 0.577]
Negative shock$_{t-1}$	1.219***	(0.382)	3.20	0.001	[0.471, 1.967]
Negative shock$_{t-2}$	-0.565	(0.366)	-1.54	0.123	[-1.283, 0.153]
Negative shock$_{t-3}$	0.043	(0.336)	0.13	0.898	[-0.617, 0.703]
Negative shock$_{t-4}$	0.197	(0.282)	0.70	0.485	[-0.356, 0.750]
Negative shock$_{t-1}$ × Buyer type	0.854	(1.057)	0.81	0.419	[-1.220, 2.927]
Negative shock$_{t-2}$ × Buyer type	3.706***	(0.963)	3.85	0.000	[1.818, 5.593]
Negative shock$_{t-3}$ × Buyer type	0.343	(0.905)	0.38	0.705	[-1.432, 2.118]
Negative shock$_{t-4}$ × Buyer type	-0.107	(1.022)	-0.11	0.916	[-2.112, 1.897]
Constant	0.034	(0.053)	0.64	0.521	[-0.069, 0.137]
Observations			2,130		
R-squared			0.3621		
Adjusted R-squared			0.3492		
Within R-squared			0.3618		
Root MSE			0.4932		
F-statistic			20.87		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10.: Base Model: Horizon 0

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-1.038***	(0.336)	-3.09	0.002	[-1.697, -0.379]
Buyer type	0.214***	(0.045)	4.79	0.000	[0.126, 0.302]
Positive shock$_t$ × Buyer type	-1.309	(0.817)	-1.60	0.109	[-2.912, 0.294]
Negative shock$_t$	1.504***	(0.398)	3.78	0.000	[0.724, 2.284]
Negative shock$_t$ × Buyer type	0.663	(1.081)	0.61	0.540	[-1.456, 2.782]
GREIX$_t$	-0.001***	(0.000)	-5.50	0.000	[-0.00187, -0.00089]
10y yield$_t$	-0.023*	(0.012)	-1.91	0.056	[-0.0464, 0.0006]
Quarter 2	0.091**	(0.040)	2.29	0.022	[0.013, 0.168]
Quarter 3	0.174***	(0.034)	5.06	0.000	[0.106, 0.241]
Quarter 4	-0.059	(0.036)	-1.64	0.101	[-0.130, 0.012]
Log(Transactions)$_{t-1}$	-0.676***	(0.034)	-20.10	0.000	[-0.742, -0.610]
Log(Transactions)$_{t-2}$	-0.421***	(0.041)	-10.34	0.000	[-0.501, -0.341]
Log(Transactions)$_{t-3}$	-0.210***	(0.043)	-4.89	0.000	[-0.295, -0.126]
Log(Transactions)$_{t-4}$	-0.098***	(0.033)	-2.94	0.003	[-0.164, -0.033]
Positive shock$_{t-1}$	0.034	(0.345)	0.10	0.922	[-0.642, 0.710]
Positive shock$_{t-2}$	0.269	(0.366)	0.73	0.463	[-0.449, 0.987]
Positive shock$_{t-3}$	1.081***	(0.354)	3.06	0.002	[0.387, 1.774]
Positive shock$_{t-4}$	1.228***	(0.381)	3.22	0.001	[0.480, 1.975]
Positive shock$_{t-1}$ × Buyer type	-1.691*	(0.872)	-1.94	0.052	[-3.400, 0.018]
Positive shock$_{t-2}$ × Buyer type	-0.189	(0.888)	-0.21	0.832	[-1.930, 1.552]
Positive shock$_{t-3}$ × Buyer type	-0.265	(0.781)	-0.34	0.734	[-1.797, 1.267]
Positive shock$_{t-4}$ × Buyer type	-1.720**	(0.875)	-1.96	0.050	[-3.437, -0.003]
Negative shock$_{t-1}$	0.004	(0.384)	0.01	0.992	[-0.749, 0.756]
Negative shock$_{t-2}$	-0.008	(0.349)	-0.02	0.981	[-0.693, 0.676]
Negative shock$_{t-3}$	0.508	(0.313)	1.63	0.104	[-0.105, 1.122]
Negative shock$_{t-4}$	-0.107	(0.328)	-0.33	0.744	[-0.749, 0.536]
Negative shock$_{t-1}$ × Buyer type	3.965***	(0.989)	4.01	0.000	[2.026, 5.903]
Negative shock$_{t-2}$ × Buyer type	1.388	(0.949)	1.46	0.144	[-0.474, 3.250]
Negative shock$_{t-3}$ × Buyer type	-0.375	(1.042)	-0.36	0.719	[-2.419, 1.668]
Negative shock$_{t-4}$ × Buyer type	0.685	(0.957)	0.72	0.474	[-1.192, 2.563]
Constant	0.220***	(0.059)	3.71	0.000	[0.104, 0.336]
Observations			2,104		
R-squared			0.3443		
Adjusted R-squared			0.3309		
Within R-squared			0.3433		
Root MSE			0.5165		
F-statistic			21.00		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11.: Base Model: Horizon 1

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	0.146	(0.404)	0.36	0.719	[-0.647, 0.939]
Buyer type	0.274***	(0.046)	5.99	0.000	[0.184, 0.364]
Positive shock$_t$ × Buyer type	-2.869***	(0.949)	-3.02	0.003	[-4.731, -1.007]
Negative shock$_t$	0.205	(0.418)	0.49	0.624	[-0.615, 1.024]
Negative shock$_t$ × Buyer type	4.086***	(1.107)	3.69	0.000	[1.915, 6.258]
GREIX$_t$	-0.0019***	(0.0003)	-7.14	0.000	[-0.00248, -0.00141]
10y yield$_t$	-0.040***	(0.013)	-3.15	0.002	[-0.0645, -0.0150]
Quarter 2	0.157***	(0.039)	4.00	0.000	[0.080, 0.235]
Quarter 3	-0.066*	(0.039)	-1.71	0.087	[-0.142, 0.010]
Quarter 4	0.029	(0.039)	0.74	0.458	[-0.048, 0.106]
Log(Transactions)$_{t-1}$	-0.672***	(0.037)	-18.34	0.000	[-0.744, -0.600]
Log(Transactions)$_{t-2}$	-0.401***	(0.043)	-9.34	0.000	[-0.485, -0.317]
Log(Transactions)$_{t-3}$	-0.247***	(0.039)	-6.38	0.000	[-0.323, -0.171]
Log(Transactions)$_{t-4}$	-0.134***	(0.034)	-3.90	0.000	[-0.202, -0.067]
Positive shock$_{t-1}$	-0.295	(0.362)	-0.82	0.415	[-1.004, 0.415]
Positive shock$_{t-2}$	0.817**	(0.375)	2.18	0.029	[0.081, 1.553]
Positive shock$_{t-3}$	1.064**	(0.420)	2.53	0.011	[0.241, 1.887]
Positive shock$_{t-4}$	2.476***	(0.401)	6.17	0.000	[1.689, 3.262]
Positive shock$_{t-1}$ × Buyer type	-0.613	(0.885)	-0.69	0.489	[-2.350, 1.123]
Positive shock$_{t-2}$ × Buyer type	-0.320	(0.833)	-0.38	0.701	[-1.953, 1.313]
Positive shock$_{t-3}$ × Buyer type	-0.834	(0.913)	-0.91	0.361	[-2.625, 0.957]
Positive shock$_{t-4}$ × Buyer type	-2.539***	(0.927)	-2.74	0.006	[-4.357, -0.721]
Negative shock$_{t-1}$	0.544	(0.364)	1.49	0.135	[-0.170, 1.259]
Negative shock$_{t-2}$	0.404	(0.322)	1.26	0.209	[-0.227, 1.036]
Negative shock$_{t-3}$	0.303	(0.347)	0.87	0.382	[-0.377, 0.982]
Negative shock$_{t-4}$	-0.680*	(0.367)	-1.85	0.064	[-1.399, 0.039]
Negative shock$_{t-1}$ × Buyer type	1.631*	(0.967)	1.69	0.092	[-0.266, 3.527]
Negative shock$_{t-2}$ × Buyer type	0.748	(1.079)	0.69	0.488	[-1.368, 2.863]
Negative shock$_{t-3}$ × Buyer type	0.715	(0.953)	0.75	0.453	[-1.153, 2.583]
Negative shock$_{t-4}$ × Buyer type	-0.597	(1.143)	-0.52	0.602	[-2.839, 1.645]
Constant	0.307***	(0.067)	4.56	0.000	[0.175, 0.439]
Observations			2,078		
R-squared			0.3472		
Adjusted R-squared			0.3337		
Within R-squared			0.3451		
Root MSE			0.5293		
F-statistic			22.69		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 12.: Base Model: Horizon 2

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-0.188	(0.416)	-0.45	0.652	[-1.004, 0.629]
Buyer type	0.272***	(0.047)	5.75	0.000	[0.179, 0.365]
Positive shock$_t$ × Buyer type	-1.705*	(0.978)	-1.74	0.081	[-3.623, 0.213]
Negative shock$_t$	0.709*	(0.398)	1.78	0.075	[-0.071, 1.490]
Negative shock$_t$ × Buyer type	1.673	(1.037)	1.61	0.107	[-0.360, 3.706]
GREIX$_t$	-0.0025***	(0.0003)	-8.52	0.000	[-0.00312, -0.00195]
10y yield$_t$	-0.057***	(0.013)	-4.30	0.000	[-0.0835, -0.0312]
Quarter 2	-0.156***	(0.040)	-3.94	0.000	[-0.233, -0.078]
Quarter 3	-0.034	(0.037)	-0.92	0.356	[-0.106, 0.038]
Quarter 4	-0.041	(0.039)	-1.05	0.295	[-0.117, 0.035]
Log(Transactions)$_{t-1}$	-0.657***	(0.041)	-16.13	0.000	[-0.737, -0.577]
Log(Transactions)$_{t-2}$	-0.446***	(0.041)	-10.85	0.000	[-0.527, -0.365]
Log(Transactions)$_{t-3}$	-0.307***	(0.042)	-7.24	0.000	[-0.390, -0.224]
Log(Transactions)$_{t-4}$	-0.162***	(0.037)	-4.32	0.000	[-0.235, -0.088]
Positive shock$_{t-1}$	0.496	(0.391)	1.27	0.204	[-0.270, 1.262]
Positive shock$_{t-2}$	1.224***	(0.452)	2.71	0.007	[0.338, 2.109]
Positive shock$_{t-3}$	2.346***	(0.422)	5.56	0.000	[1.518, 3.173]
Positive shock$_{t-4}$	0.843*	(0.431)	1.95	0.051	[-0.003, 1.689]
Positive shock$_{t-1}$ × Buyer type	-1.237	(0.853)	-1.45	0.147	[-2.909, 0.436]
Positive shock$_{t-2}$ × Buyer type	-1.695	(1.047)	-1.62	0.106	[-3.748, 0.359]
Positive shock$_{t-3}$ × Buyer type	-2.309**	(0.968)	-2.39	0.017	[-4.207, -0.411]
Positive shock$_{t-4}$ × Buyer type	0.603	(1.049)	0.57	0.565	[-1.454, 2.659]
Negative shock$_{t-1}$	0.537	(0.354)	1.52	0.130	[-0.158, 1.231]
Negative shock$_{t-2}$	0.116	(0.355)	0.33	0.744	[-0.581, 0.813]
Negative shock$_{t-3}$	-0.414	(0.383)	-1.08	0.279	[-1.165, 0.337]
Negative shock$_{t-4}$	-0.291	(0.398)	-0.73	0.465	[-1.073, 0.490]
Negative shock$_{t-1}$ × Buyer type	1.707	(1.099)	1.55	0.121	[-0.449, 3.862]
Negative shock$_{t-2}$ × Buyer type	1.677	(1.030)	1.63	0.104	[-0.343, 3.698]
Negative shock$_{t-3}$ × Buyer type	-0.266	(1.199)	-0.22	0.824	[-2.619, 2.086]
Negative shock$_{t-4}$ × Buyer type	1.009	(0.942)	1.07	0.284	[-0.839, 2.856]
Constant	0.512***	(0.070)	7.36	0.000	[0.376, 0.649]
Observations			2,052		
R-squared			0.3005		
Adjusted R-squared			0.2859		
Within R-squared			0.2970		
Root MSE			0.5479		
F-statistic			14.37		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 13.: Base Model: Horizon 3

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	0.669	(0.436)	1.54	0.125	[-0.186, 1.525]
Buyer type	0.309***	(0.050)	6.20	0.000	[0.212, 0.407]
Positive shock$_t$ × Buyer type	-2.525***	(0.949)	-2.66	0.008	[-4.387, -0.663]
Negative shock$_t$	0.764*	(0.408)	1.87	0.062	[-0.037, 1.565]
Negative shock$_t$ × Buyer type	1.540	(1.091)	1.41	0.158	[-0.600, 3.680]
GREIX$_t$	-0.0032***	(0.0003)	-9.64	0.000	[-0.00387, -0.00256]
10y yield$_t$	-0.0789***	(0.0145)	-5.42	0.000	[-0.1074, -0.0504]
Quarter 2	0.212***	(0.041)	5.18	0.000	[0.132, 0.293]
Quarter 3	0.220***	(0.040)	5.47	0.000	[0.141, 0.299]
Quarter 4	0.283***	(0.038)	7.46	0.000	[0.209, 0.357]
Log(Transactions)$_{t-1}$	-0.703***	(0.035)	-20.02	0.000	[-0.772, -0.634]
Log(Transactions)$_{t-2}$	-0.504***	(0.040)	-12.48	0.000	[-0.583, -0.424]
Log(Transactions)$_{t-3}$	-0.326***	(0.044)	-7.50	0.000	[-0.412, -0.241]
Log(Transactions)$_{t-4}$	-0.151***	(0.034)	-4.48	0.000	[-0.217, -0.085]
Positive shock$_{t-1}$	0.715	(0.467)	1.53	0.126	[-0.201, 1.630]
Positive shock$_{t-2}$	2.563***	(0.492)	5.21	0.000	[1.599, 3.528]
Positive shock$_{t-3}$	0.598	(0.487)	1.23	0.220	[-0.357, 1.553]
Positive shock$_{t-4}$	1.208***	(0.465)	2.60	0.009	[0.296, 2.121]
Positive shock$_{t-1}$ × Buyer type	-2.051*	(1.049)	-1.96	0.051	[-4.107, 0.006]
Positive shock$_{t-2}$ × Buyer type	-2.679**	(1.056)	-2.54	0.011	[-4.750, -0.608]
Positive shock$_{t-3}$ × Buyer type	0.887	(1.080)	0.82	0.412	[-1.232, 3.005]
Positive shock$_{t-4}$ × Buyer type	-0.899	(1.010)	-0.89	0.374	[-2.880, 1.082]
Negative shock$_{t-1}$	0.294	(0.410)	0.72	0.473	[-0.509, 1.098]
Negative shock$_{t-2}$	-0.549	(0.406)	-1.35	0.176	[-1.346, 0.247]
Negative shock$_{t-3}$	0.123	(0.420)	0.29	0.769	[-0.700, 0.946]
Negative shock$_{t-4}$	-0.386	(0.423)	-0.91	0.361	[-1.216, 0.443]
Negative shock$_{t-1}$ × Buyer type	2.225**	(0.974)	2.29	0.022	[0.316, 4.134]
Negative shock$_{t-2}$ × Buyer type	0.608	(1.210)	0.50	0.616	[-1.766, 2.981]
Negative shock$_{t-3}$ × Buyer type	0.905	(0.982)	0.92	0.357	[-1.022, 2.831]
Negative shock$_{t-4}$ × Buyer type	1.193	(1.102)	1.08	0.279	[-0.969, 3.355]
Constant	0.404***	(0.079)	5.09	0.000	[0.248, 0.559]
Observations			2,026		
R-squared			0.3472		
Adjusted R-squared			0.3334		
Within R-squared			0.3429		
Root MSE			0.5672		
F-statistic			23.96		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 14.: Base Model: Horizon 4

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	1.082**	(0.507)	2.13	0.033	[0.087, 2.077]
Buyer type	0.299***	(0.051)	5.80	0.000	[0.198, 0.400]
Positive shock$_t$ × Buyer type	-2.961***	(1.091)	-2.71	0.007	[-5.102, -0.821]
Negative shock$_t$	0.526	(0.429)	1.23	0.220	[-0.314, 1.367]
Negative shock$_t$ × Buyer type	2.149**	(1.017)	2.11	0.035	[0.155, 4.143]
GREIX$_t$	-0.0039***	(0.0004)	-10.99	0.000	[-0.00464, -0.00324]
10y yield$_t$	-0.0995***	(0.0152)	-6.53	0.000	[-0.1294, -0.0697]
Quarter 2	0.048	(0.043)	1.13	0.260	[-0.036, 0.133]
Quarter 3	0.154***	(0.040)	3.80	0.000	[0.075, 0.233]
Quarter 4	-0.116***	(0.040)	-2.88	0.004	[-0.195, -0.037]
Log(Transactions)$_{t-1}$	-0.731***	(0.035)	-20.84	0.000	[-0.800, -0.663]
Log(Transactions)$_{t-2}$	-0.496***	(0.045)	-11.02	0.000	[-0.584, -0.408]
Log(Transactions)$_{t-3}$	-0.287***	(0.046)	-6.23	0.000	[-0.377, -0.196]
Log(Transactions)$_{t-4}$	-0.106***	(0.041)	-2.56	0.011	[-0.188, -0.025]
Positive shock$_{t-1}$	2.162***	(0.497)	4.35	0.000	[1.187, 3.137]
Positive shock$_{t-2}$	0.932*	(0.530)	1.76	0.079	[-0.108, 1.972]
Positive shock$_{t-3}$	0.806	(0.530)	1.52	0.129	[-0.234, 1.846]
Positive shock$_{t-4}$	0.759	(0.487)	1.56	0.119	[-0.197, 1.715]
Positive shock$_{t-1}$ × Buyer type	-3.292***	(1.061)	-3.10	0.002	[-5.371, -1.212]
Positive shock$_{t-2}$ × Buyer type	0.312	(1.139)	0.27	0.784	[-1.922, 2.546]
Positive shock$_{t-3}$ × Buyer type	-0.664	(1.037)	-0.64	0.522	[-2.697, 1.369]
Positive shock$_{t-4}$ × Buyer type	1.097	(1.281)	0.86	0.392	[-1.415, 3.609]
Negative shock$_{t-1}$	-0.423	(0.431)	-0.98	0.326	[-1.268, 0.422]
Negative shock$_{t-2}$	0.048	(0.433)	0.11	0.911	[-0.800, 0.897]
Negative shock$_{t-3}$	-0.090	(0.450)	-0.20	0.842	[-0.973, 0.794]
Negative shock$_{t-4}$	0.667	(0.527)	1.27	0.206	[-0.367, 1.701]
Negative shock$_{t-1}$ × Buyer type	1.290	(1.176)	1.10	0.273	[-1.017, 3.597]
Negative shock$_{t-2}$ × Buyer type	1.965**	(0.999)	1.97	0.049	[0.007, 3.923]
Negative shock$_{t-3}$ × Buyer type	1.166	(1.114)	1.05	0.296	[-1.020, 3.351]
Negative shock$_{t-4}$ × Buyer type	0.278	(1.094)	0.25	0.799	[-1.867, 2.424]
Constant	0.721***	(0.087)	8.27	0.000	[0.550, 0.892]
Observations			2,000		
R-squared			0.3588		
Adjusted R-squared			0.3450		
Within R-squared			0.3530		
Root MSE			0.5785		
F-statistic			25.64		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 15.: Base Model: Horizon 5

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	2.470***	(0.537)	4.60	0.000	[1.418, 3.522]
Buyer type	0.285***	(0.054)	5.28	0.000	[0.179, 0.391]
Positive shock$_t$ × Buyer type	-4.534***	(1.092)	-4.15	0.000	[-6.677, -2.392]
Negative shock$_t$	-0.147	(0.442)	-0.33	0.740	[-1.013, 0.719]
Negative shock$_t$ × Buyer type	1.133	(1.105)	1.03	0.305	[-1.033, 3.299]
GREIX$_t$	-0.0045***	(0.0004)	-11.91	0.000	[-0.00523, -0.00375]
10y yield$_t$	-0.114***	(0.017)	-6.90	0.000	[-0.1463, -0.0816]
Quarter 2	0.177***	(0.044)	4.01	0.000	[0.091, 0.264]
Quarter 3	-0.075*	(0.041)	-1.83	0.067	[-0.156, 0.005]
Quarter 4	0.046	(0.043)	1.08	0.279	[-0.038, 0.131]
Log(Transactions)$_{t-1}$	-0.722***	(0.039)	-18.65	0.000	[-0.798, -0.646]
Log(Transactions)$_{t-2}$	-0.478***	(0.045)	-10.57	0.000	[-0.566, -0.389]
Log(Transactions)$_{t-3}$	-0.295***	(0.045)	-6.50	0.000	[-0.384, -0.206]
Log(Transactions)$_{t-4}$	-0.195***	(0.038)	-5.08	0.000	[-0.270, -0.119]
Positive shock$_{t-1}$	0.496	(0.530)	0.94	0.349	[-0.544, 1.537]
Positive shock$_{t-2}$	1.220**	(0.567)	2.15	0.031	[0.109, 2.331]
Positive shock$_{t-3}$	0.172	(0.534)	0.32	0.747	[-0.874, 1.219]
Positive shock$_{t-4}$	0.092	(0.528)	0.17	0.862	[-0.944, 1.127]
Positive shock$_{t-1}$ × Buyer type	-0.221	(1.147)	-0.19	0.847	[-2.471, 2.029]
Positive shock$_{t-2}$ × Buyer type	-1.109	(1.109)	-1.00	0.317	[-3.284, 1.065]
Positive shock$_{t-3}$ × Buyer type	1.539	(1.310)	1.17	0.240	[-1.030, 4.108]
Positive shock$_{t-4}$ × Buyer type	0.614	(1.214)	0.51	0.613	[-1.767, 2.994]
Negative shock$_{t-1}$	-0.072	(0.461)	-0.16	0.876	[-0.975, 0.832]
Negative shock$_{t-2}$	-0.226	(0.473)	-0.48	0.633	[-1.154, 0.702]
Negative shock$_{t-3}$	1.162**	(0.552)	2.11	0.035	[0.080, 2.244]
Negative shock$_{t-4}$	0.574	(0.517)	1.11	0.267	[-0.439, 1.587]
Negative shock$_{t-1}$ × Buyer type	2.597***	(0.981)	2.65	0.008	[0.674, 4.520]
Negative shock$_{t-2}$ × Buyer type	1.890*	(1.128)	1.68	0.094	[-0.321, 4.102]
Negative shock$_{t-3}$ × Buyer type	0.186	(1.141)	0.16	0.870	[-2.051, 2.423]
Negative shock$_{t-4}$ × Buyer type	0.832	(1.200)	0.69	0.488	[-1.520, 3.185]
Constant	0.846***	(0.093)	9.08	0.000	[0.663, 1.028]
Observations			1,974		
R-squared			0.3650		
Adjusted R-squared			0.3511		
Within R-squared			0.3576		
Root MSE			0.5839		
F-statistic			24.65		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 16.: Base Model: Horizon 6

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	0.861	(0.573)	1.50	0.133	[-0.262, 1.985]
Buyer type	0.264***	(0.056)	4.74	0.000	[0.155, 0.373]
Positive shock$_t$ × Buyer type	-1.880	(1.160)	-1.62	0.105	[-4.154, 0.395]
Negative shock$_t$	0.140	(0.484)	0.29	0.773	[-0.810, 1.089]
Negative shock$_t$ × Buyer type	2.200**	(0.977)	2.25	0.024	[0.285, 4.115]
GREIX$_t$	-0.0051***	(0.0004)	-12.47	0.000	[-0.00589, -0.00429]
10y yield$_t$	-0.129***	(0.018)	-7.14	0.000	[-0.1640, -0.0933]
Quarter 2	-0.155***	(0.042)	-3.73	0.000	[-0.237, -0.074]
Quarter 3	-0.039	(0.042)	-0.91	0.361	[-0.122, 0.044]
Quarter 4	-0.086**	(0.043)	-2.00	0.046	[-0.170, -0.002]
Log(Transactions)$_{t-1}$	-0.697***	(0.041)	-17.22	0.000	[-0.777, -0.618]
Log(Transactions)$_{t-2}$	-0.469***	(0.045)	-10.44	0.000	[-0.557, -0.381]
Log(Transactions)$_{t-3}$	-0.366***	(0.044)	-8.34	0.000	[-0.452, -0.280]
Log(Transactions)$_{t-4}$	-0.176***	(0.036)	-4.92	0.000	[-0.246, -0.106]
Positive shock$_{t-1}$	0.972*	(0.564)	1.72	0.085	[-0.134, 2.078]
Positive shock$_{t-2}$	0.845	(0.590)	1.43	0.152	[-0.312, 2.003]
Positive shock$_{t-3}$	-0.861*	(0.513)	-1.68	0.093	[-1.867, 0.144]
Positive shock$_{t-4}$	-0.487	(0.565)	-0.86	0.389	[-1.594, 0.621]
Positive shock$_{t-1}$ × Buyer type	-1.874*	(1.125)	-1.67	0.096	[-4.081, 0.332]
Positive shock$_{t-2}$ × Buyer type	1.216	(1.348)	0.90	0.367	[-1.427, 3.860]
Positive shock$_{t-3}$ × Buyer type	1.615	(1.208)	1.34	0.182	[-0.755, 3.984]
Positive shock$_{t-4}$ × Buyer type	-0.604	(1.187)	-0.51	0.611	[-2.931, 1.723]
Negative shock$_{t-1}$	-0.529	(0.493)	-1.07	0.283	[-1.496, 0.438]
Negative shock$_{t-2}$	0.908	(0.575)	1.58	0.114	[-0.218, 2.035]
Negative shock$_{t-3}$	1.180**	(0.540)	2.19	0.029	[0.121, 2.239]
Negative shock$_{t-4}$	1.237**	(0.513)	2.41	0.016	[0.231, 2.242]
Negative shock$_{t-1}$ × Buyer type	2.382**	(1.100)	2.17	0.030	[0.224, 4.540]
Negative shock$_{t-2}$ × Buyer type	0.900	(1.157)	0.78	0.436	[-1.368, 3.169]
Negative shock$_{t-3}$ × Buyer type	0.222	(1.218)	0.18	0.855	[-2.167, 2.611]
Negative shock$_{t-4}$ × Buyer type	1.042	(1.197)	0.87	0.384	[-1.305, 3.389]
Constant	1.140***	(0.100)	11.46	0.000	[0.945, 1.336]
Observations			1,948		
R-squared			0.3341		
Adjusted R-squared			0.3194		
Within R-squared			0.3242		
Root MSE			0.5930		
F-statistic			19.45		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 17.: Base Model: Horizon 7

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	1.093*	(0.602)	1.82	0.070	[-0.087, 2.273]
Buyer type	0.270***	(0.054)	5.01	0.000	[0.164, 0.376]
Positive shock$_t$ × Buyer type	-3.103***	(1.158)	-2.68	0.007	[-5.373, -0.832]
Negative shock$_t$	-0.496	(0.526)	-0.94	0.345	[-1.527, 0.535]
Negative shock$_t$ × Buyer type	2.368**	(1.146)	2.07	0.039	[0.119, 4.616]
GREIX$_t$	-0.0057***	(0.0004)	-12.84	0.000	[-0.00661, -0.00486]
10y yield$_t$	-0.147***	(0.020)	-7.55	0.000	[-0.1856, -0.1090]
Quarter 2	0.207***	(0.044)	4.65	0.000	[0.119, 0.294]
Quarter 3	0.161***	(0.044)	3.68	0.000	[0.075, 0.247]
Quarter 4	0.246***	(0.043)	5.71	0.000	[0.162, 0.330]
Log(Transactions)$_{t-1}$	-0.713***	(0.037)	-19.53	0.000	[-0.785, -0.642]
Log(Transactions)$_{t-2}$	-0.570***	(0.045)	-12.81	0.000	[-0.658, -0.483]
Log(Transactions)$_{t-3}$	-0.377***	(0.042)	-9.05	0.000	[-0.459, -0.296]
Log(Transactions)$_{t-4}$	-0.195***	(0.036)	-5.38	0.000	[-0.266, -0.124]
Positive shock$_{t-1}$	0.256	(0.587)	0.44	0.663	[-0.895, 1.406]
Positive shock$_{t-2}$	-0.307	(0.554)	-0.55	0.580	[-1.394, 0.781]
Positive shock$_{t-3}$	-1.094*	(0.586)	-1.87	0.062	[-2.244, 0.056]
Positive shock$_{t-4}$	-0.831	(0.551)	-1.51	0.132	[-1.912, 0.249]
Positive shock$_{t-1}$ × Buyer type	0.988	(1.320)	0.75	0.454	[-1.600, 3.576]
Positive shock$_{t-2}$ × Buyer type	1.715	(1.351)	1.27	0.204	[-0.934, 4.364]
Positive shock$_{t-3}$ × Buyer type	-0.547	(1.228)	-0.45	0.656	[-2.955, 1.862]
Positive shock$_{t-4}$ × Buyer type	0.290	(1.250)	0.23	0.816	[-2.161, 2.742]
Negative shock$_{t-1}$	0.492	(0.610)	0.81	0.420	[-0.704, 1.688]
Negative shock$_{t-2}$	0.922*	(0.553)	1.67	0.096	[-0.163, 2.008]
Negative shock$_{t-3}$	1.616***	(0.531)	3.04	0.002	[0.575, 2.657]
Negative shock$_{t-4}$	1.383***	(0.513)	2.70	0.007	[0.378, 2.389]
Negative shock$_{t-1}$ × Buyer type	1.488	(1.105)	1.35	0.178	[-0.679, 3.655]
Negative shock$_{t-2}$ × Buyer type	0.852	(1.182)	0.72	0.471	[-1.465, 3.169]
Negative shock$_{t-3}$ × Buyer type	1.044	(1.212)	0.86	0.389	[-1.334, 3.423]
Negative shock$_{t-4}$ × Buyer type	0.865	(1.241)	0.70	0.486	[-1.569, 3.299]
Constant	1.095***	(0.107)	10.28	0.000	[0.886, 1.304]
Observations			1,922		
R-squared			0.3707		
Adjusted R-squared			0.3566		
Within R-squared			0.3593		
Root MSE			0.6037		
F-statistic			26.48		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 18.: Base Model: Horizon 8

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	0.370	(0.624)	0.59	0.554	[-0.854, 1.593]
Buyer type	0.295***	(0.055)	5.34	0.000	[0.187, 0.404]
Positive shock$_t$ × Buyer type	-0.668	(1.290)	-0.52	0.605	[-3.198, 1.863]
Negative shock$_t$	0.582	(0.640)	0.91	0.363	[-0.673, 1.837]
Negative shock$_t$ × Buyer type	1.337	(1.031)	1.30	0.195	[-0.685, 3.360]
GREIX$_t$	-0.0059***	(0.0005)	-12.09	0.000	[-0.00683, -0.00493]
10y yield$_t$	-0.142***	(0.020)	-7.04	0.000	[-0.182, -0.103]
Quarter 2	0.086*	(0.047)	1.85	0.065	[-0.005, 0.178]
Quarter 3	0.128***	(0.045)	2.82	0.005	[0.039, 0.217]
Quarter 4	-0.104**	(0.045)	-2.33	0.020	[-0.191, -0.016]
Log(Transactions)$_{t-1}$	-0.817***	(0.041)	-19.96	0.000	[-0.897, -0.736]
Log(Transactions)$_{t-2}$	-0.594***	(0.043)	-13.68	0.000	[-0.679, -0.508]
Log(Transactions)$_{t-3}$	-0.412***	(0.044)	-9.29	0.000	[-0.499, -0.325]
Log(Transactions)$_{t-4}$	-0.233***	(0.037)	-6.29	0.000	[-0.305, -0.160]
Positive shock$_{t-1}$	-0.398	(0.554)	-0.72	0.473	[-1.484, 0.688]
Positive shock$_{t-2}$	-0.523	(0.591)	-0.88	0.377	[-1.683, 0.637]
Positive shock$_{t-3}$	-1.396**	(0.578)	-2.42	0.016	[-2.530, -0.263]
Positive shock$_{t-4}$	-0.783	(0.548)	-1.43	0.153	[-1.859, 0.293]
Positive shock$_{t-1}$ × Buyer type	1.050	(1.317)	0.80	0.425	[-1.533, 3.632]
Positive shock$_{t-2}$ × Buyer type	-0.098	(1.254)	-0.08	0.938	[-2.556, 2.361]
Positive shock$_{t-3}$ × Buyer type	1.056	(1.318)	0.80	0.423	[-1.528, 3.641]
Positive shock$_{t-4}$ × Buyer type	-2.169*	(1.184)	-1.83	0.067	[-4.491, 0.154]
Negative shock$_{t-1}$	0.277	(0.592)	0.47	0.640	[-0.885, 1.438]
Negative shock$_{t-2}$	1.204**	(0.542)	2.22	0.026	[0.141, 2.267]
Negative shock$_{t-3}$	1.873***	(0.544)	3.44	0.001	[0.806, 2.941]
Negative shock$_{t-4}$	0.832	(0.588)	1.42	0.157	[-0.321, 1.985]
Negative shock$_{t-1}$ × Buyer type	1.452	(1.173)	1.24	0.216	[-0.849, 3.754]
Negative shock$_{t-2}$ × Buyer type	1.448	(1.168)	1.24	0.215	[-0.843, 3.739]
Negative shock$_{t-3}$ × Buyer type	0.530	(1.247)	0.42	0.671	[-1.916, 2.975]
Negative shock$_{t-4}$ × Buyer type	1.649	(1.125)	1.47	0.143	[-0.557, 3.855]
Constant	1.268***	(0.114)	11.16	0.000	[1.045, 1.491]
Observations			1,896		
R-squared			0.4082		
Adjusted R-squared			0.3948		
Within R-squared			0.3961		
Root MSE			0.6095		
F-statistic			24.73		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 19.: Base Model: Horizon 9

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-0.095	(0.557)	-0.17	0.865	[-1.188, 0.998]
Buyer type	0.341***	(0.057)	5.99	0.000	[0.229, 0.452]
Positive shock$_t$ × Buyer type	0.148	(1.280)	0.12	0.908	[-2.361, 2.658]
Negative shock$_t$	0.335	(0.599)	0.56	0.577	[-0.841, 1.510]
Negative shock$_t$ × Buyer type	1.454	(1.184)	1.23	0.219	[-0.868, 3.776]
GREIX$_t$	-0.0063***	(0.0005)	-12.07	0.000	[-0.00727, -0.00524]
10y yield$_t$	-0.148***	(0.021)	-7.09	0.000	[-0.1886, -0.1068]
Quarter 2	0.095**	(0.046)	2.05	0.041	[0.004, 0.186]
Quarter 3	-0.124***	(0.046)	-2.70	0.007	[-0.213, -0.034]
Quarter 4	-0.019	(0.046)	-0.42	0.676	[-0.110, 0.071]
Log(Transactions)$_{t-1}$	-0.752***	(0.039)	-19.39	0.000	[-0.828, -0.676]
Log(Transactions)$_{t-2}$	-0.553***	(0.047)	-11.88	0.000	[-0.644, -0.462]
Log(Transactions)$_{t-3}$	-0.386***	(0.046)	-8.34	0.000	[-0.477, -0.296]
Log(Transactions)$_{t-4}$	-0.161***	(0.039)	-4.17	0.000	[-0.236, -0.085]
Positive shock$_{t-1}$	-0.780	(0.596)	-1.31	0.191	[-1.948, 0.389]
Positive shock$_{t-2}$	-1.113*	(0.587)	-1.90	0.058	[-2.264, 0.038]
Positive shock$_{t-3}$	-1.651***	(0.551)	-3.00	0.003	[-2.731, -0.571]
Positive shock$_{t-4}$	0.163	(0.645)	0.25	0.801	[-1.103, 1.429]
Positive shock$_{t-1}$ × Buyer type	-0.425	(1.239)	-0.34	0.731	[-2.856, 2.005]
Positive shock$_{t-2}$ × Buyer type	1.292	(1.394)	0.93	0.354	[-1.443, 4.027]
Positive shock$_{t-3}$ × Buyer type	-1.846	(1.188)	-1.55	0.120	[-4.175, 0.483]
Positive shock$_{t-4}$ × Buyer type	-1.509	(1.307)	-1.15	0.248	[-4.073, 1.054]
Negative shock$_{t-1}$	0.702	(0.577)	1.22	0.224	[-0.430, 1.834]
Negative shock$_{t-2}$	1.664***	(0.560)	2.97	0.003	[0.565, 2.762]
Negative shock$_{t-3}$	1.204**	(0.598)	2.01	0.044	[0.031, 2.377]
Negative shock$_{t-4}$	1.464**	(0.577)	2.54	0.011	[0.332, 2.595]
Negative shock$_{t-1}$ × Buyer type	1.897*	(1.151)	1.65	0.100	[-0.361, 4.156]
Negative shock$_{t-2}$ × Buyer type	0.795	(1.255)	0.63	0.527	[-1.667, 3.258]
Negative shock$_{t-3}$ × Buyer type	1.566	(1.107)	1.41	0.158	[-0.606, 3.737]
Negative shock$_{t-4}$ × Buyer type	1.228	(1.295)	0.95	0.343	[-1.311, 3.767]
Constant	1.387***	(0.122)	11.40	0.000	[1.149, 1.626]
Observations			1,870		
R-squared			0.3923		
Adjusted R-squared			0.3783		
Within R-squared			0.3758		
Root MSE			0.6105		
F-statistic			26.16		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 20.: Base Model: Horizon 10

Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-0.669	(0.611)	-1.09	0.274	[-1.868, 0.530]
Buyer type	0.446***	(0.060)	7.46	0.000	[0.328, 0.563]
Positive shock$_t$ × Buyer type	-1.411	(1.253)	-1.13	0.260	[-3.869, 1.046]
Negative shock$_t$	0.693	(0.595)	1.17	0.244	[-0.473, 1.859]
Negative shock$_t$ × Buyer type	1.826*	(1.114)	1.64	0.101	[-0.360, 4.012]
GREIX$_t$	-0.0065***	(0.0006)	-11.64	0.000	[-0.00763, -0.00543]
10y yield$_t$	-0.151***	(0.022)	-6.97	0.000	[-0.1940, -0.1088]
Quarter 2	-0.128***	(0.043)	-2.94	0.003	[-0.213, -0.043]
Quarter 3	-0.033	(0.045)	-0.73	0.468	[-0.121, 0.056]
Quarter 4	-0.006	(0.045)	-0.13	0.900	[-0.094, 0.083]
Log(Transactions)$_{t-1}$	-0.755***	(0.040)	-18.82	0.000	[-0.833, -0.676]
Log(Transactions)$_{t-2}$	-0.548***	(0.045)	-12.19	0.000	[-0.636, -0.460]
Log(Transactions)$_{t-3}$	-0.327***	(0.044)	-7.45	0.000	[-0.413, -0.241]
Log(Transactions)$_{t-4}$	-0.166***	(0.035)	-4.76	0.000	[-0.234, -0.097]
Positive shock$_{t-1}$	-1.278**	(0.592)	-2.16	0.031	[-2.438, -0.118]
Positive shock$_{t-2}$	-1.105*	(0.574)	-1.93	0.054	[-2.231, 0.021]
Positive shock$_{t-3}$	-0.754	(0.641)	-1.17	0.240	[-2.012, 0.505]
Positive shock$_{t-4}$	0.489	(0.639)	0.77	0.444	[-0.764, 1.741]
Positive shock$_{t-1}$ × Buyer type	0.894	(1.374)	0.65	0.515	[-1.801, 3.590]
Positive shock$_{t-2}$ × Buyer type	-1.634	(1.248)	-1.31	0.191	[-4.082, 0.814]
Positive shock$_{t-3}$ × Buyer type	-0.847	(1.327)	-0.64	0.523	[-3.449, 1.755]
Positive shock$_{t-4}$ × Buyer type	-3.556***	(1.260)	-2.82	0.005	[-6.027, -1.084]
Negative shock$_{t-1}$	0.960*	(0.577)	1.66	0.097	[-0.172, 2.093]
Negative shock$_{t-2}$	0.831	(0.613)	1.36	0.176	[-0.372, 2.034]
Negative shock$_{t-3}$	1.811***	(0.587)	3.08	0.002	[0.659, 2.963]
Negative shock$_{t-4}$	0.683	(0.514)	1.33	0.184	[-0.326, 1.691]
Negative shock$_{t-1}$ × Buyer type	1.320	(1.206)	1.09	0.274	[-1.045, 3.686]
Negative shock$_{t-2}$ × Buyer type	1.840*	(1.133)	1.62	0.104	[-0.381, 4.061]
Negative shock$_{t-3}$ × Buyer type	1.092	(1.296)	0.84	0.400	[-1.450, 3.634]
Negative shock$_{t-4}$ × Buyer type	2.383*	(1.371)	1.74	0.082	[-0.306, 5.072]
Constant	1.448***	(0.128)	11.36	0.000	[1.198, 1.699]
Observations			1,844		
R-squared			0.3851		
Adjusted R-squared			0.3707		
Within R-squared			0.3641		
Root MSE			0.6123		
F-statistic			22.63		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 21.: Base Model: Horizon 11

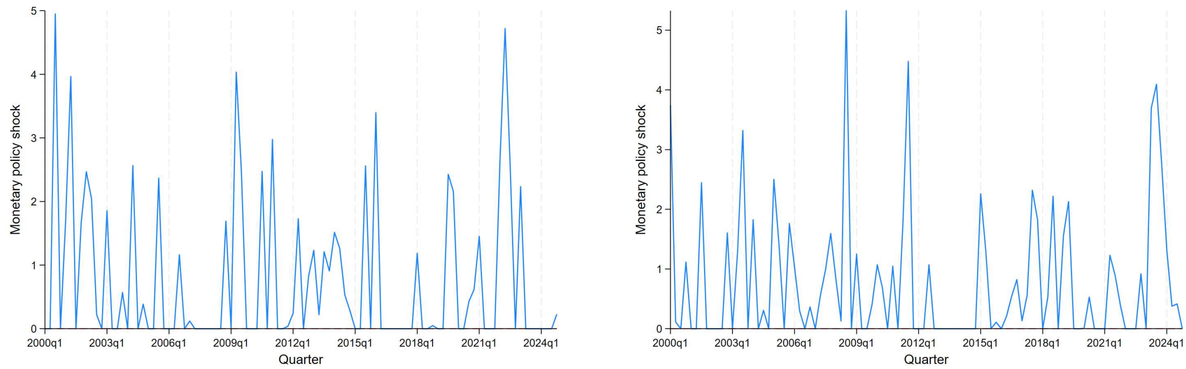
Variable	Coefficient	Std. Error	t	p-value	95% CI
Positive shock$_t$	-1.014*	(0.614)	-1.65	0.099	[-2.218, 0.191]
Buyer type	0.503***	(0.061)	8.23	0.000	[0.383, 0.622]
Positive shock$_t$ × Buyer type	-0.416	(1.413)	-0.29	0.768	[-3.187, 2.355]
Negative shock$_t$	1.116*	(0.599)	1.86	0.063	[-0.059, 2.291]
Negative shock$_t$ × Buyer type	1.023	(1.180)	0.87	0.386	[-1.290, 3.337]
GREIX$_t$	-0.0069***	(0.0006)	-11.72	0.000	[-0.0080, -0.0057]
10y yield$_t$	-0.156***	(0.022)	-7.08	0.000	[-0.1992, -0.1128]
Quarter 2	0.175***	(0.046)	3.79	0.000	[0.084, 0.265]
Quarter 3	0.214***	(0.046)	4.66	0.000	[0.124, 0.304]
Quarter 4	0.222***	(0.044)	5.10	0.000	[0.137, 0.307]
Log(Transactions)$_{t-1}$	-0.746***	(0.037)	-19.93	0.000	[-0.820, -0.673]
Log(Transactions)$_{t-2}$	-0.482***	(0.043)	-11.25	0.000	[-0.566, -0.398]
Log(Transactions)$_{t-3}$	-0.318***	(0.043)	-7.38	0.000	[-0.402, -0.233]
Log(Transactions)$_{t-4}$	-0.143***	(0.037)	-3.83	0.000	[-0.217, -0.070]
Positive shock$_{t-1}$	-1.551***	(0.586)	-2.64	0.008	[-2.701, -0.401]
Positive shock$_{t-2}$	-0.351	(0.652)	-0.54	0.591	[-1.629, 0.928]
Positive shock$_{t-3}$	0.034	(0.666)	0.05	0.959	[-1.271, 1.340]
Positive shock$_{t-4}$	0.404	(0.701)	0.58	0.564	[-0.970, 1.779]
Positive shock$_{t-1}$ × Buyer type	-2.009	(1.266)	-1.59	0.113	[-4.491, 0.473]
Positive shock$_{t-2}$ × Buyer type	-0.559	(1.391)	-0.40	0.688	[-3.286, 2.169]
Positive shock$_{t-3}$ × Buyer type	-3.563***	(1.291)	-2.76	0.006	[-6.094, -1.031]
Positive shock$_{t-4}$ × Buyer type	-1.886	(1.339)	-1.41	0.159	[-4.512, 0.739]
Negative shock$_{t-1}$	0.333	(0.640)	0.52	0.603	[-0.923, 1.588]
Negative shock$_{t-2}$	1.639***	(0.602)	2.72	0.006	[0.459, 2.819]
Negative shock$_{t-3}$	1.005*	(0.533)	1.89	0.059	[-0.040, 2.049]
Negative shock$_{t-4}$	0.486	(0.592)	0.82	0.411	[-0.674, 1.647]
Negative shock$_{t-1}$ × Buyer type	2.285**	(1.126)	2.03	0.043	[0.077, 4.494]
Negative shock$_{t-2}$ × Buyer type	1.293	(1.261)	1.03	0.305	[-1.180, 3.766]
Negative shock$_{t-3}$ × Buyer type	2.212	(1.409)	1.57	0.117	[-0.551, 4.975]
Negative shock$_{t-4}$ × Buyer type	2.637	(1.705)	1.55	0.122	[-0.707, 5.981]
Constant	1.295***	(0.132)	9.81	0.000	[1.036, 1.554]
Observations			1,818		
R-squared			0.4050		
Adjusted R-squared			0.3909		
Within R-squared			0.3807		
Root MSE			0.6145		
F-statistic			27.43		

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 22.: Base Model: Horizon 12

C. Appendix: Robustness checks

This section presents additional graphs for the robustness checks described in Chapter 6. Figure 14 displays the positive and negative shock series constructed from high-frequency data on German government bonds.



(a) Positive monetary surprise shocks. **(b)** Negative monetary surprise shocks.

Figure 14.: Monetary surprise shocks based on high-frequency data, derived from the changes in German government bonds.

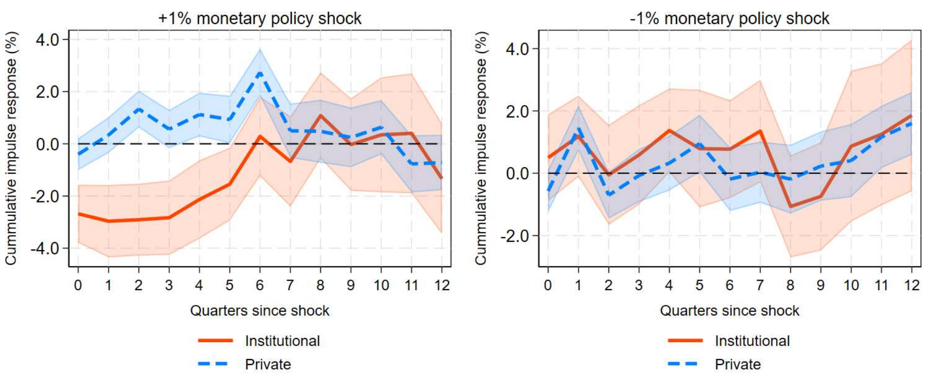


Figure 15.: Output of local projection for only multi-family and single-family houses.

When only looking at multi-family and single-family houses the affect only remains for institutional investors in the case of monetary tightening and is statistically insignificant when monetary policy is loosened. This can be attributed to many different reasons. One might be the case that there is less data on those two segments of housing and institutional investors are less active in buying them. Therefore, less data points are available. Another reason might be that different institutional investors are active in different segments and therefore do have differing responses. Nevertheless, as clearly observable in Figure 15, the effect in the case of an increase in the lending rate is significant for large-scale investors. As in the base model, private individuals do not adjust the number of residential real estate purchases in response to interest rate changes, regardless of the direction of the policy decision.