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**How not to Reduce Commission Rates
of Real Estate Agents: Evidence From
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How not to Reduce Commission Rates of Real Estate Agents: Evidence From Germany

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Abstract

This paper studies a recent legal reform in Germany, which aims to lower commission rates of real estate agents by raising the cost salience of sellers. I find that the reform has backfired and real estate agents have exploited the transition to increase their commission rates. The findings document that in some regions real estate agents increase their commission by up to 2 percentage points, adding over €6,000 in transaction cost to the average home sale. As explicit collusion is unlikely in this setting, I argue that this arbitrary increase points to seller ignorance instead. To verify if and why sellers fail to induce price competition, I run a pre-registered survey experiment with 1,062 real estate agents. Although commission rates should be negotiated independently for each sale, the survey confirms that 85% of sellers do not attempt to negotiate lower commission rates. The randomized experimental questions suggest that real estate agents may cater to the low willingness of sellers to negotiate by providing misleading reference commission rates and shrouding the economic incidence for sellers.

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I Introduction

The preferences for homeownership are unbroken around the world. For example, respondents in the US rank owning a home as a higher gauge for prosperity than a career, having children, or a college education.¹ Even in countries with a long tradition of renting, such as Germany, approximately 70% of tenants would prefer owning their homes.² High transaction costs pose a direct challenge to this desire for homeownership. Aside from real estate transfer taxes and stamp duties, commission fees for real estate agents represent a large portion of these transaction costs.

The level of commission fees is typically not regulated. Assuming that real estate agents operate in a competitive market, one would therefore expect the commission to approximate the marginal production cost of a real estate agent to fulfill a given transaction. Considering the technological advancements of the past two decades, these innovations should have brought down cost and, in turn, the commission fees of real estate agents: large databases help to determine a reasonable asking price, artificial intelligence and smartphones assist in producing object descriptions and images, and online tools can automate the scheduling for viewings.

The developments in several countries affirm that such cost-lowering innovations can translate into lower commission rates. For example, Dutch real estate agents now charge around 1.25% of the selling price, and some online real estate agents even offer a flat fee full-service package for less than €2,000.³ However, in other countries, the commission rates of real estate agents refuse to decrease: often adding 4% to 6% to the final price of a property, commission rates in France, Germany, or the US remain three to four times higher than in the Netherlands, the UK, or most of Scandinavia (Table 1).

¹The YouGov survey was based on a sample of 2,530 respondents representative for the U.S. and commissioned by the financial provider *Bankrate*.

²The survey was based on a sample of 2,180 respondents from a representative online panel in Germany. The sample was collected in 2022, and the survey was commissioned by the financial provider *Interhyp*.

³Based on an offer from the Dutch agency *maakelaarsland.nl* in April 2023. The flat fee of €1,950 includes the agency analyzing and pricing the home, a professional photographer taking pictures, listing the home on the relevant platform, conducting viewings, as well as assisting with negotiations and legal matters. In sum, the flat fee includes all the service components that most real estate agents provide around the world.

Table 1: Average Total Commission Rates per Transaction Around the World

Country	Commission rate (2022)	Commission rate (2002)	Housing prices to income ratio (2020)	Buying Agent	Commission paid by
Netherlands	1.25	1.75	11.4	No	Seller
Norway	1.5	2.5	8.7	No	Seller
Sweden	1.5	5	9.0	No	Seller
U.K.	1.5	1.5	12.7	No	Seller
Ireland	1.75	1.75	8.5	No	Seller
Australia	2.5	2.5	12.7	No	Seller
Denmark	2.5	3	9.2	No	Seller
Finland	3	4	6.2	No	Seller
Belgium	3	3	8.2	No	Seller
Indonesia	3	5	-	No	Seller
Spain	3	5	8.4	No	Seller
Mexico	3.5	7.5	-	No	Seller
Greece	4	4	-	No	Seller or buyer
Israel	4	4	-	No	Split
Russia	4	7.5	-	No	Seller
Canada	5	4.5	11.5	Partially	Seller
France	5	-	9.2	No	Seller or buyer
Japan	5	3	-	Yes	Split
Germany	5.5	4.5	12.0	No	Split
Italy	6	5	8.1	No	Seller or buyer
U.S.	6	6	7.4	Yes	Seller

Note: This table displays average total commission rates per transaction. The data from 2002 are reproduced from Delcours and Miller (2002). Commissions from 2022 and information on the national systems are collected using web queries from at least three local websites for each country that provided information on customary commission rates no older than two years. Buying agent "Yes" indicates widespread use of additional buying agents. Housing price-to-income ratios are calculated by dividing 2020's average transaction prices by median incomes. Average housing prices are sourced from national statistical offices or, if not available, other web sources. Median incomes are taken from Eurostat (2023). The price-to-income ratios seek to illustrate that national housing prices are comparable across countries and are unlikely to explain the much larger gaps in commission rates.

This divergence adds to long-standing doubts⁴ if commission rates in such high-commission countries are determined competitively. As technological innovation combined with low entry barriers and the decentralized market structure of real estate agents should drive down rates, their persistence in some regions motivates a closer inspection.

In this paper, I focus on Germany, which has one of the consistently highest commission rates in the world. My study leverages a legal reform that explicitly aims to increase price competition. As in most countries, real estate agents in Germany are predominantly

⁴These concerns are old (Crockett, 1982) and typically derived from the unresponsiveness of commission rates to changes in residential real estate prices, the resulting excess entry (Hsieh & Moretti, 2003; Han & Hong, 2011; Barwick & Pathak, 2015), and the uniformity of commission rates (Owen & Kickbacks, 1977; Miceli, 1992; Hatfield, Kominers, & Lowery, 2019). Adequate explanations exist only for the US, indicating barriers for low-commission real estate agents to access the relevant listing platforms (Hahn, Litan, & Gurman, 2006) and collusive steering (Levitt, Syverson, & Ferreira, 2008; Barwick, Pathak, & Wong, 2017), where the practice of using a buying agent who is compensated with a share of the selling agent's commission incentivizes buying agents to steer customers away from low-commission listings.

selling agents, i.e. they are initially contracted by the seller and incentivized by the commission to work in the interest of the seller. However, before the reform, the commission for the selling agent was often charged only from the buyer. As this practice allowed real estate agents to claim that the service for sellers was “free of charge”, this custom raised concerns about sellers failing to exert sufficient competitive pressure on commission rates.⁵ To change this, the reform required sellers who commission a selling agent to pay at least half of the statutory commission fee. Echoing recent findings on the incomplete salience of taxes and tax-like costs (e.g. Chetty, Looney, & Kroft, 2009; Bradley & Feldman, 2020), German policy makers reckoned that forcing sellers to partially pay the commission explicitly would make the cost more visible:

“[With the reform,] everyone, who commissions [a real estate agent] becomes aware, that he can maximally pass through half [of the commission]. The seller has an incentive that prices and thus commission rates decrease. This creates competition.”⁶

I study this policy by examining half a million listings around the reform. My results demonstrate that the policy not only failed to lower commission rates but even backfired. Using an event study design, I reveal that total commission rates have strongly increased in response to the reform. The documented increase is robust to controlling for a wide set of property characteristics to ensure that the finding is not driven by a changing composition of the listed properties around the reform.

A heterogeneity analysis shows that this increase follows a simple strategy that is tied to the regionally typical commission rates. Pre-reform, the commission rates paid by buyers were most frequently 4% or 5% of the property price in low-commission regions, and 6% in regions with the highest commissions. Post-reform, many agents switched to charging 3% from buyers and sellers each, often increasing the total commission rate from 4% or 5% to 6%. These increases are substantial: applied to the average home price in the sample, raising commission rates of 4% or 5% to 6% corresponds to respective additional transaction cost of approximately €6,000 or €3,000, almost overnight.

I provide complementary evidence that this increase does not follow conventional ex-

⁵I return to discussing the economic incidence of the commission below.

⁶Karsten Möring, member of the German parliament for the CDU party at the 160th session of the federal parliament on 14 May 2020 when debating the reform. Original: “*Es ist die Tatsache, dass wir nicht das Bestellerprinzip in Reinkultur einführen, sondern jeden, der bestellt, davon in Kenntnis setzen, dass er maximal die Hälfte davon weitergeben kann. Er hat ein Interesse daran, dass die Preise, die Provision sinken. Damit entsteht Wettbewerb.*”

planations. The reform merely shifted the statutory payment but should have left other market conditions unchanged. Using a traditional incidence framework, I illustrate that standard economic theory would render the shifting statutory incidence irrelevant for all parties. The evident increase also rejects the idea underpinning the legal reform: increased cost salience for sellers does not appear to stimulate price competition. Lastly, the data indicate that neither the industry structure nor other empirical observations support collusion of real estate agents as a convincing alternative explanation.

Instead, my study emphasizes the passive role of home sellers: sellers can negotiate the commission freely with the agent and my results indicate that sellers bear most of the economic commission cost; nevertheless, the evidence suggest that sellers appear surprisingly inelastic to the price increase. I offer two complementary interpretations to explain sellers' indifference. First, sellers could underestimate their burden of the commission incidence. The incidence framework illustrates that if sellers believe that real estate agents can pass all the commission costs to buyers in the form of a higher selling price, then sellers might underestimate the economic commission cost. Second, sellers' inattention to commission rates may be fueled by the influence of reference rates. I show that the reference commission rate used by real estate agents is not only inflated but can also explain the path of the commission rate increases which cascade from high- to low-commission regions.

I validate these hypotheses in a survey experiment among 1,062 real estate agents. First and foremost, responses indicate that sellers appear perplexingly unwilling to seek lower commissions: 85% of sellers do not attempt to negotiate lower rates. Failing to demand a lower commission is most prevalent among female and older home sellers. Randomized experimental questions further indicate that real estate agents inflate the reference commission rate and expect their ability to fetch a higher price to transcend any incidence effects. Incentivizing accurate answers deflates both estimates, suggesting that real estate agents communicate inaccurate information by default.

My paper offers three contributions to the literature. First, my findings speak to the specific research on real estate agents. By emphasizing the low willingness of home sellers to seek lower commissions, the present study provides a new angle to the old puzzle of constant and unresponsive commission rates. Providing evidence on a price increase

without changes in market conditions, my paper substantiates concerns that also outside the US, rates are not determined competitively (e.g. Crockett, 1982; Barwick et al., 2017; Barwick & Wong, 2019). Furthermore, comparing listing prices to owners selling directly supports the findings on the underwhelming performance of real estate agents in general (Rutherford, Springer, & Yavas, 2005; Levitt & Syverson, 2008; Jia & Pathak, 2010).

Second, the comparison of listing prices to offers without a commission also contributes to measuring the neutrality of the statutory incidence (Kopczuk, Marion, Muehlegger, & Slemrod, 2016; Benzarti, Carloni, Harju, & Kosonen, 2020). The commission rate for real estate agents partially resembles a tax by creating a wedge between prices for buyers and sellers. However, the statutory commission rate shift studied in this paper is not fully offset by higher listing prices. Thus, my results also speak to the mounting evidence of incomplete tax salience (Chetty et al., 2009; Finkelstein, 2009; Bradley & Feldman, 2020).

Third, I demonstrate that markets prevail in which many consumers leave serious money on the table. Hereby, the study intersects with the literature on consumer inattention (e.g. Gabaix & Laibson, 2006; Finkelstein, 2009; Bhargava, Loewenstein, & Sydnor, 2017; Bordalo, Gennaioli, & Shleifer, 2019) and the problematic behavior of commission-motivated agents (Levitt et al., 2008; Anagol, Cole, & Sarkar, 2017). The present paper supports the notion that such problems are especially acute in the domain of real estate (Simonsohn & Loewenstein, 2006; Woodward & Hall, 2012; Bradley, 2017; Repetto & Solís, 2019; Agarwal & Karapetyan, 2022) and among vulnerable consumer groups, such as women and the elderly. However, the reform was introduced with the ulterior motive that home sellers better respond to salient cues. One would have expected that forcing sellers to explicitly pay part of the commission would have made cost more salient (Bradley & Feldman, 2020). However, my research shows that this logic did not materialize in the specific context of splitting the commission payment. Although the results point to inattentive home sellers, the unexpected consequences of the reform offer a caveat about predicting the interaction of the statutory incidence with salience on a policy scale.

Ultimately, the perplexing commission increase following the reform relates the commission rates in Germany to a policy choice. This finding aligns with international observations, where high-commission countries either have confusing commission systems where both sellers and buyers may pay the selling agent or, alternatively, use systems

that incentivize the involvement of an extra buying agent, like in the US (Table 1). By contrast, other global examples point to simpler and less bureaucratic policy solutions: countries with low commissions all share systems with just a selling agent who is only paid for by the seller.

II Institutional Background

II.1 Market Characteristics

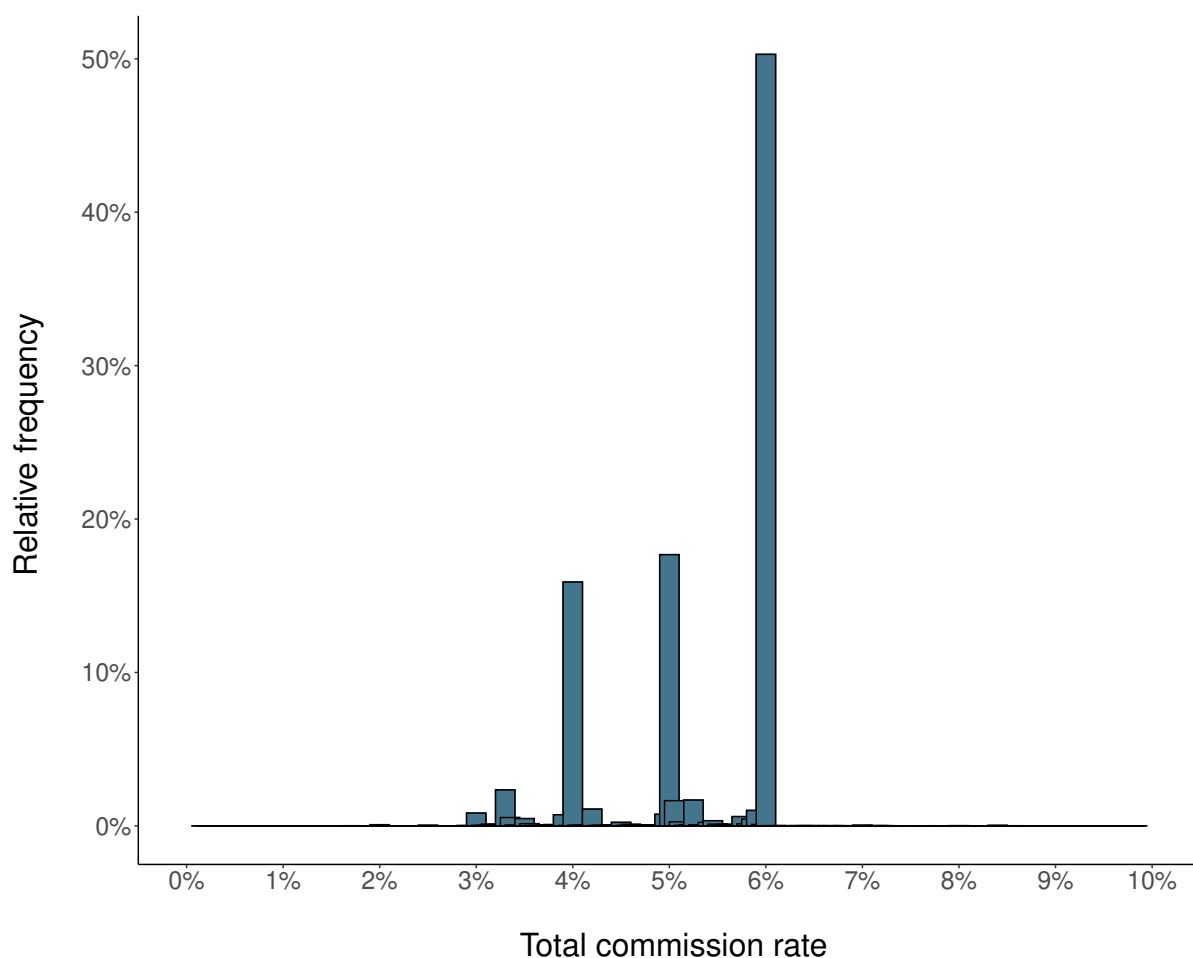
Real estate agents play an important role in German housing markets (Figure A.4). As in most countries, real estate agents in Germany are generally selling agents, meaning that they are initially hired by sellers to list and show the property to potential buyers. Unlike in the US, buyers in Germany search for properties on their own and almost never hire a buying agent. Real estate agents and private sellers alike use independent third-party platforms to offer properties.

Selling agents receive a commission for their service. The commission is a percentage value, henceforth referred to as “commission rate”, of the final selling price.⁷ Although all contracts are purportedly negotiated independently, nearly all total commission rates are either 4%, 5%, or 6% of the final selling price (Figure 1). These rates exclude an additional 19% (16%)⁸ VAT. For ease of presentation, all the commission rates are displayed excluding the respective VATs throughout the paper.

⁷Fixed price commissions are unusual in Germany.

⁸As part of the second COVID-19 relief package, Germany temporarily reduced the VAT rate from 19% to 16% between July and December 2021, that applies to the commission rates of real estate agents. Theoretically, this may affect the demand for real estate agents and housing. However, the empirical analysis shows that the former remains constant, whereas the impact of the latter is marginal: reducing the commission rate of on average 5% by the change in VAT of 3% will unlikely translate into a noticeable price effect for housing.

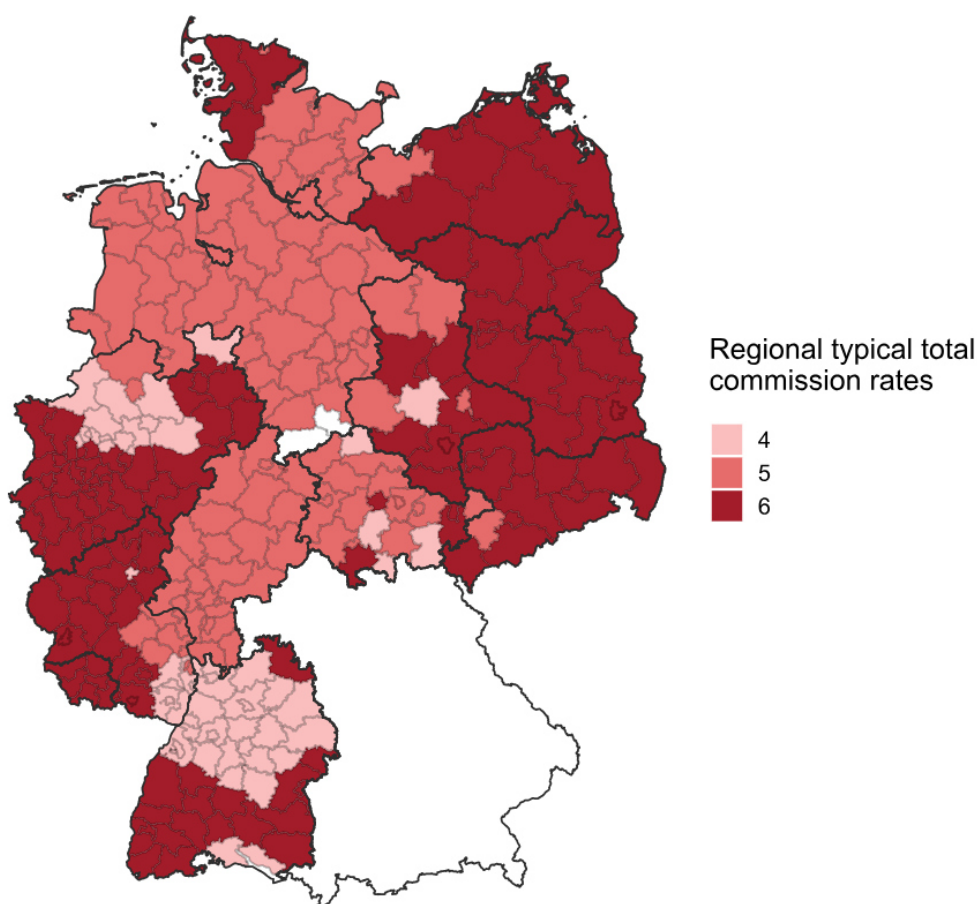
Figure 1: Histogram of Total Commission Rates in the Sample



Note: This figure displays the distribution of total commission rates in Germany over the entire sample period. While the majority of real estate agents either offers 4%, 5%, or 6% commissions, a small share of real estate agents offers lower rates.

These values are often communicated as the respective *regionally typical* commission rate (“ortsübliche Provision”). However, the meaning of this *regionally typical* rate is atypical: the *regionally typical* commission rate seems to refer to the most frequent commission rate (modal value) rather than the arithmetic mean. Furthermore, the different *regionally typical* commission rates do not appear to be tied to any market characteristics; for instance, although one would expect that regions with higher real estate prices would feature lower commission rates, these or similar correlations are not reflected in the data (Figure 2). Interestingly, the empirical distribution of commission rates is left-skewed: as several real estate agents offer rates below the typical rate, the communicated *regionally typical* rate is almost always higher than the actual average commission rate.

Figure 2: District Variation of the Most Frequent Pre-Reform Commissions Rates



Note: The map depicts the *regionally typical* commission rates based on all the listings before the reform in December 2020. Commission rates for the sellers in Bavaria cannot be observed and are therefore excluded.

By international standards, commission rates in Germany are high (Table 1). Compared to structurally similar countries such as the Netherlands and the UK, or countries in northern Europe, commission rates in Germany are two to four times as large for equivalent service offerings, despite similar housing prices to income ratios (Table 1). This notable disparity raises questions about whether typical commission rates represent an equilibrium of a perfectly competitive market and how policy could influence this outcome.

II.2 Legal Reform and Statutory Incidence

While most countries around the world require the seller, who typically hires the selling agent, to also pay the commission, Germany is an outlier. Before the studied reform, sellers could hire their selling agent but could make the buyer pay for the selling agent's

entire commission.⁹ Although a few sellers paid the commission themselves, most sellers made buyers pay the entire commission of the selling agent.

This practice was considered problematic for several reasons. First, the setting may undermine the buyers' efforts to demand a lower commission rate, as real estate agents can exclude potential buyers who seek to negotiate the initially asked commission rate. Second, the system was believed to make the commission cost not salient enough to sellers who are in a better position to demand lower rates. In response, the German federal government passed a reform with the explicit aim of "protect[ing] buyers from exploitation of this [contractual] predicament" (BMJ, 2019) and raising the cost salience for sellers.

The reform defines who pays the statutory commission cost; it was enacted in May 2020 and came into effect as of late December 2020. The original intent of the law was to require only sellers who commission the real estate agent to pay the entire commission (*"Bestellerprinzip"*); however, a compromise was passed to prohibit sellers from making buyers pay more than half of the total commission rate. When establishing a contract with the real estate agent, sellers are now restricted to pay the entire commission themselves or split the commission with the buyer.¹⁰ In practice, sellers now predominantly split the commission equally with the buyer.¹¹ How would this reform affect typical commission rates and selling prices? In the following, I outline a theoretical framework to provide a baseline prediction before empirically studying the impact of the reform in Section IV.

⁹Bavaria followed a special path: Although the payment of the commission was also not regulated, even before the reform commissions were regularly split. Nonetheless, the seller's share was not required to match the commission rate of the buyer. This custom made the seller's commission private information, thus deterring the reliable estimation of the pre-reform level of the total commission rate in Bavaria.

¹⁰Theoretically, other splits are possible whereby sellers pay a higher share than buyers. However, in practice, this approach is virtually never used.

¹¹To enforce that agents do not offer hidden discounts to sellers, buyers must pay their share only after being presented a receipt of the seller's payment. Some real estate agents claim that this additional bureaucracy leads to later payments. However, as this delay concerns merely a few weeks, the additional financial cost can be considered negligible.

III Theoretical Framework

III.1 Prices for Buyers and Sellers

As a starting point, consider the listings for sale by owner, which are not subject to any commission. Let $D(p)$ denote the buyers' demand, and let $S(p)$ signify the supply as a function of price p . $D(p) = S(p)$ yields the equilibrium selling price $p = p'$ when an object is sold directly by an owner.

Introducing a real estate agent adds a commission rate that applies to the final selling price. The total commission rate can be treated as an *ad valorem* tax τ_t , where $t \in \{pre, post\}$ denotes the period before or after the reform. For the moment, I hold the commission rate τ_t fixed around the reform, $\tau_{pre} = \tau_{post}$. To allow for the shifting of the statutory incidence of the total commission rate τ_t between buyers and sellers, the total commission rate τ_t may be split up between buyers τ_t^B and sellers τ_t^S , such that $\tau_t = \tau_t^B + \tau_t^S$.

Prior to the reform, the seller formally made the buyer pay the entire commission, or $\tau_{pre}^S = 0$ and $\tau_{pre}^B = \tau_{pre}$. Note that the commission rate creates a wedge between the price that a buyer must pay $p_{pre}^B = (1 + \tau_{pre}^B)p_{pre}$ and the price that a seller receives $p_{pre}^S = p_{pre}$. Setting $D((1 + \tau_{pre}^B)p_{pre}) = S(p_{pre})$ yields the market clearing price with a real estate agent $p = p_{pre}^*$ before the reform. Assuming that the conditions of a competitive market hold, the distribution of the economic incidence of the commission in equilibrium depends only on the respective elasticities of buyers $\eta^B = (\partial D / \partial p_{pre}^B)(p_{pre}^B / D)$ and sellers $\eta^S = (\partial S / \partial p_{pre}^S)(p_{pre}^S / S)$. Although the buyer formally pays the commission, part of the burden may be passed through to sellers even before the reform.

After the reform, the statutory incidence of the commission rate partially shifts from buyers to sellers. In practice, this requirement means that the statutory payment of the commission rate is split equally. The commission rate consequently changes to $\tau_{post}^B = \tau_{post}^S = \frac{1}{2}\tau_{post}$, which transforms the prices of buyers and sellers to represent the commission-inclusive prices $p_{post}^B = (1 + \frac{1}{2}\tau_{post})p_{post}$ and $p_{post}^S = (1 - \frac{1}{2}\tau_{post})p_{post}$ after the reform.

From a traditional incidence perspective, this partial shift of the statutory incidence is irrelevant: the economic incidence between the parties should be independent of who

pays the commission. Although the statutory shift is predicted to alter the commission-exclusive equilibrium price with a real estate agent, that is, the listing price, such that $p_{post}^* \neq p_{pre}^*$, the commission-inclusive prices that home sellers receive and buyers pay should remain unaffected.

PREDICTION 1: Commission-inclusive prices around the reform remain equal or $p_{pre}^{*S} = p_{post}^{*S}$ and $p_{pre}^{*B} = p_{post}^{*B}$.

A possible complication arises from the nature of the commission rate. The model assumes a fixed rate thus far. However, in contrast to a tax rate that is traditionally set exogenously, the commission rate τ_t is a market outcome shaped by the interaction between the seller and the real estate agent. This requires a more in-depth analysis of the role of home sellers and real estate agents.

III.2 The Incidence of the Commission

In a simple framework, the home seller values the real estate transaction according to a utility function that is quasi-linear around the value of the property,

$$U_{pre}^S = p'_{pre} - a \tag{1}$$

where p'_{pre} again denotes the equilibrium price when not using a real estate agent and a represents the transaction cost to the seller without assistance.¹² Potential buyers are expected to be indifferent to an object presented by the owner directly or through a real estate agent. Before the reform, involving a real estate agent replaces the transaction cost a with the commissioning cost of the real estate agent. This changes the seller's calculation to

$$U_{pre}^S = p_{pre}^{*S} \tag{2}$$

where p_{pre}^{*S} denotes the commission-inclusive price received by the seller. Even though the buyer formally pays the commission, the seller must account for this indirect commission

¹²Assume that a follows some distribution F that reflects the different transaction cost to different sellers. For example, sometimes a seller might want to list an object inherited from a relative living next door, but another seller might have moved to a location afar from the object for sale, which makes conducting viewings prohibitively costly. A heterogeneous distribution of a in the seller population predicts why some sellers list objects on their own instead of using an agent.

cost. Assuming that neither the supply from sellers is perfectly elastic ($\eta^S < \infty$) nor that the buyers' demand is completely inelastic ($\eta^B > 0$), sellers should expect their commission-inclusive selling price with a real estate agent to be lower than when selling alone, $p_{pre}^{*S} < p'_{pre}$. The difference between the equilibrium price without a real estate agent p'_{pre} (when $\tau = 0$) and the equilibrium price with a real estate agent p_{pre}^{*S} represents the effective commission cost borne by the seller, or $p_{pre}^{*S} - p'_{pre}$. To highlight how this commission incidence is composed, one can express the seller's calculation also as

$$U_{pre}^S = p_{pre}^{*S} \equiv p'_{pre} - p_{pre}^* \tau_{pre} \gamma^S \quad (3)$$

where $p_{pre}^* \tau_{pre}$ represents the total commission cost of which the seller bears the pass-through rate denoted as γ^S , with $\gamma^S = 1$ if the entire commission is passed through to the seller and $\gamma^S = 0$ if the seller bears none of the commission. Thus, Equation 3 illustrates that γ^S is critical to the utility of the seller.

Under a rational choice framework, a seller would commission a real estate agent when the cost a of selling alone is larger than the total commission cost induced by a real estate agent $a > p'_{pre} - p_{pre}^S$. Note that the commission burden to the seller should only depend on the economic incidence. After the reform that shifts half of the statutory incidence toward the seller, the pass-through of the economic incidence of a seller γ^S should remain the same. Similarly, as long as the commission cost $p_{pre}^* \tau_t$ remain constant, the decision of a seller to commission a real estate agent should be independent of the reform.

III.3 Commission Rates

Next, we must acknowledge that the commission rate τ_t is a market outcome. This raises the question of whether τ_t remains constant around the reform. In simple terms, the utility of the real estate agent can be denoted as the revenue, $p_t \tau_t$, minus the cost c of the transaction:

$$U_t^A = p_t \tau_t - c \quad (4)$$

Assuming that the pre-reform commission rate τ_{pre} reflects the equilibrium rate, the incidence analysis suggests that the utility of buyers and sellers should not change around the reform. Since the commission burden is determined only by the elasticity of sellers

and buyers, the sellers' commission burden and their demand for the services of real estate agents remain the same after the reform. Moreover, the statutory shift leaves the cost of real estate agents unaffected, implying that their supply remains unaffected. Even though the incidence framework is primarily established in the context of an exogenously set *ad valorem* tax, the statutory reform should not affect any of the endogenous forces that determine the interaction between buyers, sellers, and real estate agents. Thus, the subsequent analysis follows the principle of the liability side equivalence and assumes that no one is better or worse off as a result of the reform.

However, note that a real estate agent's revenue relies on the equilibrium price p_{pre}^* to which the commission rate τ_{pre} applies. Pre-reform, sellers did not bear any statutory commission cost, making the equilibrium price with a real estate agent p_{pre} equal to the price that a seller receives, $p_{pre} = p_{pre}^S$. Post-reform, sellers pay half of the statutory commission. Assuming that the elasticities for buyers and sellers remain constant, the additional statutory commission cost are added to the commission-exclusive selling price. This leads to the new equilibrium selling price p_{post}^* that ensures that sellers receive the same commission-inclusive price as before. In other words, while the framework predicts commission-inclusive prices for sellers to remain the same around the reform $p_{pre}^{*S} = p_{post}^{*S}$, the new equilibrium selling price of an object p_{post}^* must increase by the fraction of the statutory commission rate $\frac{1}{2}\tau_t$ that sellers now pay.

The adjustment of the commission-exclusive selling price p_{post}^* ensures that buyers and sellers receive the same prices post-reform. However, note that this increase would affect the earnings of a real estate agent, as the commission rate τ_{pre} applies to the higher equilibrium price $p_{post}^* = (1 + \frac{1}{2}\tau_{pre})p_{pre}^*$. This increase by $1 + \frac{1}{2}\tau_{pre}$ would raise the earnings of a real estate agent by the same proportion. Yet, within the assumptions of a traditional incidence framework, the nature of the reform should not affect the market power of sellers, buyers, or real estate agents. Consequently, the market conditions and nominal revenues of real estate agents are expected to remain the same.

For this case to hold, the commission rate τ_{post} must decrease to offset the expected higher selling price p_{post}^* to which the commission rate applies. Since the commission-exclusive selling price increases to $p_{post}^* = (1 + \frac{1}{2}\tau_t)p_{pre}^*$, the post-reform commission rate must decrease proportionately, that is $\tau_{post} = \frac{\tau_{pre}}{1 + \frac{1}{2}\tau_{pre}}$. This prediction upholds the liability

side equivalence, ensuring that a statutory shift, which should not affect the market conditions for any party, leaves the outcome for all parties unaffected. Nevertheless, in Germany, where the size of τ_{pre} typically ranges between 4% to 6%, the expected change in τ_{post} is relatively minor.¹³

PREDICTION 2: Nominal commission rates are slightly lower after the reform or $\tau_{post} = \frac{\tau_{pre}}{1 + \frac{1}{2}\tau_{pre}}$.

The incidence framework and its predictions provide a benchmark from the perspective of standard economic theory. In the next section, I empirically test the commission rate and the commission-inclusive prices around the reform to examine the predictions of the standard model against alternative interpretations.

IV Evidence From a Legal Reform in Germany

IV.1 Data

To analyze the reform, I use data from the leading real estate platform in Germany. The data are provided by ImmobilienScout24 and kindly published by the RWI Essen (Schaffner, 2022). This sample offers the largest base of detailed listings, which also maintains consistent records of seller types and commission rates. Another strength of the data is the mixed-user base. The platform is popular among real estate agents and for sale by owners.¹⁴ Nonetheless, listings offered by real estate agents dominate and do so consistently (Figure A.4). Featuring around half a million listings between January 2018 and June 2022, the data provide a comprehensive overview of real estate listings for the 18 months before and after the reform (Table 2).

¹³For instance, assuming that selling prices p_{post}^* fully adjust to the statutory shift, a pre-reform commission of $\tau_{pre} = 6\%$ would be expected to decrease to $\tau_{post} = 5.825\%$. Table A.1 provides a numerical example to illustrate the incidence framework in more detail.

¹⁴Opposed to e.g. the Netherlands, a property listed by an owner instead of a real estate agent is not perceived as suspicious and considered normal. This is important for the later analysis where I compare prices of objects listed by a real estate agents to those listed by owners directly.

Table 2: Summary Statistics of Listing Characteristics

	Full Sample				Houses	Flats
	Mean	Std. Dev.	Min	Max	Mean	Mean
Price (€)	336,484	233,137	20,001	2,499,000	402,333	280,291
Floor space	108.50	49.49	15.00	250.00	144.07	78.15
Price per m ²	3,210	1,670	97.51	11,995	2,830	3,535
Construction year	1961	40.48	1000	2018	1958	1963
Rooms	4.00	1.88	1	15	5.38	2.82
Time on market (in days)	31.36	37.30	1	365	31.90	30.90
Listing offered by real estate agent (0/1)	0.87	0.34	0	1	0.87	0.86
Commission rate* (in %)	5.27	0.92	0	12.56	5.27	5.28
Observations	560,160				257,895	302,211

Note: *Commission rate only considers listings by real estate agents ($n = 484,964$) and depicts the net total commission rate excluding VAT as percentage value of the final selling price.

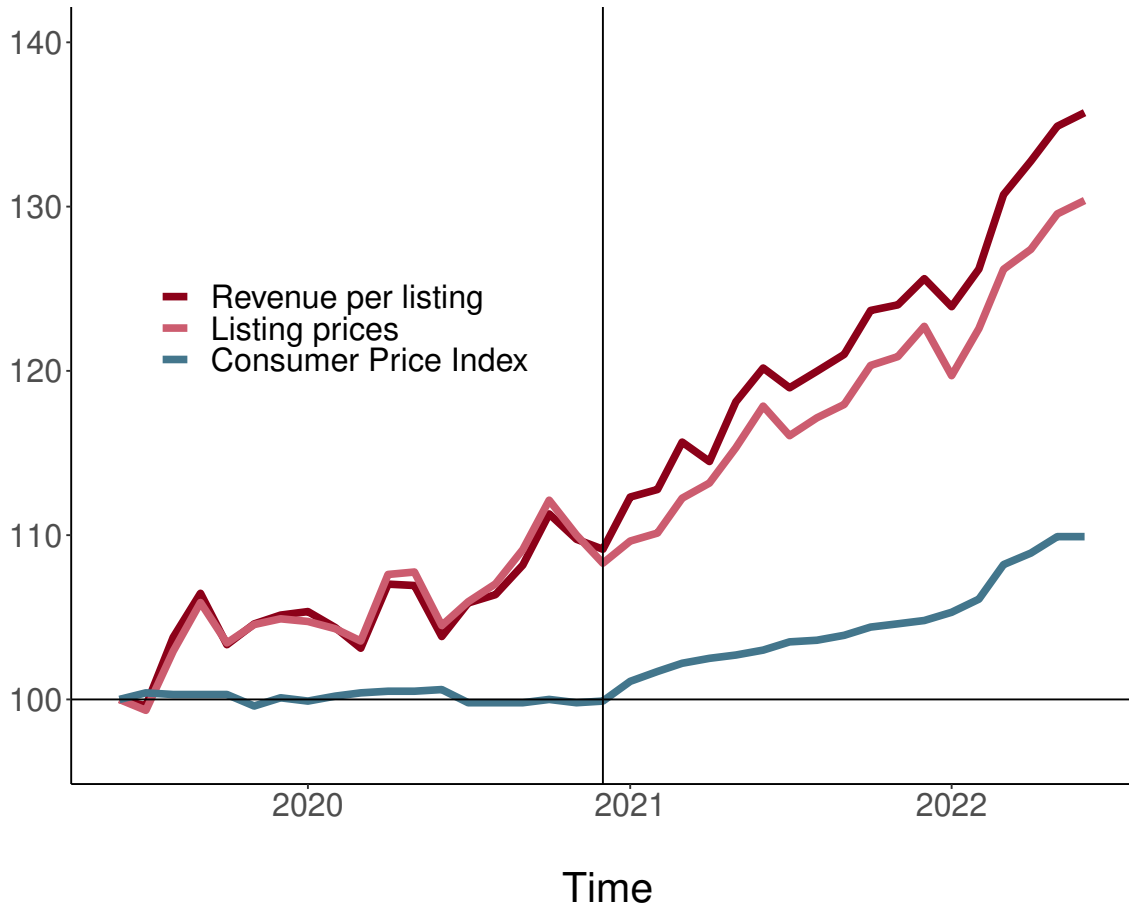
Other variables used in the analysis include the type of property (house or flat), numerous categories for each type (e.g. semi-detached or single-family for houses; ground-floor apartment or penthouse), multiple levels of furnishing and condition, and other individual characteristics, e.g. availability of a balcony or a parking space.

The purpose of the analysis naturally implies certain restrictions on the data. As the reform only applies to non-commercial transactions of residential property between private individuals, offers by commercial actors and developers are omitted. Thus, I only consider constructed apartments and houses. For the same reason, I exclude the small share of listings featuring specific property types unaffected by the reform, such as entire apartment buildings with multiple flats. Listings where sellers pay the entire commission and the level of commission rates is unknown are excluded. For similar reasons, Bavaria is not included in the sample: even before the reform, commissions were split but not always equal. Since this makes the share of sellers is private information, total rates cannot be observed before the reform. Furthermore, one must note that the detailed property characteristics of each listing are not obtained from official records but are entered manually. Therefore, some listings display improbable values, typos, or plain errors. These require further processing described in Appendix I.

The resulting sample appears to represent the real estate market in Germany well. Although the platform is marketed toward more urban and premium customers, this imbalance is only partially reflected in the sample. A comparison of average prices in the sample to the notarized prices of aggregated real estate transactions in Germany indicates proportional price levels across regions (Figure A.1).

Descriptively plotting the trend of prices and commission revenues ($\tau \times p$) of each listing in Figure 3 provides first indications of increasing commission rates.

Figure 3: Commission Revenue per Transaction Over Time



Note: The figure describes the approximate revenues ($p \times \tau$) of real estate agents per listing in the sample against the trajectory of housing prices and the official consumer price index for Germany (Destatis, 2023). All trends have July 2019 as starting point (= 100). Next to the windfalls from rising housing prices, revenues begin to decouple after the reform, pointing to an increase in average commission rates beyond the rate of inflation.

Even in the short period before the reform, the increase in housing prices exceeds the rate of inflation, generating large windfall revenues per object for real estate agents.¹⁵ Moreover, from the reform onward, commission revenues outpace the increase in housing prices, pointing to rising commission rates. Whereas commission revenues averaged €16,786 in the beginning of the sample in June 2019, they increased disproportionately stronger to €20,873 by June 2022. Taken together, these initial observations provide a strong motivation for a closer examination of commission rates around the reform. Moreover, the descriptive nature of these observations requires careful inspection. For example, the evidence in Figure 3 cannot rule out that the increase in commission rates is caused

¹⁵Note that my figure only displays the tail of a long trend. Real house prices in Germany increased by 30% since 2010.

by a change in the characteristics of the offered housing stock which might correlate with commission rates. To address this shortcoming, I perform an event study in the next section.

IV.2 Method

Beginning with the commission rate as dependent variable, I estimate the equation:

$$\tau_{i,t} = \sum_{t=-18}^{-8} \delta_t m_t^{Pre} + \sum_{t=-6}^{18} \delta_t m_t^{Post} + \alpha X_i + \lambda_r + \epsilon_{i,r,t} \quad (5)$$

where the m_t^{pre} and m_t^{post} respectively represent the key dummies for the 18 months before and after the reform. The coefficients δ_t are the key estimates, capturing changes in the total commission rate τ over time. To account for anticipation before the reform came into effect, I define the enactment in May 2020 ($t = -7$) as the reference period. The commission rate τ could depend on the characteristics of properties i , which may change around the reform; thus, vector X_i controls for relevant characteristics.¹⁶ Lastly, I include λ_r to control for regional fixed effects on the zip-code level, the latter is also used to cluster standard errors.

Next to potential changes in the commission rate, I study how prices respond to the reform. Therefore, I modify Equation 5 in order to exploit the context that the platform is used not only by real estate agents but also by owners for direct sale. These listings provide an interesting benchmark for two reasons.

First, an object listed for sale by owner is “untaxed” by the commission rate of a real estate agent. Assuming that, aside from the commission, buyers are indifferent if an object with given characteristics X_i is presented by a real estate agent or the owner directly, then these listings serve as references unaffected by the reform. Any remaining price difference would reflect the effect of the commission rate on prices.

¹⁶The characteristics include month of the listing; (squared) floor and lot size; furnishing (e.g. deluxe or simple); condition (e.g. needs renovation or is modernised); number of rooms; heating type. Furthermore, I include dummies for the availability of a balcony; parking space; garden; kitchen; or basement. Since the effect of the construction year appears nonlinear, I create construction year dummies for 10-year strata. Furthermore, vector X_i includes an indicator for whether a property i is rented or not with a state interaction term to capture differences in tenant protection laws that vary by state. Regional variations in price trends are captured by interacting monthly dummies with the degree of urbanization (“*Siedlungsstrukturelle Kreistypen*”) following Dolls, Fuest, Krolage, and Neumeier (2021).

Second, comparing listings from real estate agents to the ones for sale by owner can reveal the economic incidence. Price differences between these listing types would indicate the distribution of the economic incidence between buyers and sellers.

I empirically estimate the effects around the reform on the commission-inclusive prices separately for buyers ($j = B$) and sellers ($j = S$) with

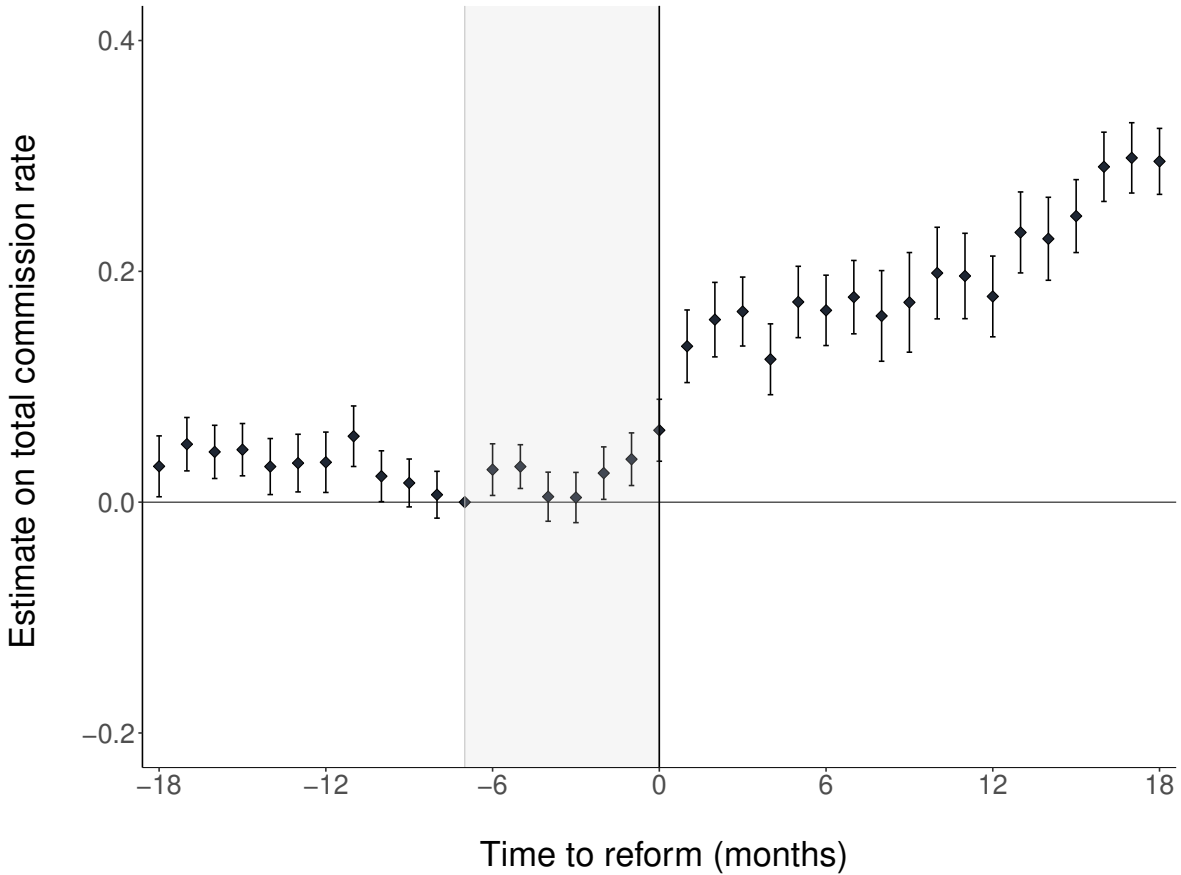
$$\log(p_{i,t}^j) = \sum_{t=-18}^{18} \beta_t m_t \times A_i + \alpha X_i + \lambda_r + \epsilon_{i,r,t} \quad (6)$$

where $m_t \times A_i$ indicates dummies for month m_t with an interaction term for a listing i when offered through a real estate agent ($A_i = 1$) or through the homeowner directly ($A_i = 0$). This interaction term captures the within month difference to listings for sale by owner that serve as the reference group. Otherwise, the right-hand side is identical to Equation 5.

IV.3 Results

I begin with the analysis of commission rates around the reform. Recall that the incidence framework predicts that commission rates remain approximately neutral. The empirical estimates displayed in Figure 4 clearly reject this notion.

Figure 4: Event Study Estimates for Total Commission Rates Around the Reform



Note: The figure plots the event study estimates for the total commission rate. The underlying model controls for relevant property characteristics and uses regional (zip) fixed effects. Standard errors are clustered on zip codes and represent 95% confidence intervals. As the law was enacted in May 2020 and came into effect in December 2020, I use May 2020 ($t = -7$) as the reference period. The total net commission rate displayed is adjusted for the temporary VAT decrease in Germany six months before the reform between July and December 2020.

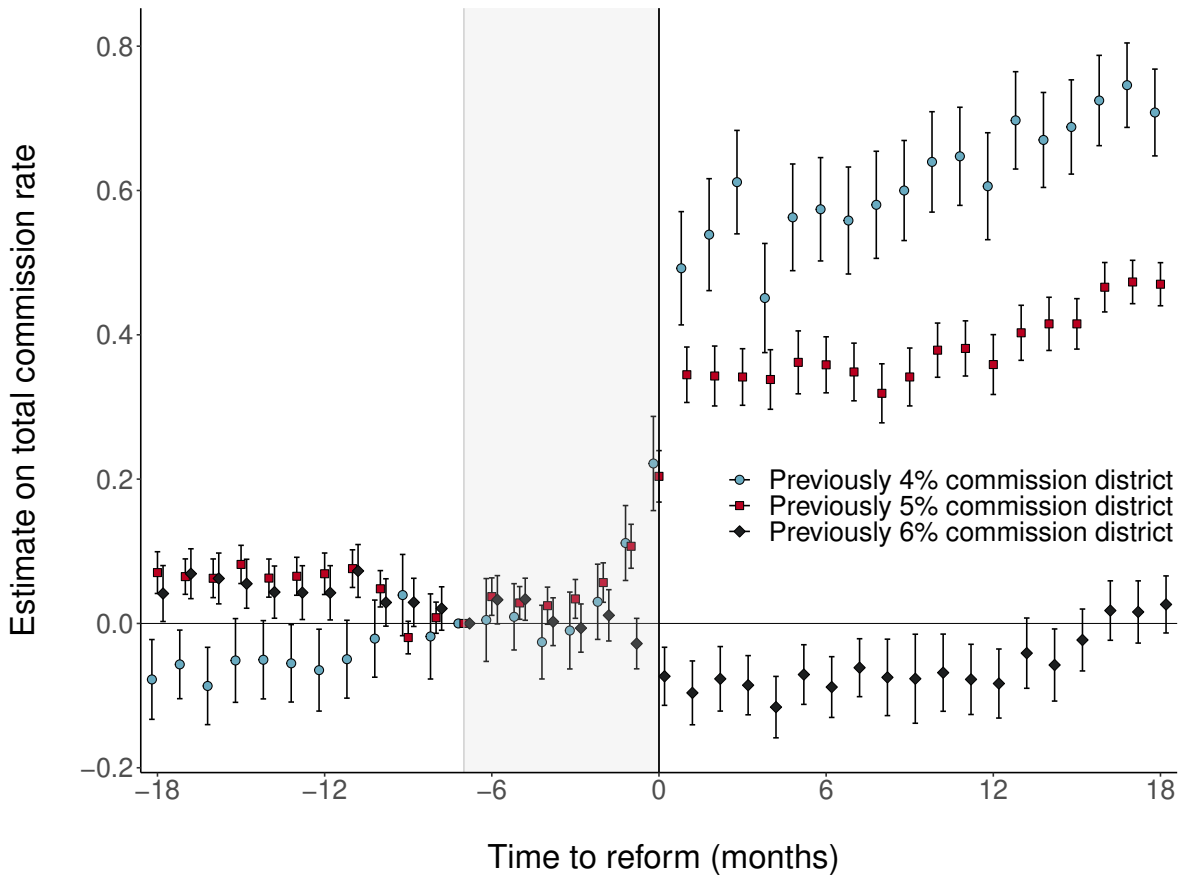
Commission rates are stable before the reform. However, after the enactment of the law in May 2020 ($t = -7$), commission rates begin to increase and rise sharply when the law came into effect in December 2020 ($t = 0$). I find that within one year, the total commission rate τ_{post} is on average 0.2 percentage points larger. After 18 months, the commission rate τ_{post} is 0.3 percentage points above pre-reform levels τ_{pre} . On average, this increase corresponds to an additional €956.32 per transaction.¹⁷

Figure 4 displays the average effect of the reform. Studying heterogeneity reveals important details. As Figure 2 illustrates, total commissions rates differ regionally before the reform. Although regions with previously either 4%, 5%, or 6% as their typical

¹⁷Based on the average property price of €318,775 in the sample throughout the enactment month.

commission rate also feature listings with lower or higher rates, exploiting this pre-reform variation reveals the strategy of the increase. For this purpose, Figure 5 presents the estimates when the sample is split by regions and their most frequent commission rates before the reform.

Figure 5: Event Study Estimates for Total Commission Rates Split by Pre-Reform Regions



Note: The figure shows the event study estimates for total commission rates using the sample split by regions according to the most frequent commission rates as shown in Figure 2. The underlying models control for relevant property characteristics and use regional (zip) fixed effects. Standard errors are clustered on zip codes and represent 95% confidence intervals. The law was enacted in May 2020 and came into effect in December 2020; hence, I use May 2020 ($t = -7$) as the reference period. The total net commission rate displayed is adjusted for the temporary VAT decrease in Germany six months before the reform between July and December 2020.

The trajectory of commission rates in the different regions is similar before the reform, but it diverges right before the reform came into effect in $t = 0$ and strongly separates thereafter. Regions with a total commission rate of typically 4% before the reform see the strongest increase of 0.7 percentage points after 18 months. Similarly, districts with a predominant commission rate of 5% are subject to an increase of 0.4 percentage points.

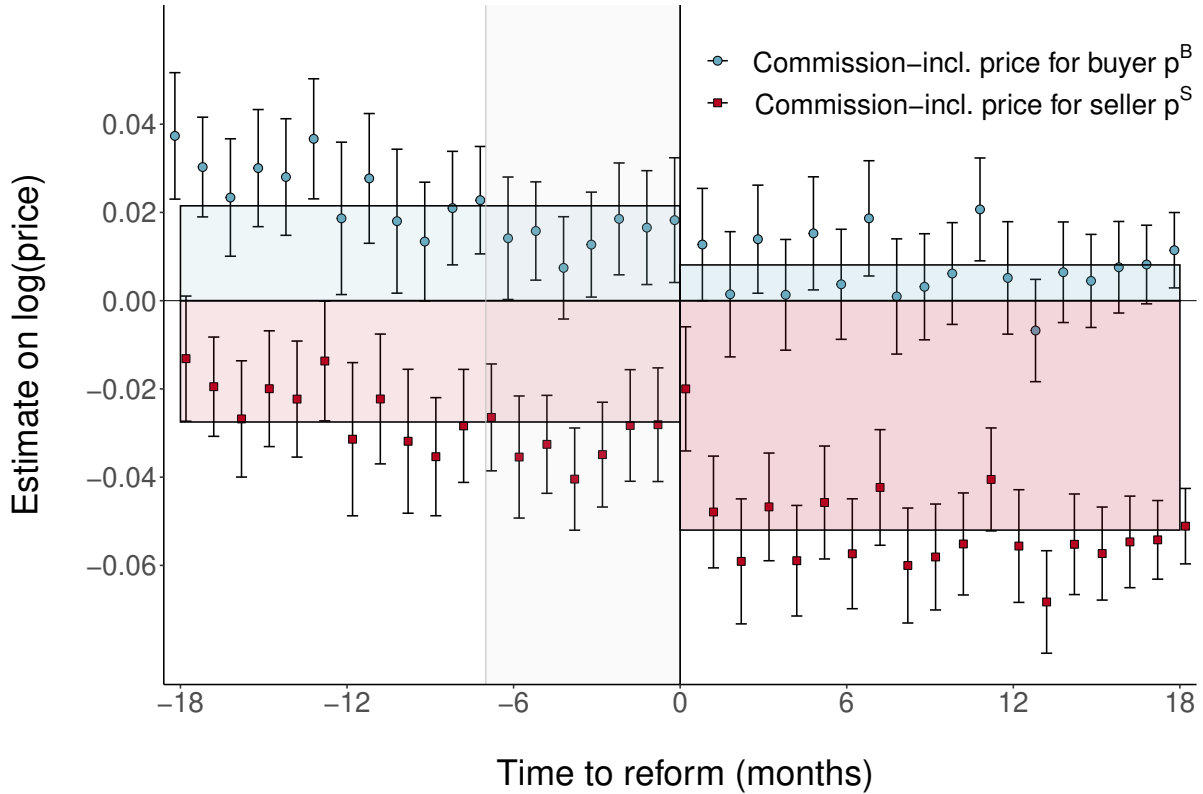
Although numerically small, this value translates into raw increases for revenues of commission services by 18% and 10%, respectively. In absolute terms, this corresponds to additional revenues of €2,231 and €1,275. However, note that even this raise does not yet consider the general increase in housing prices depicted in Figure 3.

By contrast, commission rates in districts that previously featured the highest values remain relatively stable. The heterogeneous response to the statutory shift hints at the strategy of most price increases: in regions where buyers previously paid 4% or 5% as the entire commission, several real estate agents switched to asking 3% from both parties after the reform, allowing the total commission rate to converge to the 6% level that already persisted in several other regions. In these cases, the commission fee for the transaction of an averaged priced home increased by approximately €6,000 and €3,000, respectively.

This structure is supported by descriptive evidence (Figure A.2 and A.3). Interestingly, sellers' demand for real estate agent services appears unaffected by this. The probability of using a real estate agent does not appear to change around the reform (Figure A.7).

I continue with the estimation of commission-inclusive prices. Figure 6 presents the estimates of Equation 6 with logged commission-inclusive prices for buyers and sellers. Recall that the estimates display the effect of listings offered by a real estate agent compared to the reference of listings for sale by owner. The distance between the estimates for buyers' and sellers' prices corresponds to the total commission τ_t . Consequently, the ratio of the estimates to the distance between the estimates of both parties can be interpreted as the share of the commission economically borne by buyers and sellers.

Figure 6: Event Study Estimates for Commission-Inclusive Prices for Buyers and Sellers Around the Reform



Note: This figure presents the event study estimates on the (log) commission-inclusive prices for buyers and sellers. The colored boxes display the average effect before and after the reform. The underlying model controls for relevant property characteristics and uses regional (zip) fixed effects. Standard errors are clustered on zip codes and represent 95% confidence intervals. To account for anticipation effects, the model uses $t = -7$ (May 2020) as the reference period when the reform was announced and was passed by the German Parliament. The reform came into effect in $t = 0$ (December 2020).

I find that commission-inclusive prices for buyers $p^B = (1 + \tau_t^B)p_t$ (blue) are only modestly impacted by the reform. Although p^B appears to be slightly decreasing in the beginning of the sample, prices seem stable around the months when the reform came into effect. Compared to the enactment month $t = -7$, buyers' prices are on average 0.8% lower than before, bringing them closer to the price of listings that do not involve any real estate agent.

By contrast, the commission-inclusive prices p^S (red) that sellers receive diminish notably. Post-reform, sellers exhibit an approximately 2% lower price than before. The incidence model predicts that the statutory shift of the commission from buyers to sellers would be fully offset by a higher listing price but the results do not support this adjustment. The raw listing prices only partially compensate the statutory shift of the reform

(Figure A.5). Initially, sellers appear to receive lower prices with a real estate agent, which diminish further after the reform. This trend is robust to a wide scope of control variables (Figure A.6).

The event study also supports the previous assumption that a non-trivial share of the economic incidence of the commission is on the sellers. Note that the seller's pass-through rate can be expressed as the ratio of the seller's commission cost and the total commission cost, or $(p'_t - p_t^S)/(p_t^B - p_t^S)$. This pass-through is provided by the empirical estimates in Figure 6, which display the seller's commission cost (red boxes) in relation to the total commission cost illustrated by the wedge between sellers' and buyers' prices (red and blue boxes). These estimates suggest that sellers bear between 56% and 87% of the economic incidence of the commission. This corroborates the assumption that sellers bear a non-zero commission share, even before the reform.

These results should be interpreted with care as the data reflect listed prices and the interpretation assumes objects for sale by owner to approximate the untaxed equilibrium price p'_t . Nonetheless, they align well with the theoretical considerations of the fixed quantity of supply in housing markets, and empirical research on real estate transfer taxes: recent evidence in developed countries suggests that tax increases on real estate transactions mostly fall on sellers (Kopczuk & Munroe, 2015; Dolls et al., 2021).

Overall, the key findings highlight a quantitatively and statistically significant increase in the total commission rates following the reform. Comparing listings by real estate agents to objects without any commission further indicates that prices largely fail to adjust to the statutory shift and that it is sellers who bear most of the commission incidence. Both findings contradict the theoretical predictions from a standard incidence framework. Thus, I consider alternative ways to interpret my findings next.

IV.4 Interpretation

The results suggest that the policy reform not only failed to lower commission rates, but also even backfired. Parallel to continuously rising real estate prices, several real estate agents increased their commission rates after the reform. What triggered this response? Home sellers commission the real estate agent, negotiate the commission rate with the agent, and, as the analysis of prices that sellers receive indicates, home sellers bear most

of the commission cost. As a result, sellers should have an incentive to induce competitive pressure by contracting real estate agents offering lower rates.

The results point to inattentive home sellers. Recent findings suggest that individuals may underreact to taxes (e.g. Chetty et al., 2009; Bradley, 2017) or cost (e.g. Gabaix & Laibson, 2006; Heiss, Ornaghi, & Tonin, 2023) with lower salience. Since the commission rate of real estate agents represents both, limited salience of the commission could explain inattention. However, within my setting, increasing salience does not unfold as planned. Assuming a limited visibility of the commission previously, the reform specifically aimed to raise salience by forcing sellers to pay real estate agents explicitly. Yet the results indicate that this increased salience did not increase attention.

The incidence framework marks two alternative gateways to interpret my results. As illustrated in Equation 3, the commission rate τ_t and the pass-through rate γ^S are essential to the seller's commission cost. Focusing on these components, I suggest two other mechanisms to interpret the increase and reconcile the findings with other peculiarities of the German market for real estate agents.

Incidence Neglect. The first interpretation focuses on seller's perception of their economic incidence. Before seeking lower commission rates, a seller must expect a benefit from reducing the commission rate. However, the difficulties of the real estate market, namely limited experience, insufficient learning, and information asymmetries, fully extend to the market for real estate agents. As a result, sellers do not have information on their share of the commission incidence γ^S . If sellers believe that buyers bear all commission costs anyway through a higher selling price, then a seller would not expect a benefit from a lower commission rate.

The empirical evidence suggests that the incidence borne by home sellers is not trivial (Figure 6). This aspect sharply contrasts to the marketing efforts by real estate agents. Recurring lawsuits¹⁸ show that real estate agents regularly claim to fetch the highest possible prices for sellers, although stating such claims is prohibited by law. Highlighting the ability to fetch higher prices may signal to sellers that their incidence burden is close to zero.

Considering how limited sellers are in their ability to infer the true pass-through rate,

¹⁸See State Court Berlin (2020) Az. 52 O 125/19 or State Court Hamburg (2020) Az. 312 O 367/19.

overlooking the economic incidence could explain why sellers underreact to commission fees. I hypothesize that real estate agents cater to this neglect by concealing information that would indicate that the commission cost is partially passed-through to sellers in the form of lower selling prices. However, the incidence neglect of sellers can only explain a generally low level of attention to the commission cost. To interpret the commission rate increase, I argue that attention to the commission rate is influenced by reference commission rate.

Reference Commission Rates. Many home sellers commission a real estate agent only once every few decades. To judge the commission rate τ_t , I suppose that sellers compare the offered rate against what they perceive as the current typical rate $\bar{\tau}_t$. Recall that the industry term of the *regionally typical* commission rate encapsulates this idea. Building on previous work on inattention (e.g. Bordalo et al., 2019) and non-binding retail prices (Puppe & Rosenkranz, 2011; Bruttel, 2018), I hypothesize that attention to the offered commission rate depends on the distance between the offered rate τ_t and the currently perceived typical rate $\bar{\tau}_t$. In other words, if sellers have no historical benchmark and see that the offered commission rate τ_t is equal to what others currently seem to pay $\bar{\tau}_t$, then why should they negotiate?

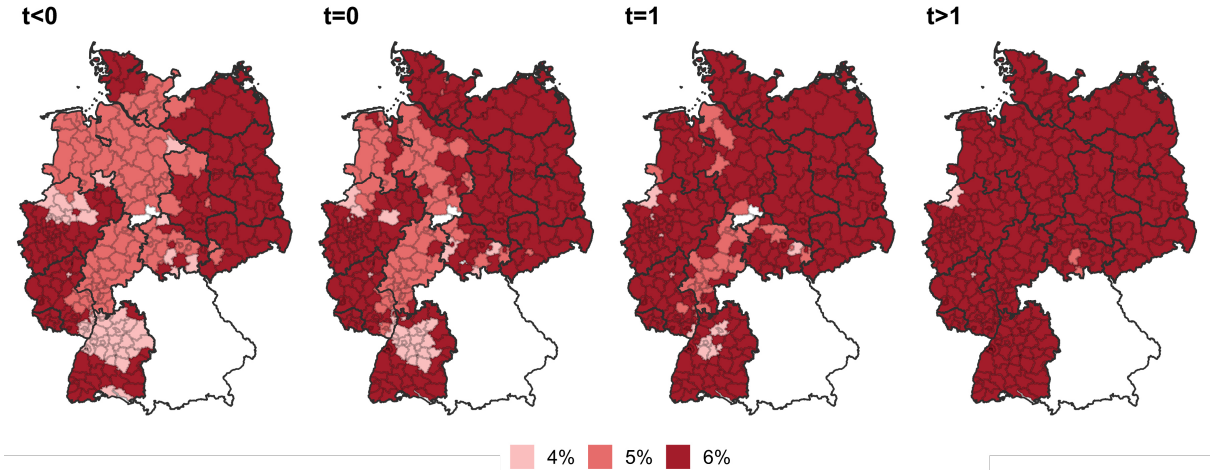
The influence of reference rate can also account for the nature of the increase (Figure 5): the statutory shift forced real estate agents to adjust their commission rates that they display in listings.¹⁹ As a result, several offers listed the adjusted commission rates, whereas others still displayed old rates meant to be only paid by buyers around the date of the reform. A seller that observes the market only at this point in time cannot identify a dominant reference rate. Instead, sellers could perceive both, lower and higher rates, as regionally typical.

Furthermore, the idea of reference rates can explain the apparent upper bound of rates at 6%. While a real estate agent charging a 6% rate can always point to a region where 6% *regionally typical* rates already existed before the reform, a higher rate of e.g. 7% would be highly conspicuous with no reference rate to refer to. However, if an adjacent region already had 6% as the *regionally typical* rates, then real estate agents raising their

¹⁹Recall that previously, these rates were mostly 4%, 5%, or 6% for the buyer only. Afterward, these values should have halved. Yet, Figure 5 indicates that many real estate agents switched from a 4% or 5% commission rate paid by the buyer to a 3% rate paid by both.

rates from 4% or 5% could more easily refer to this higher level. This is consistent with the cascading path of the increase (Figure 7).

Figure 7: Regional Spread of the Commission Increase

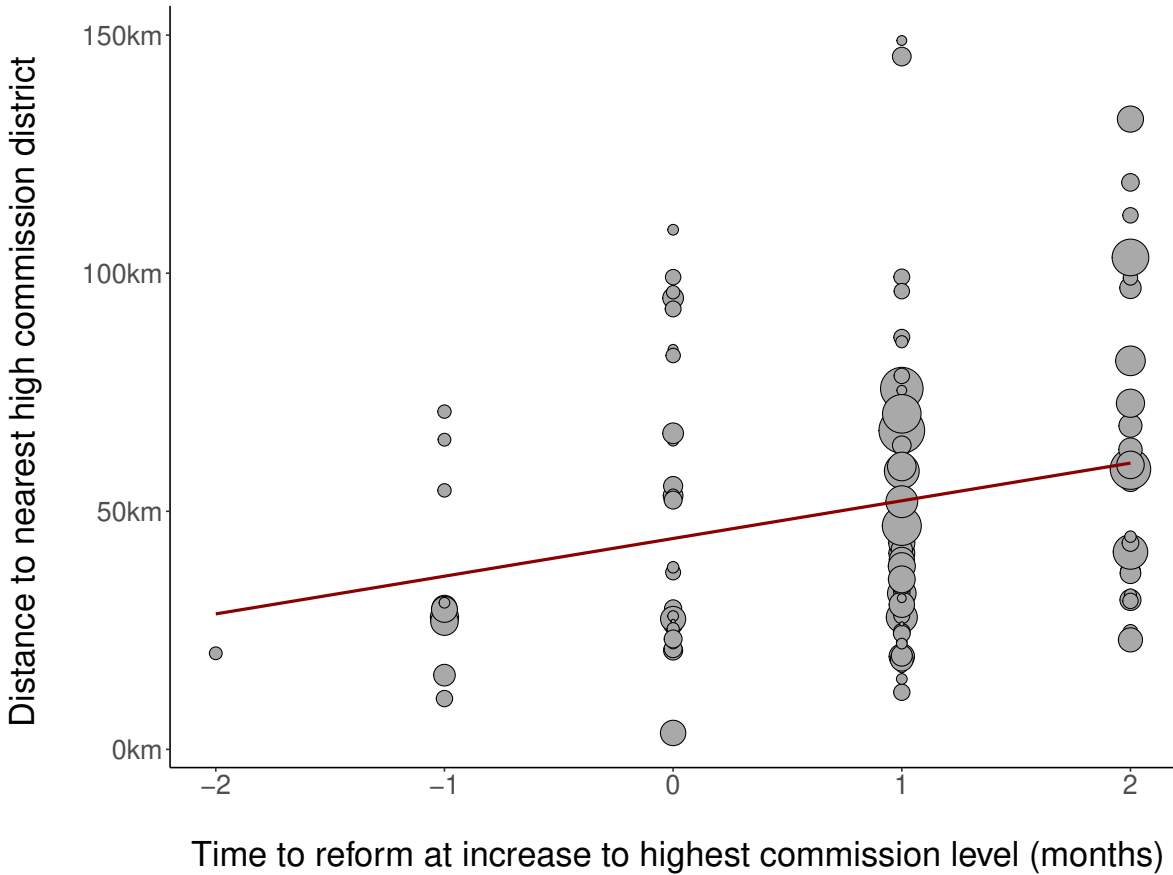


Note: The maps display the *regionally typical* commission rates around the reform in December 2020 ($t = 0$) based on three-month moving averages. Rate increases spread from high- to low-commission regions.

The increases gradually spread from high- to low-commission regions. Low-commission regions close to high-commission regions are the first to increase commission rates, whereas those in the center of larger low-commission areas are the last (Figure 8).²⁰

²⁰As an example, imagine two adjacent regions where one has a high typical commission rate (i.e. 6%), while the other has a lower typical rate (e.g. 5%). The *regionally typical* rate implies that in an area overlapping the border of the regions, the frequency of both, high and low rates, is similar. I argue that in such bordering regions, only a few real estate agents in the lower region must switch to higher commission rates to establish these higher commissions as the new *regionally typical* rate.

Figure 8: Timing of Increases vs Distance to High-Commission Districts



Note: The figure illustrates the time when the regionally typical commission rate of a previously low-commission district of 4% or 5% increased to the highest rate of 6% in relation to the distance to the nearest high-commission district. Each dot corresponds to one district, where the size of the dot is proportionate to the number of listings per region. On average, regions that are farthest from high-commission districts are among the latest to establish the highest level of 6% as *regionally typical* rate.

Similar to exploiting the confusion about the economic incidence, I hypothesize that real estate agents could act upon the influence of the reference rate by attempting to inflate the *regionally typical* rate that is often used for reference.

In the next section, I examine both interpretations and test if real estate agents respond strategically to sellers' incidence neglect and the influence of reference rates.

V Evidence From a Randomized Survey Experiment

The findings in the first part of this paper suggest that sellers could be inattentive to the commission cost. I interpret this inattention as a result of sellers' neglect about their economic incidence and the influence of reference commission rates.

In the following, I present a survey experiment to further validate these accounts. First, I seek to verify if home sellers are inattentive to the commission cost. Second, I examine my previous interpretation in more detail: if sellers are uncertain about their economic incidence and substantially influenced by reference rates, real estate agents may respond strategically to these channels. As a result, I hypothesize that real estate agents inflate their capacity to fetch higher prices and the level of reference commission rates.

V.1 Subject Pool and Design

The survey experiment was run with currently active real estate agents from the three largest real estate platforms in Germany.²¹ I contacted the candidates by email over two weeks in November 2022. In return for participation, subjects received an exclusive report of the survey results to e.g. optimize their marketing strategies. Out of 1,315 respondents who started the survey, 1,146 finished it with 1,062 completing all the questions.²² To test for selection effects, I estimate the participation of subjects conditional on measurable characteristics (Figure A.11). The results indicate that responses appear uncorrelated with the size of a firm and seem regionally balanced.

In the first section, the survey inquired about factors which real estate agents believe to be important to their customers. Although mainly asked to spark interest, one question also asked to estimate the current *regionally typical* commission rate in their state. Later, this estimate serves as a baseline for one of the incentivized experimental questions.

In the second section, real estate agents had to consider their most recent home seller only.²³ Next to demographics, this part is critical to understand the role of sellers in the commission rate increase: subjects were asked whether or not the home seller tried to demand a lower commission rate when signing them as a real estate agent.

The third section contained the randomized experiment. Two incentivized questions

²¹Although I originally planned to survey home sellers who directly commissioned a real estate agent, reaching this population was not possible without either deceiving real estate agents or violating the German interpretation of the European General Data Protection Regulation.

²²The survey achieved a response rate of 7.8%, considering that 5% of the invitations bounced back due to expired addresses, full mailboxes, or spam protection and that I collected 15,441 e-mail addresses from active listings to begin with.

²³Limiting the focus to only the most recent seller has two advantages. First, this approach reduces distortions by particularly memorable customers and mitigates social desirability concerns. Second, a question asking for the general share of customers who demand a lower commission may trigger concerns of revealing illicit competitive practices; by contrast, the behavior of a single home seller cannot be traced back to the potentially distorting behavior of the real estate agent.

seek to test if real estate agents strategically exploit sellers' potential incidence neglect and the influence of the reference commission rate.

For the incidence neglect, one question asked real estate agents' to estimate the average price difference between the listings of real estate agents and statistically similar listings for sale by owner. In essence, this question assesses real estate agents' perception of the incidence effects measured in the first part of this paper.

For the influence of reference rates, another question asked for an estimate of the average (arithmetic mean) commission level in their region. Comparing this value to their estimate for the *regionally typical* commission level aims to detect whether real estate agents are aware of the gap between the oft-communicated industry term and the empirical average.

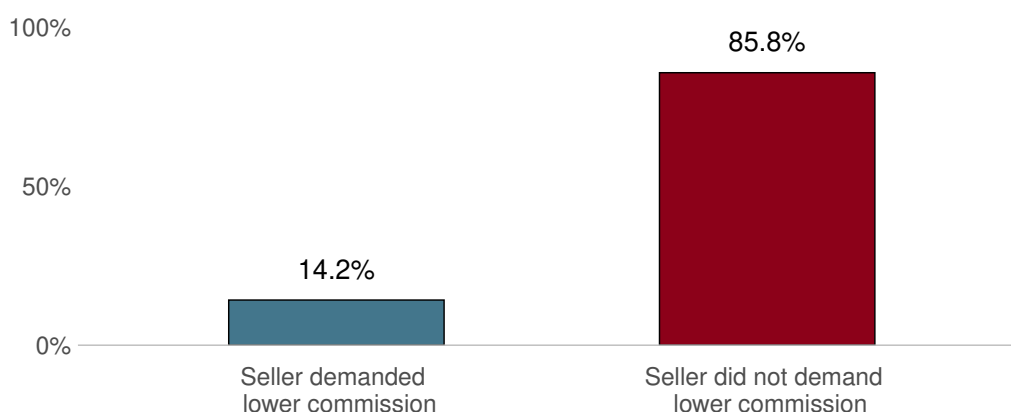
To detect whether real estate agents may withhold information strategically, one of the two experimental questions was randomly incentivized: the survey offered €5 in the form of an Amazon gift card if their estimate matched the outcome of my empirical analysis. To mitigate any spillover effects, the experimental questions were also randomized in order. Appendix II provides the translated copies of the invitation e-mail, the welcome page, and the questionnaire.

V.2 Results

The results are presented in two parts: I begin with descriptive evidence on the frequency of home sellers demanding lower commission rates. Verifying that most home sellers do not seek lower commissions, I subsequently present real estate agents' beliefs for the underlying reasons. Although these results are descriptive, they are consistent with the findings from the randomized experimental questions, which are presented in the final part of the results.

Descriptive Evidence: Low Demand for Low Commissions. To test if sellers fail to demand lower commission rates from real estate agents, the survey asks whether the most recent home seller of the real estate agent tried to negotiate the commission. I find that less than 15% of home sellers demand lower commission rates (Figure 9).

Figure 9: Share of Home Sellers Demanding a Lower Commission Rate



Note: This plot illustrates the distribution of responses for the survey item “Did your last customer negotiate the commission rate, or not?”. Most sellers do not appear to seek lower commission rates.

The surprisingly low willingness to negotiate merits a reassessment. Although answers can be misreported, real estate agents have no foreseeable incentive to provide biased estimates in the observed direction: if real estate agents were attempting to create the impression that the observed commission rates are a natural market outcome, then they could have simply stated that home sellers did negotiate but failed to achieve a lower rate by doing so.

One imprecision arises from the fact that some real estate agents offer lower rates at the outset. As a small share indicates later, their sellers do not negotiate because they already offer lower rates. Yet as this matter concerns less than 5% of responses, this limitation does not affect the main finding: Most sellers do not try to demand lower rates when commissioning a real estate agent.

Descriptive Evidence: Explaining Negotiation Behavior. To seek potential explanations, I explore more descriptive evidence on home sellers’ characteristics and real estate agents’ beliefs on the negotiation behavior. In the following, I provide a brief summary of these supplementary findings, which are discussed in more detail in Appendix II.

Examining the propensity to negotiate based on demographic traits yields two main insights (Table A.2). First, I find that women appear half as likely to negotiate with a real estate agent than men. Second, the willingness of sellers to negotiate decreases

substantially with age.

Studying the beliefs of real estate agents about sellers' negotiation behavior further motivates the survey experiment. Real estate agents state that the reference commission rate and sellers' perception of real estate agents' ability to fetch a higher price play the most role in affecting sellers' negotiating behavior (Figure A.12). However, although indicative, these findings cannot verify that home sellers low willingness to negotiate is a result of biased reference rates and underestimated incidence effects. To overcome this issue, I provide experimental evidence that tests whether real estate agents respond strategically to these limitations of sellers.

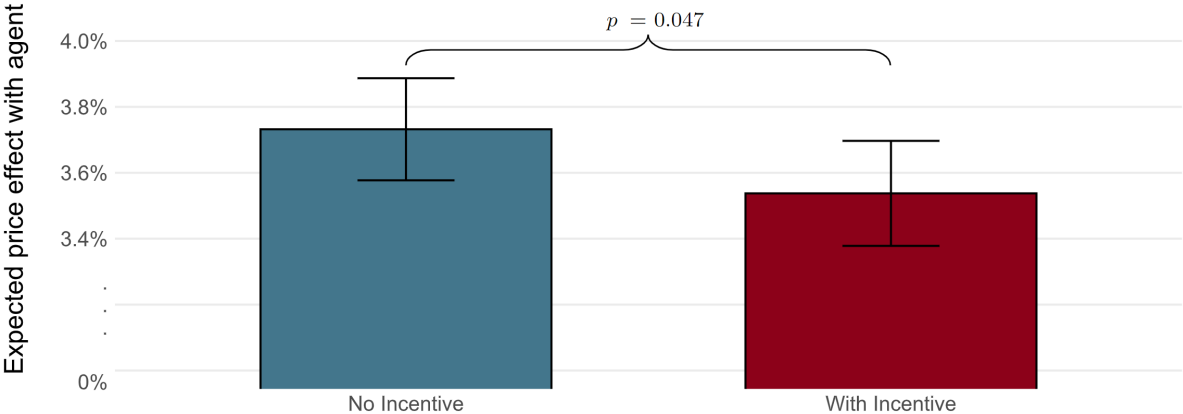
Experimental Evidence: Misguiding Real Estate Agents. Sellers are potentially unaware of the incidence of the commission and influenced by reference commission rates. As a result, I hypothesize that real estate agents may strategically inflate their ability to fetch higher prices for sellers and the reference commission rate which they communicate to sellers. To test this, the experimental questions ask real estate agents to guess the average price difference between listings offered by real estate agents and listings for sale by owner as well as to provide estimates on the average commission rate. Both questions are presented in random order with one of the questions being randomly incentivized: if the estimates provided by real estate agents are approximately correct, then they received a €5 Amazon gift card in the succeeding weeks. This design assumes that the information which real estate agents communicate by default is also what they communicate to potential sellers. Consequently, I hypothesize that randomly incentivising accurate answers deflates the estimates in both questions.

Selling Price and Incidence. The subjects are asked to estimate the price difference between listings made by real estate agents and those for sale by owner. For reference, recall the analysis of the incidence in Section IV which indicates that offers by real estate agents are consistently priced below those listed for sale by owners (Figure 6).

Half of the subjects are randomly incentivized to provide accurate answers. The results are illustrated in Figure 10. In the unincentivized group, I find that real estate agents estimate to list objects at a 3.73% higher price than similar listings offered by the owners

themselves. When adding the incentive, their estimate decreases to 3.54% ($p = 0.047$).²⁴ This negative effect induced by the incentive denotes that several real estate agents seem to know that their actual listing prices are lower or, at least, not as high than initially suggested.

Figure 10: Price Effect as Estimated by Real Estate Agents



Note: The figure illustrates the mean values stated by real estate agents when asked to estimate the price difference of listings offered by real estate agents compared to statistically similar objects offered for sale by owner when offered an incentive (right) and when not (left). Note that the y-axis is truncated for ease of presentation. The error bars display 95% confidence intervals.

Between the treatment groups, I find that real estate agents severely overestimate their ability to offer listings at a higher price than objects not taxed by a commission. The findings suggest that real estate agents communicate biased information by default. The incentivized survey item suggests that real estate agents seem to be aware of this aspect. Although this result needs to be interpreted with care given the weaker statistical significance,²⁵ the direction of the effect supports the notion that real estate agents may conceal the economic incidence of the commission to home sellers.

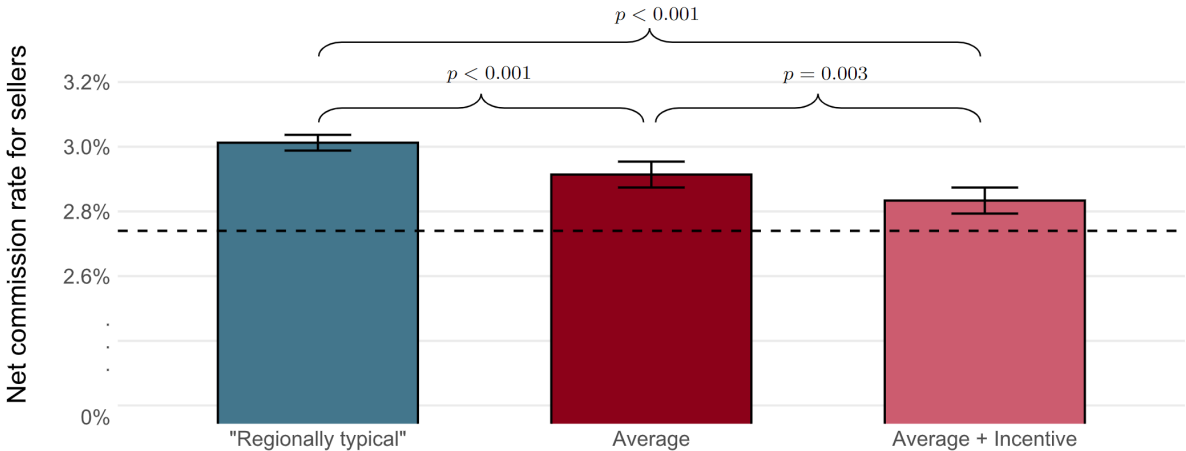
Reference Commission Rate. Recall from the first part of this study that the empirical average of the commission rate is often lower than the *regionally typical* com-

²⁴Response times in both groups are statistically the same. Mean response times for the unincentivized and the incentivized group are 35.46 seconds and 36.48 seconds, respectively ($p = 0.39$).

²⁵The significance level likely underestimates the true difference. For technical reasons, I had to limit the answer options to an 11-point scale ranging from -5% to +5%. As the distribution of answers indicates, this likely biases the results: several real estate agents apparently would have selected an even higher value if given the opportunity, particularly in the unincentivized group. With around half of participants selecting the maximum value on the effect of a real estate agent on the listed price (Figure A.13), I clearly underestimated the tendency of real estate agents to overestimate their ability.

mission rate (Figure 1). This gap motivates two goals when asking real estate agents about the average commission rate. First, I intend to test whether subjects are aware that the average commission rate is lower than what they declared as the *regionally typical* commission rate in the beginning of the survey. Second, my objective is to verify whether real estate agents withhold information on the prevalence of lower commission rates by incentivizing true reporting on the estimated average commission rate. The results are shown in Figure 11.

Figure 11: Commission Rate Estimates by Real Estate Agents



Note: This figure shows the mean of the values stated by real estate agents when asked about the typical regional commission rate (left), the average commission rate (middle) and the average commission rate when incentivizing correct answers (right). Note that the y-axis is truncated for ease of presentation. The dashed horizontal line presents the actual average commission rate observed in the post-reform listing data. The error bars display 95% confidence intervals.

To mitigate any misunderstandings, I explicitly ask real estate agents to provide estimates for the sellers’ commission share and not the total commission for both, buyers and sellers. For reference, Figure 11 includes the empirical average commission level as the dashed line.

Unsurprisingly, real estate agents correctly guess the industry term of the *regionally typical* rate; with 3.01%, this proportion perfectly corresponds to the most frequently used commissions for sellers seen in the micro data.

Turning towards the average commission rate yields more interesting results: even the group without an incentive for this question appears to be aware that the average commission rate is lower than the *regionally typical* commission rate. When asked about the

average rate, real estate agents indicate a lower estimate of 2.91% ($p < 0.001$). Although the effect size appears small, this change is driven by a large extensive margin response. Only 18% of subjects indicate a rate less than 3% as the *regionally typical* commission, but this share nearly doubles to 34% when asked for the average commission rate. This result implies that several real estate agents are aware of the inconsistency between the *regionally typical* rate and the empirical distribution.

In the incentivized treatment arm, this effect is even more pronounced. With the opportunity to gain €5, real estate agents stated an average commission rate of 2.83%, significantly lower ($p = 0.003$) than in the unincentivized group. The decrease is again primarily driven by an increased share of respondents (44%) reporting a lower value than the typical 3% rate. This indicates that real estate agents are not only aware of the lower average commission rate but also withhold this information when not encouraged otherwise. As the item for the unincentivized group did not feature the additional note informing about the incentive, lower salience might explain this effect rather than the word “average”, which can be overlooked. However, analyzing response times indicates that respondents in both groups paid similar attention to the question.²⁶

Overall, the higher rates among unincentivized subjects appear to measure the real estate agents’ concealment of their knowledge of lower commission rates. Assuming that real estate agents communicate similar information in the survey and to home sellers, communicating inflated rates would corroborate the hypothesis that sellers are influenced by the reference rate.

VI Discussion

VI.1 Policy Implications

The results hold several implications. Above all, the findings signal that the reform failed to lower commission rates. The evident price increase even suggests that the reform backfired, adding significant cost to buyers and sellers. Assuming an annual transaction

²⁶Both groups spent a statistically similar amount of time to give their estimates. More precisely, the incentivized group averaged 34.42 seconds, whereas the unincentivized respondents spent 32.23 seconds ($p = 0.24$) on average. Considering that the incentivized item featured slightly more text, this small difference becomes even less of a convincing explanation for insufficient attention in the unincentivized group.

volume of €130 billion with real estate agents,²⁷ buyers and sellers approximately lose €390 million every year from the commission rate increase of 0.3% following the reform alone.²⁸

The survey experiment extends the insight around this failure. Showing that only 15% of sellers demand lower commission rates confirms that unresponsive sellers may explain why the reform failed to lower commission rates. Furthermore, the experiment indicates that sellers unwillingness to negotiate may be maintained by the real estate agents' tendency to communicate obscure reference commission rates and the downplaying of the economic incidence of the commission cost.

The German system of sharing the commission cost with the buyer represents an outlier internationally and a puzzle internally: the system of splitting the commission between sellers and buyers is frequently advertised as fair; however, real estate agents in the current system are selected by the sellers, their service portfolios are determined by the sellers, and they are incentivized through a commission on the selling price to work in favor of the sellers only. My findings extend these doubts by offering new evidence that this unusual policy facilitates rent seeking by real estate agents. The fact that all countries with low total commission rates have systems with only selling agents who are solemnly paid for by the sellers provides a coherent indication that such a clear system maximizes price competition.

VI.2 Limitations and Alternative Explanations

The results must be interpreted considering the limitations of the study. Foremost, data availability restrains my research. Germany does not provide access to large-scale micro data for research purposes on housing prices. Although this limitation should not influence the findings on the commission rate increase, the precision of incidence effects may be affected. Being restricted to the last posted listing price interacts with the assumption that

²⁷The transaction volume of residential real estate in 2020 was €217 billion (AK OGA, 2021), of which I assume that 60% of residential sales were being handled by real estate agents. This estimate is deliberately lower than what my sample suggests: note that transactions also transpire without an intermediary, for example, when objects are offered by property developers directly or among family members and friends.

²⁸When calculated against real estate commissions in low-commission countries with similar housing prices, where total commission rates average approximately 2% rather than 5.5%, the yearly loss to buyers and sellers is nearly €3 billion.

prices of listings offered for sale by owner or through a real estate agent are comparable. However, after a listing is taken offline, the bargaining process between the buyer and a real estate agent or an owner selling directly may differ. Although my results align well with previous findings in direction and magnitude (Rutherford et al., 2005; Levitt et al., 2008; Jia & Pathak, 2010), the estimates involving listing prices should be interpreted with care. Beyond data restrictions, other explanations could play a role.

First, poor information on the true cost and abilities of real estate agents may lead home sellers to infer quality from price. Low commission rates may signal low quality, possibly hindering real estate agents' incentive to compete through lower commission rates. Similarly, sellers may fear moral hazard following a demand for lower commission rates. However, as this does not stop consumers from comparing multiple offers and prices in other service industries, this argument likely plays a minor role.

Second, the way by which the reform was communicated might explain part of the increase: advocates framed the effective split as a fair compromise between buyers and sellers. Even though this argument ignores the fact that the commission incentivizes real estate agents to work in favor of the seller only and fully disregards the economic incidence, sellers may see less necessity to negotiate a commission rate that is presented to them as fair.

Finally, the possibility of collusion must be examined. At first glance, the uniformity of commission rates might suggest that real estate agents fix commission rates. However, the real estate agent industry in Germany is highly decentralized. Approximately 70,000 real estate agents work in 32,000 firms, of which only 6,500 firms generate annual revenues larger than €250,000 (Destatis, 2020). Large cities offer hundreds of real estate agencies to choose from, and even rural markets exhibit little concentration (Figure A.8).²⁹ The decentralized organization reflects the low entry barriers: real estate agents in Germany only require a standard business license³⁰ but no formal qualification, training, or membership access. Unlike the US, for example, where the Multiple Listing Service is exclusively operated by real estate agents, the central platforms in Germany are run independently. Other collusive practices such as “steering” are not possible, whereby buy-

²⁹Low HHI scores corroborate this conjecture, ranking below 1,000 in rural areas and around 50 to 300 in larger cities. As a sanity check, I also calculated HHI scores for the capitals of the states where the districts in Figure A.8 are located, namely Mainz (133), Hannover (75), and Magdeburg (276).

³⁰Costing between €20 and €60.

ing agents might steer customers away from selling agents who advertise a lower overall commissions (Barwick et al., 2017).

Yet one feature of the real estate agent market in Germany may be conducive to price coordination: the commission rates are transparent. As buyers continue to pay some of the commission after the reform, real estate agents must publicly display the rate in each listing. One would assume that this practice serves price competition. However, recent evidence suggests that transparency may also facilitate price coordination among competitors (Luco, 2019). Such tacit price coordination based on the commission rates of other agencies would add to the potentially problematic influence of reference dependence induced by the obscure *regionally typical* commission rate.

VII Conclusion

This paper relates a perplexing increase of commission rates to home sellers' not demanding lower rates. Exploiting a reform which shifts the obligation to pay the commission fees from buyers to sellers, I find that commission rates increase sharply while the demand for real estate agents remains constant. The results show that the reform, which attempted to lower commission rates by raising cost salience, backfired.

However, I demonstrate that the commission increase also contradicts standard incidence predictions. Although the results indicate that sellers bear most of the economic incidence, they appear to underreact to the statutory shift and do not seem to demand lower commissions from real estate agents. I attribute these observations to seller inattention to the commission cost. I argue that this inattention is potentially fueled by biased reference commission rates and confusion about the pass-through to sellers. A follow-up survey experiment verifies that 85% of home sellers do not attempt to demand lower commission rates. Furthermore, the experimental questions illustrate that real estate agents may strategically exploit sellers' ignorance. Randomly incentivizing accurate answers suggests that real estate agents knowingly inflate reference commission rates and conceal the empirical incidence.

Although my results are based on national evidence, they speak internationally. By structuring the idiosyncrasies of the global practices of real estate agents, the overview in Table 1 may suggest that all low-commission markets are alike, and every high-

commission system is limited in its competitiveness in its own way; more specifically, all low-commission countries forgo a buying agent and oblige the seller to pay the entire commission. By contrast, most high-commission countries add complexity by either incentivizing the use of an additional buying agent or, alternatively, by splitting the obligation to pay the selling agent (or leave it entirely unclear). Germany is a case in point: my findings imply that the current split policy adds complexity to obscure reference rates and the neglect of home sellers' incidence.

Considering the rising cost of housing, my research highlights a policy opportunity to reduce the cost of homeownership. Linking inattentive consumer behavior to potential mechanisms, my work not only extends ongoing studies on consumer inattention and tax salience but also identifies the current limits of predicting their effects at a policy scale.

If 85% of consumers in any other industry were to indicate that they do not care about the price for a service, then one would scarcely believe such pronouncement. Yet in the market for real estate agents, such behavior is almost inconspicuous. Ultimately, this paper aims to challenge the conception that the market for real estate agents is bound to follow a different set of economic principles than other industries.

References

- Agarwal, S., & Karapetyan, A. (2022). Information salience and mispricing in housing. *Management Science*. doi: 10.1287/mnsc.2021.4253
- AK OGA. (2021). Immobilienmarktbericht Deutschland 2021 der Gutachterausschüsse in der Bundesrepublik Deutschland. Retrieved from <https://www.immobilienmarktbericht-deutschland.info>
- Anagol, S., Cole, S., & Sarkar, S. (2017). Understanding the advice of commissions-motivated agents: Evidence from the Indian life insurance market. *Review of Economics and Statistics*, 99(1), 1–15. doi: 10.1162/REST_a_00625
- Barwick, P. J., & Pathak, P. A. (2015). The costs of free entry: An empirical study of real estate agents in Greater Boston. *The RAND Journal of Economics*, 46(1), 103–145. doi: 10.1111/1756-2171.12082
- Barwick, P. J., Pathak, P. A., & Wong, M. (2017). Conflicts of interest and steering in residential brokerage. *American Economic Journal: Applied Economics*, 9(3), 191–222. doi: 10.1257/app.20160214
- Barwick, P. J., & Wong, M. (2019). Competition in the real estate brokerage industry: A critical review. *The Brookings Institution Publication, December 2019*.
- Benzarti, Y., Carloni, D., Harju, J., & Kosonen, T. (2020). What goes up may not come down: Asymmetric incidence of value-added taxes. *Journal of Political Economy*, 128(12), 4438–4474. doi: 10.1086/710558
- Bhargava, S., Loewenstein, G., & Sydnor, J. (2017). Choose to lose: Health plan choices from a menu with dominated option. *The Quarterly Journal of Economics*, 132(3), 1319–1372. doi: 10.1093/qje/qjx011
- BMJ. (2019). Gesetz über die Verteilung der Maklerkosten bei der Vermittlung von Kaufverträgen über Wohnungen und Einfamilienhäuser.
- Bordalo, P., Gennaioli, N., & Shleifer, A. (2019). Memory and reference prices: An application to rental choice. *AEA Papers and Proceedings*, 109, 572–76. doi: 10.1257/pandp.20191052
- Bradley, S. (2017). Inattention to deferred increases in tax bases: How Michigan home buyers are paying for assessment limits. *Review of Economics and Statistics*, 99(1), 53–66. doi: 10.1162/REST_a_00597

- Bradley, S., & Feldman, N. E. (2020). Hidden baggage: Behavioral responses to changes in airline ticket tax disclosure. *American Economic Journal: Economic Policy*, 12(4), 58–87. doi: 10.1257/pol.20190200
- Bruttel, L. (2018). The effects of recommended retail prices on consumer and retailer behaviour. *Economica*, 85(339), 649–668. doi: 10.1111/ecca.12218
- Chetty, R., Looney, A., & Kroft, K. (2009). Salience and taxation: Theory and evidence. *American Economic Review*, 99(4), 1145–77. doi: 10.1257/aer.99.4.1145
- Crockett, J. H. (1982). Competition and efficiency in transacting: The case of residential real estate brokerage. *Real Estate Economics*, 10(2), 209–227. doi: 10.1111/1540-6229.00264
- Delcours, N., & Miller, N. G. (2002). International residential real estate brokerage fees and implications for the us brokerage industry. *International Real Estate Review*, 5(1), 12–39.
- Destatis. (2020). Strukturhebung im Dienstleistungsbereich Grundstücks- und Wohnungswesen. *Fachserie 9 Reihe 4.3*.
- Destatis. (2023). Verbraucherpreisindex. Retrieved from https://www.destatis.de/DE/Themen/Wirtschaft/Preise/Verbraucherpreisindex/_inhalt.html#238920
- Dolls, M., Fuest, C., Krolage, C., & Neumeier, F. (2021). Who bears the burden of real estate transfer taxes? Evidence from the German housing market. *CESifo Working Paper No. 8839*.
- Eurostat. (2023). Mean and median income by age and sex - EU-SILC and ECHP surveys. Retrieved from [https://ec.europa.eu/eurostat/databrowser/view/ILC_DI03\\$DEFAULTVIEW/default/table](https://ec.europa.eu/eurostat/databrowser/view/ILC_DI03$DEFAULTVIEW/default/table)
- Finkelstein, A. (2009). E-ZTax: Tax salience and tax rates. *The Quarterly Journal of Economics*, 124(3), 969–1010. doi: 10.1162/qjec.2009.124.3.969
- Gabaix, X., & Laibson, D. (2006). Shrouded attributes, consumer myopia, and information suppression in competitive markets. *The Quarterly Journal of Economics*, 121(2), 505–540. doi: 10.1162/qjec.2006.121.2.505
- Hahn, R. W., Litan, R. E., & Gurman, J. (2006). Bringing more competition to real estate brokerage. *Real Estate Law Journal*, 35(1), 86.
- Han, L., & Hong, S.-H. (2011). Testing cost inefficiency under free entry in the real estate

- brokerage industry. *Journal of Business & Economic Statistics*, 29(4), 564–578. doi: 10.1198/jbes.2011.08314
- Hatfield, J. W., Kominers, S. D., & Lowery, R. (2019). Collusion in brokered markets. *Harvard Business School Entrepreneurial Management Working Paper*(20-023).
- Heiss, F., Ornaghi, C., & Tonin, M. (2023). Inattention matters: An analysis of consumers' inaction in choosing a water tariff. *Journal of the European Economic Association*. doi: 10.1093/jeea/jvac073
- Hsieh, C.-T., & Moretti, E. (2003). Can free entry be inefficient? fixed commissions and social waste in the real estate industry. *Journal of Political Economy*, 111(5), 1076–1122. doi: 10.1086/376953
- Jia, P., & Pathak, P. A. (2010). The impact of commissions on home sales in Greater Boston. *American Economic Review*, 100(2), 475–79. doi: 10.1257/aer.100.2.475
- Kopczuk, W., Marion, J., Muehlegger, E., & Slemrod, J. (2016). Does tax-collection invariance hold? evasion and the pass-through of state diesel taxes. *American Economic Journal: Economic Policy*, 8(2), 251–286. doi: 10.1257/pol.20140271
- Kopczuk, W., & Munroe, D. (2015). Mansion tax: The effect of transfer taxes on the residential real estate market. *American Economic Journal: Economic Policy*, 7(2), 214–57. doi: 10.1257/pol.20130361
- Leibbrandt, A., & List, J. A. (2015). Do women avoid salary negotiations? evidence from a large-scale natural field experiment. *Management Science*, 61(9), 2016–2024. doi: 10.1287/mnsc.2014.1994
- Levitt, S. D., & Syverson, C. (2008). Market distortions when agents are better informed: The value of information in real estate transactions. *The Review of Economics and Statistics*, 90(4), 599–611. doi: 10.1162/rest.90.4.599
- Levitt, S. D., Syverson, C., & Ferreira, F. (2008). Antitrust implications of outcomes when home sellers use flat-fee real estate agents. *Brookings-Wharton Papers on Urban Affairs*, 47–93. doi: 10.1353/urb.2008.a249797
- Luco, F. (2019). Who Benefits from Information Disclosure? The Case of Retail Gasoline. *American Economic Journal: Microeconomics*, 11(2), 277–305.
- Miceli, T. J. (1992). The Welfare Effects of Non-Price Competition Among Real Estate Brokers. *Real Estate Economics*, 20(4), 519–532. doi: 10.1111/1540-6229.00594

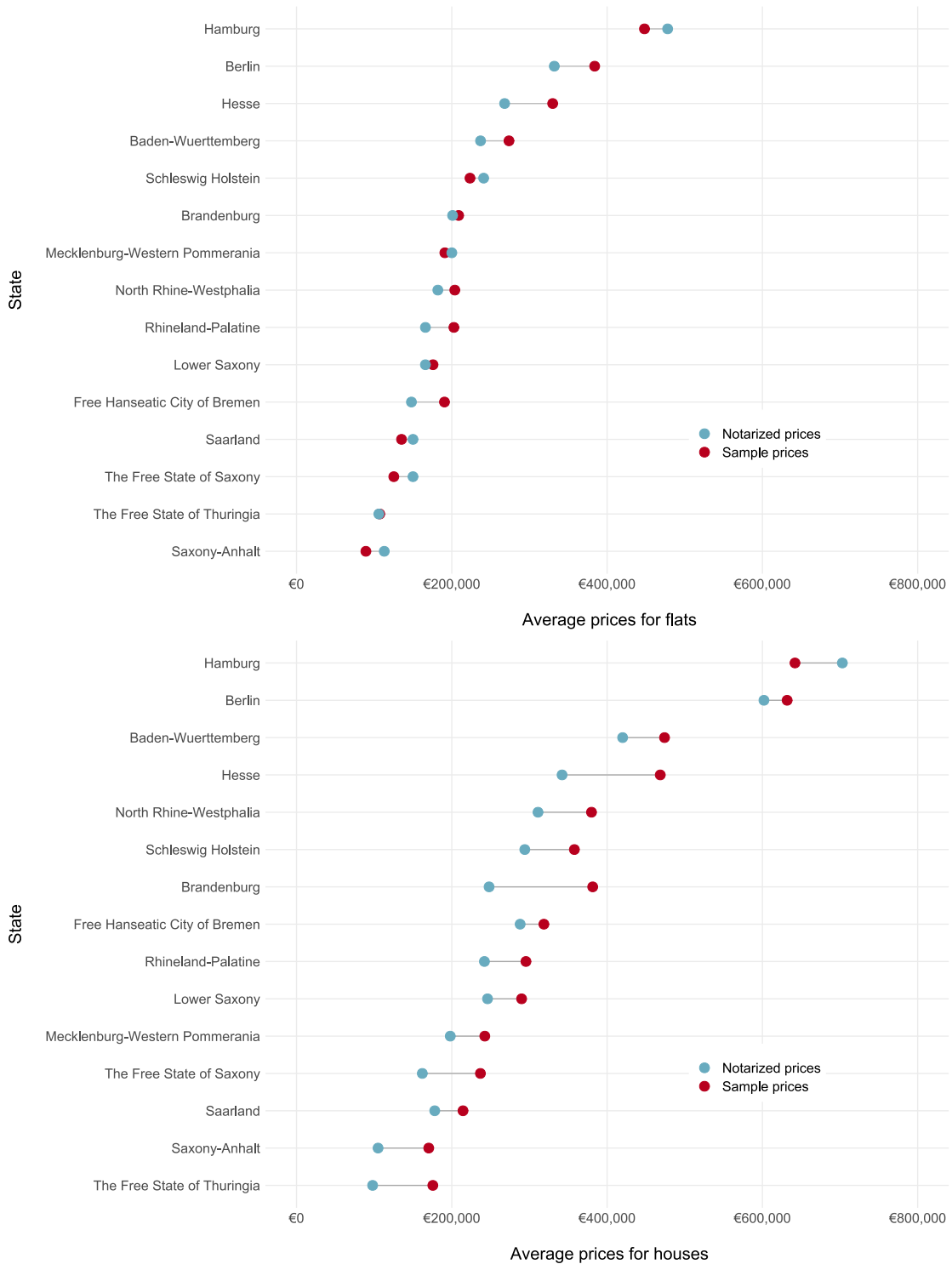
- Owen, B. M., & Kickbacks, S. (1977). Kickbacks, specialization, price fixing, and efficiency in residential real estate markets. *Stanford Law Review*, 29, 931–947. doi: 10.2307/1228140
- Puppe, C., & Rosenkranz, S. (2011). Why suggest non-binding retail prices? *Economica*, 78(310), 317–329. doi: 10.1111/j.1468-0335.2009.00827.x
- Repetto, L., & Solís, A. (2019). The price of inattention: Evidence from the swedish housing market. *Journal of the European Economic Association*, 18(6), 3261–3304. doi: 10.1093/jeea/jvz065
- Rutherford, R. C., Springer, T. M., & Yavas, A. (2005). Conflicts between principals and agents: evidence from residential brokerage. *Journal of Financial Economics*, 76(3), 627–665. doi: 10.1016/j.jfineco.2004.06.006
- Schaffner, S. (2022). RWI-GEO-RED: RWI Real Estate Data (Scientific Use File) - Houses and apartments for sale. doi: 10.7807/immo:red:wk:suf:v5.1
- Simonsohn, U., & Loewenstein, G. (2006). Mistake #37: The effect of previously encountered prices on current housing demand. *The Economic Journal*, 116(508), 175–199. doi: 10.1111/j.1468-0297.2006.01052.x
- Thünen. (2023). Thünen-Landatlas Ausgabe 29/03/2023. *Thünen-Institut Forschungsbereich ländliche Räume, Braunschweig*.
- Woodward, S. E., & Hall, R. E. (2012). Diagnosing consumer confusion and sub-optimal shopping effort: Theory and mortgage-market evidence. *American Economic Review*, 102(7), 3249–76. doi: 10.1257/aer.102.7.3249

APPENDIX

Part I: Data Processing, Supplementary Tables, and Figures

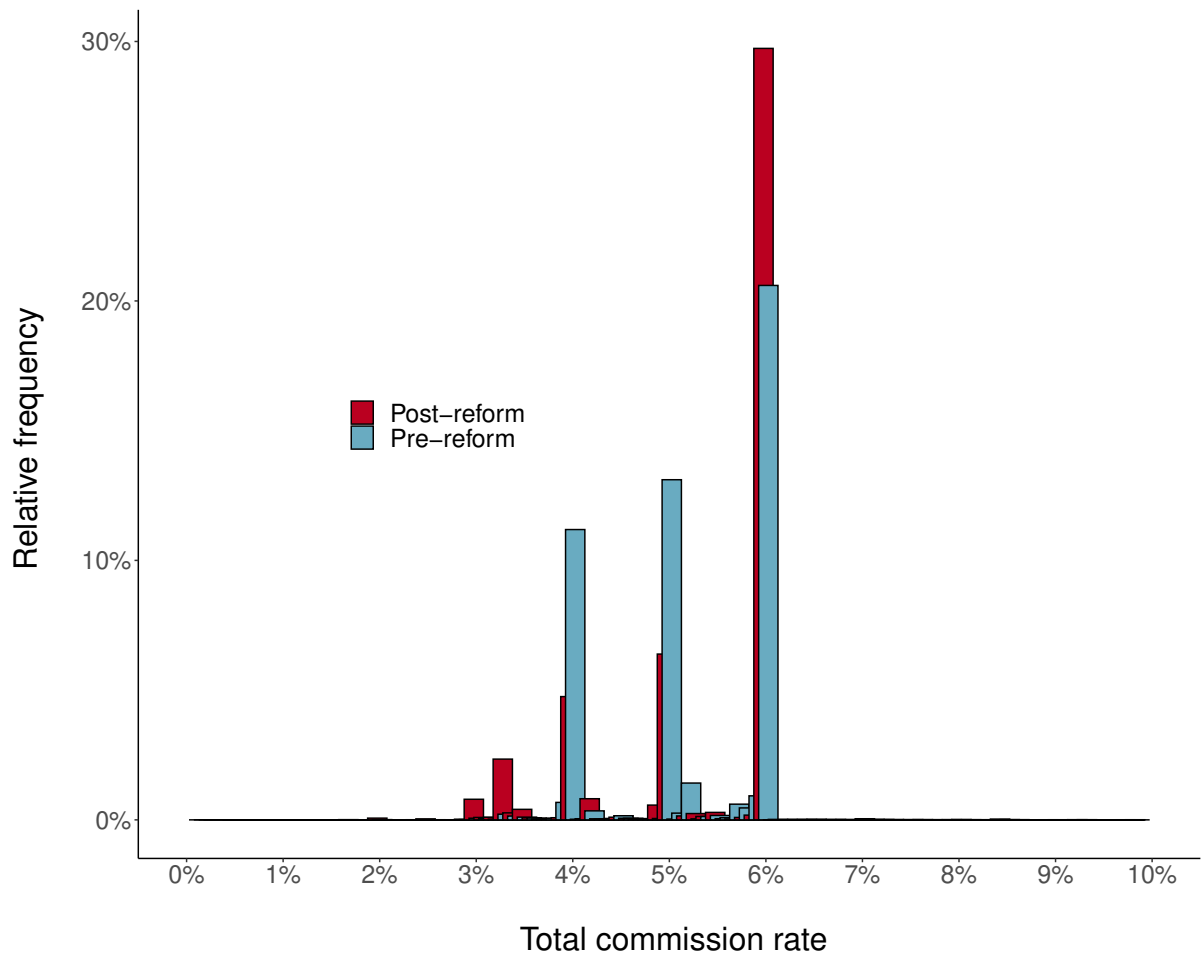
Data Processing. To correct for errors that mostly stem from typos or classifications errors, I begin by omitting listings with implausible values considering their declared floor space, price, or their combination. In a second step, properties with highly unusual characteristics or at the extreme end are discarded. This typically concerned properties with a value below € 20,000, which often represent misclassified parking spaces or undeveloped plots of land. On the upper end of the spectrum, properties with prices above € 2,500,000 are omitted, which either display luxury properties with highly sophisticated features that the available variables cannot adequately control for, or entire apartment buildings listed incorrectly as a single object. For the same reason, objects with a price per m^2 above € 12,000 are omitted. I set the minimum floor space to 15 m^2 and exclude flats larger than 200 m^2 or houses larger than 250 m^2 , as these regularly include hotels or restaurants indicating a commercial use. Similarly, the sample is limited to objects with 1 to 15 rooms. Naturally, duplicates of the same property are not considered.

Figure A.1: Comparing Sample Housing Prices With Notarized Data



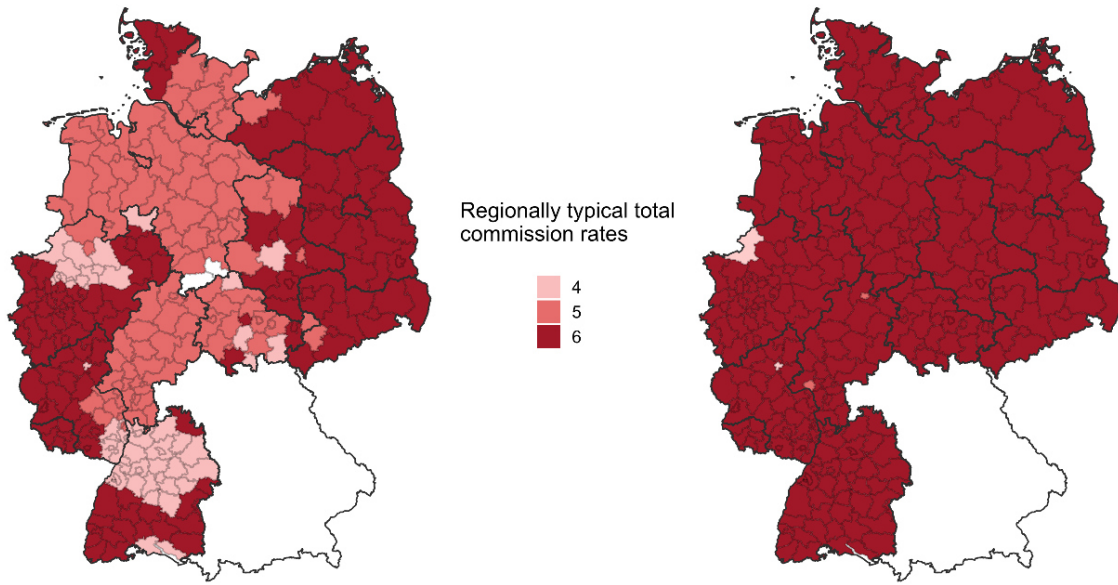
Note: This figure compares the average housing prices in each state within the listing price sample and the official transaction data. The official data is provided by the German committee on land and property evaluation (“*Gutachterausschuss*”) in its national report for the year 2020.

Figure A.2: Histogram of Total Commission Rates Before and After Reform



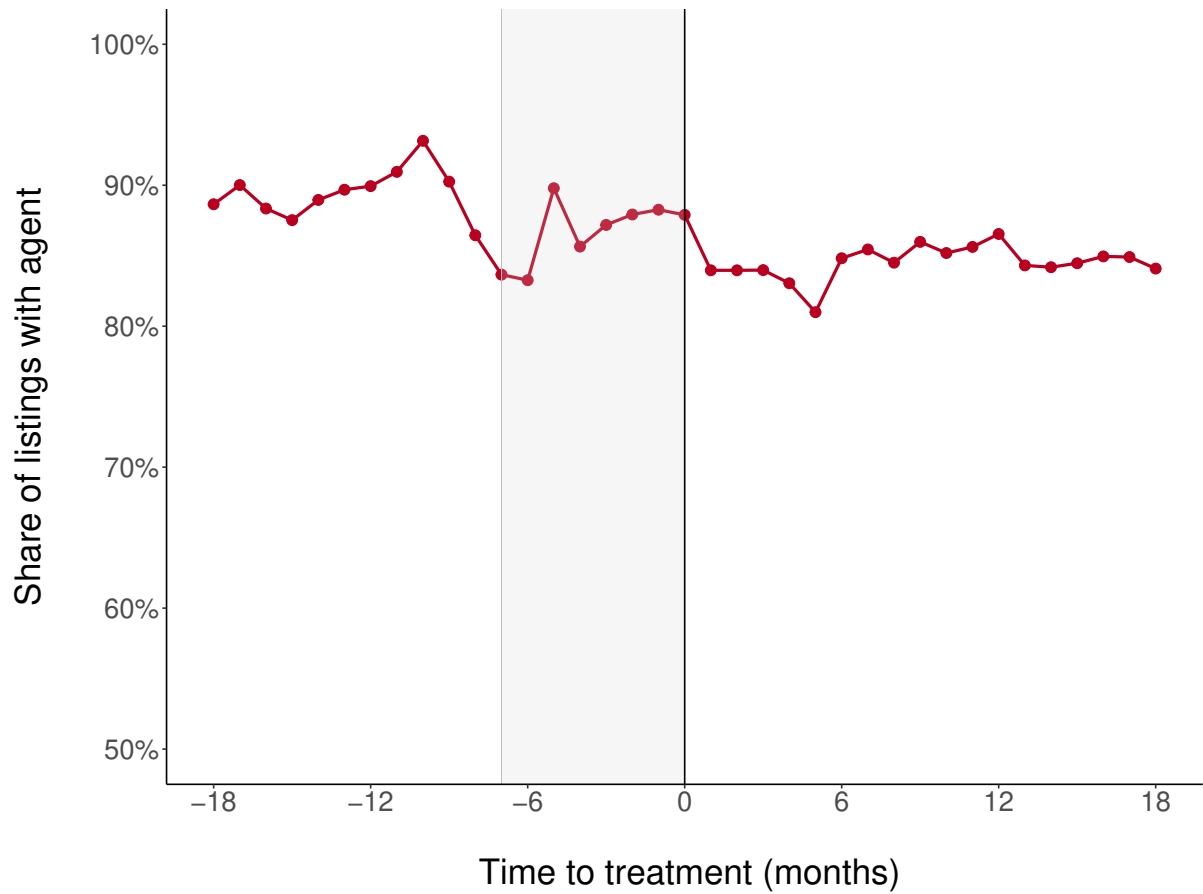
Note: This figure shows the distribution of total commission rates split by the periods before and after the legal reform. Although reflecting the general increase of commission rates, a notable share of agents still advertises lower rates after the reform.

Figure A.3: District Variation of the Most Frequent Commissions Rates



Note: The maps display the most frequent total commission rates for all listings by real estate agents before the reform in December 2020 (left) and thereafter (right).

Figure A.4: Descriptive Mean Share of Listings With Real Estate Agents



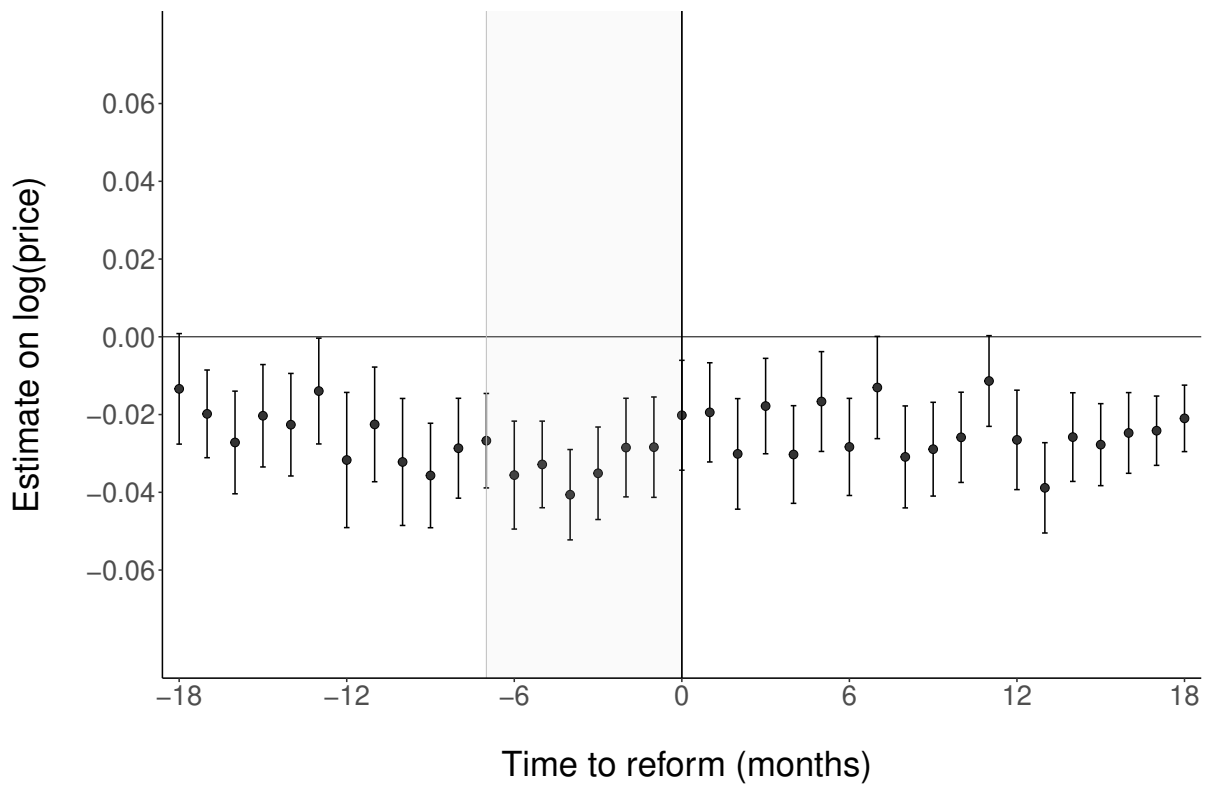
Note: The figure displays the share of listings offered by real estate agents over time. The data covers all listings that are either listed by an agent or by the owner directly. Note that the sample in this study does not include other seller types, such as commercial developers, which is why the data overestimates the use of real estate agents in Germany.

Table A.1: Illustrative Numerical Example for the Theoretical Incidence Analysis

	Pre-reform	Post-reform
Statutory incidence buyer (relative)	100%	50%
Statutory incidence seller (relative)	0%	50%
Eq. price w/o agent (p')	103,000	103,000
Eq. selling price w/ agent (p_t^*)	100,000	103,000
Commission rate (τ_t)	6%	5.825%
Earnings of real estate agent ($\tau_t \times p_t^*$)	6,000	6,000
Economic incidence buyer (relative)	50%	50%
Economic incidence seller (relative)	50%	50%
Economic incidence buyer (nominal)	3,000	3,000
Economic incidence seller (nominal)	3,000	3,000
Commission-inclusive price buyer (p_t^{*B})	106,000	106,000
Commission-inclusive price seller (p_t^{*S})	100,000	100,000

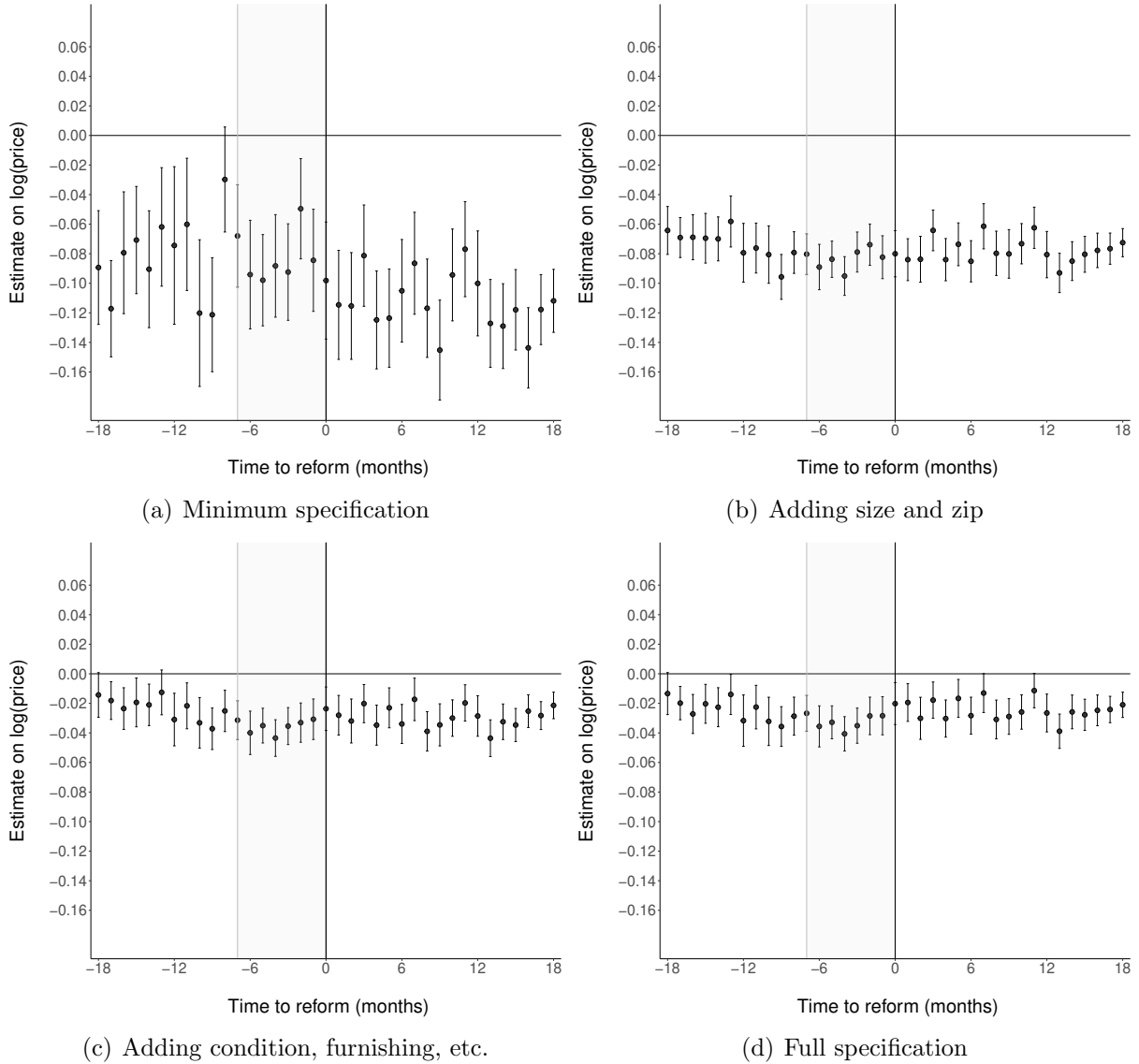
Note: This example serves to illustrate the concept of the incidence framework presented in Section III. For ease of presentation, I assume a hypothetical economic incidence for buyers and sellers of 50% and an equilibrium price without a real estate agent of 103,000. The reform only shifts the statutory incidence of buyers to sellers. The equilibrium price without a real estate agent remains the same throughout (103,000). The lower pre-reform equilibrium selling price with a real estate agent (100,000) reflects the economic incidence of the seller, while the increase after the reform (103,000) displays the inclusion of the statutory shift, reflecting the principle of the liability side equivalence. For the same reason, the commission-inclusive prices for the buyer p_t^{*B} and the seller p_t^{*S} remain constant. The statutory shift should not alter the market conditions of buyers, sellers, or real estate agents. Consequently, the post-reform commission rate τ_{post} adjusts so that all parties receive the same outcome as before.

Figure A.5: Event Study Estimates for Raw Listing Prices Around the Reform



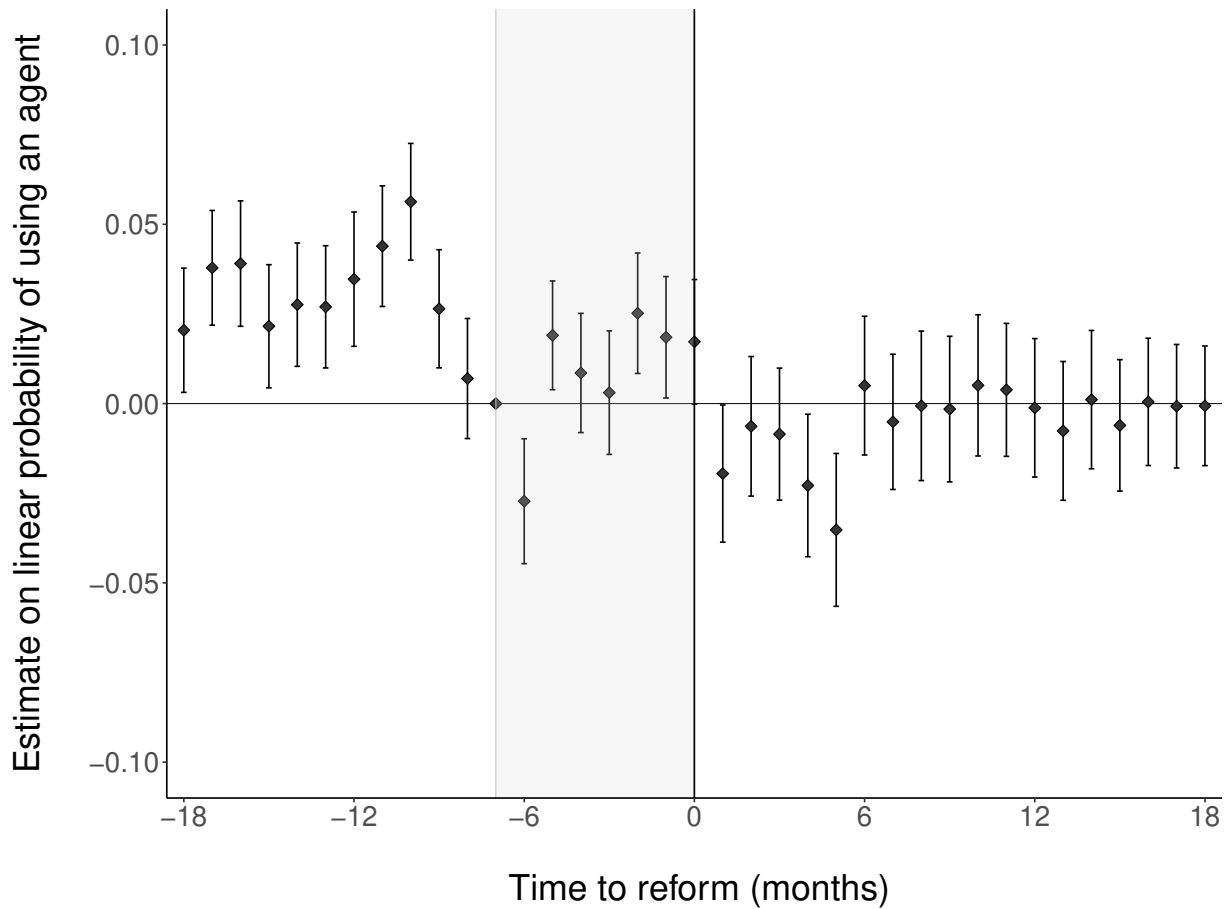
Note: The figure presents event study estimates for raw listing prices around the reform. The underlying model controls for relevant property characteristics and uses regional (zip) fixed effects. Standard errors are clustered on zip codes and represent 95% confidence intervals. To account for anticipation effects, the model uses $t = -7$ (May 2020) as the reference period when the reform was announced and was passed by the German Parliament. The reform came into effect in $t = 0$ (December 2020). Listing prices hardly adjust to the statutory shift of the legal reform.

Figure A.6: Robustness Check With Step-Wise Price Estimations



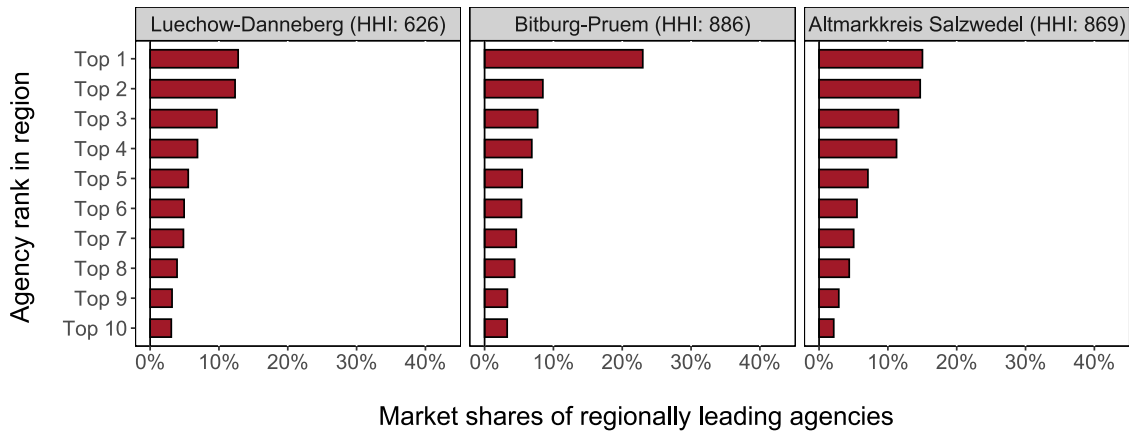
Note: These figures display the event study estimates on raw (logged) listing prices as in Figure A.5, successively adding additional covariates: (a) Minimum model only controlling for $m_t \times A_i$ and monthly FEs; (b) Adding (squared) object/lot size and regional FEs; (c) Adding furnishing, condition, category, and heating type; (d) Full specification. Although the price gap between listings offered by real estate agents and those for sale by owner is in part driven by different characteristics, a substantial gap remains even when controlling for all available characteristics in the full specification.

Figure A.7: Linear Probability Model of Using a Real Estate Agent



Note: The plot shows the coefficient estimates for a linear probability model with the usage of a real estate agent as dependent variable over time. Apart from the dependent variable, the model is identical to the event study on the commission rate (Equation 5) and uses regional (zip) fixed effects. Standard errors are clustered on zip codes and represent 95% confidence intervals. As the law was enacted in May 2020 and came into effect in December 2020, I use May 2020 ($t = -7$) as reference period. Splitting the sample according to pre-reform commission levels does not produce qualitatively different results.

Figure A.8: Market Shares in Three Exemplary Rural Districts



Note: These plots show the market shares of regionally individual top 10 agencies based on the listing volume from a snapshot for houses on the largest real estate platform in February 2023. The Herfindahl-Index (HHI) for each region is provided in brackets. To reflect the mobility constraints of real estate agents, listings were selected if they fell within a radius of 20 kilometers within the center of each district. The displayed regions are randomly sampled from the 20 most rural regions in Germany as defined by Thünen (2023). Even in the most rural regions, market concentration appears low.

Part II: Survey Appendix

Survey Materials

Figure A.9: Translated Copy of the Survey Invitation

Dear Mrs _____,

We are researchers from the Hertie School in Berlin and would like to offer you the opportunity to participate in our study on the motives of home sellers. The survey takes approximately three minutes.

In return for participation, you will receive exclusive access to a report of the study which will not be published in this bundled form otherwise. The report may help you to gain a competitive edge compared to other real estate agents in your region by showing how e.g. other real estate agents acquire new sellers most successfully.

If interested, please follow this link: [To the survey](#)

Thank you for your support!

With kind regards,

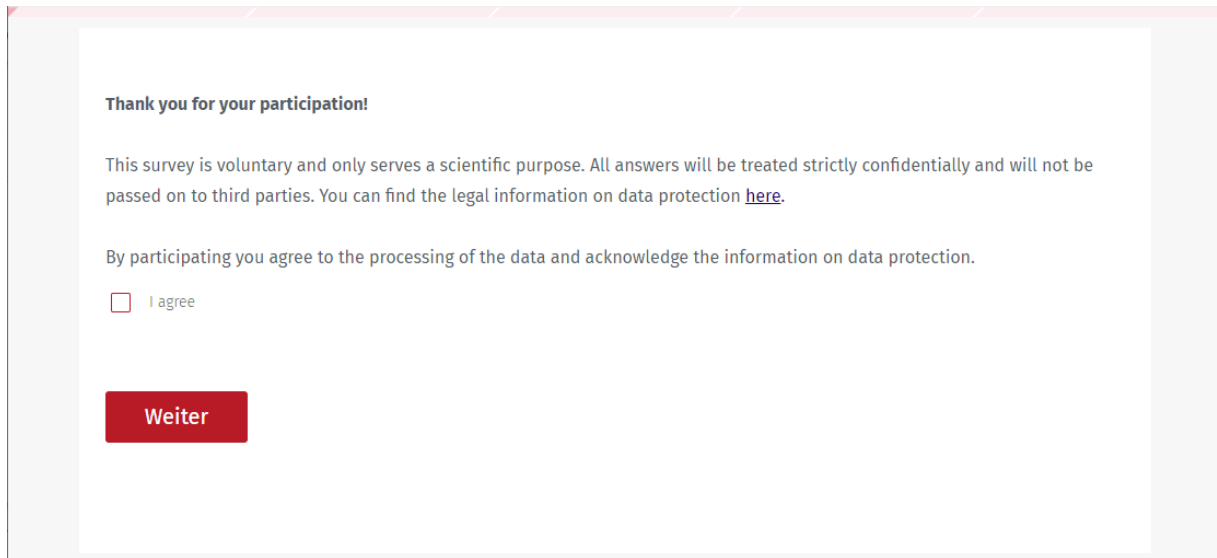
Julius Stoll

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Figure A.10: Translated Copy of the Welcome Page



Thank you for your participation!

This survey is voluntary and only serves a scientific purpose. All answers will be treated strictly confidentially and will not be passed on to third parties. You can find the legal information on data protection [here](#).

By participating you agree to the processing of the data and acknowledge the information on data protection.

I agree

Weiter

Survey

[Welcome Page]

1. How do most sellers learn about you?

- Real estate platform (e.g. ImmobilienScout24)
 - Internet search (e.g. Google)
 - Cold call
 - Physical shop/office
 - Personal contact (e.g. friends, family)
 - Referral from other sellers
 - Other: (please indicate)
-

2. What do you believe are services that current sellers find particularly convincing?

- Modern exposé (e.g. virtual viewings, drone images)
 - Creation of professional floor plan
 - Variety of platforms used
 - International marketing
 - Permanent reachability
 - Other: (please indicate)
-

3. What is the current regionally typical seller commission rate in your state? (incl. VAT)

[Slider] Percent (incl. VAT) 2 [- - - - - • - - - - -] 5

For statistical purposes, we now ask you to consider your most recent seller only.

- Understood
-

4. What do you believe, what is the most important reason that your most recent customer chose you as their agent?

- High selling price

- Fast sale
 - Extensive service portfolio
 - Trust
 - Low commission
 - Visibility of physical office/shop
 - Other: (please indicate)
-

5. What do you believe, what is the most important reason that your most recent customer chose you as their agent?

- High selling price
 - Fast sale
 - Extensive service portfolio
 - Trust
 - Low commission
 - Other: (please indicate)
-

6. Did your most recent seller negotiate the commission, or not?

- Yes
 - No
-

6.-No If No, what do you believe, why not?

- Seller expects offered service to lead to comparably higher selling price that compensates for commission cost
 - Seller is guided by typical regional commission level or the commission rate of other listings
 - Seller is not explicitly aware that commission can be negotiated
 - Other: (please indicate)
-

6.-Yes If Yes, what do you believe, why yes?

- Seller expects a lower selling price, as buyer pays for higher buying commission
- Seller observed other listings that had lower commissions
- Seller received advice to negotiate commission

Other: (please indicate)

7. How much did your last seller know about the current legal framework concerning the commissioning of real estate agents?

[7-point scale] My last seller knew the framework...

[Very imprecisely] [imprecisely] [somewhat imprecisely] [more or less] [somewhat precisely] [precisely] [very precisely]

8. Please describe the profile of your latest seller

Less than 40 years old

41-50 years old

51-60 years old

61-70 years old

71-80 years old

Over 80 years old

Home value

Below 200,000 Euro

200,001 to 400,000 Euro

400,001 to 600,000 Euro

600,001 to 800,000 Euro

800,001 to 1,000,000 Euro

1,000,001 to 1,200,000 Euro

1,200,001 to 1,400,000 Euro

over 1,400,000 Euro

Sex

Male

Female

Compared to other sellers: How much experience did your most recent seller have in the real estate market?

[7-point scale] My last seller had ... experience.

[much less] [less] [somewhat less] [average] [somewhat more] [more] [much more]

👉 If your estimate in this question matches the outcome of a separate analysis with listings, you will receive a 5-Euro Amazon gift card via email. [Only in incentivized group; order of this and next question is random]

(Your Answer is correct when it matches the analysis to +/- 0.03 percent)

9. What do you estimate: What is the current average seller commission rate in your state? (incl. VAT)

[Slider] Percent (incl. VAT) 2 [- - - - - ● - - - - -] 5

👉 If your estimate in this question matches the outcome of a separate analysis with listings, you will receive a 5-Euro Amazon gift card via email. [Only in incentivized group; order of this and previous question is random]

(Your Answer is correct when it matches the analysis to the nearest percentage point)

10. What do you estimate: Do real estate agents achieve a higher or lower price than comparable listings for sale by owner?

[Discrete slider] Real estate agent achieve percent less/more -5 [- - - - - ● - - - - -] +5

11. I want to receive the short report of this study via e-mail once it is completed

Yes, to the e-mail address I have been initially contacted with

Yes, but to another e-mail address: [please indicate]

No

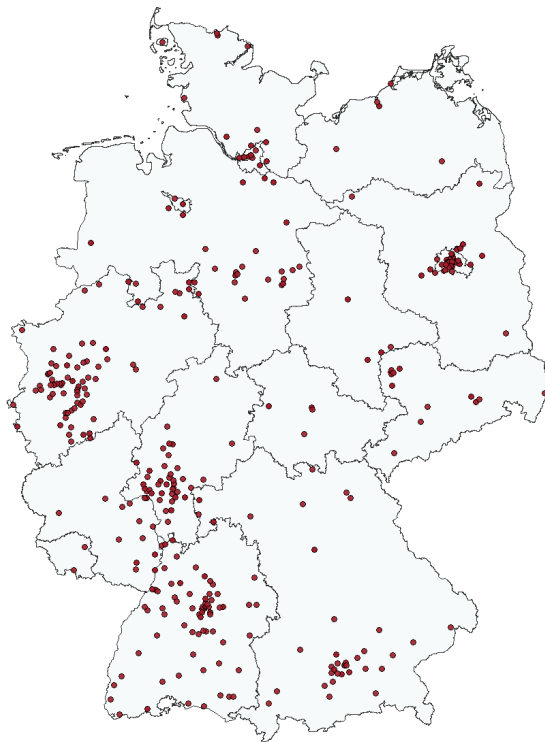
Thank you for participating in this survey.

If indicated, you will receive the short report with the results of this survey within the next 3 months, after all the data has been collected and analyzed. If your answer was correct, you will receive the Amazon gift card to your preferred e-mail address.

Survey Sample

Figure A.11 displays the results from testing the participation conditional on observable characteristics. I limit this test to the subject pool recruited from the largest online platform because this platform also provided information on the number of listings each agency had on offer when collecting the data. Furthermore, I construct a proxy for the size of each real estate agency³¹ based on unique e-mail domains. Note that the number of listings exhibits a slightly negative coefficient. As the survey incentivized respondents with information to improve marketing, this effect appears natural but for the present research, negligible. Similar considerations explain the weak effects for certain states representing Germany's most contracting real estate markets.

Figure A.11: Survey Sample Selection



	Survey Participation	
	Estimate	Std. Error
Firm size	0.003	(0.004)
Firm size ²	-0.000	(0.000)
Number of listings	-0.003*	(0.001)
Brandenburg	0.456*	(0.214)
Berlin	0.356	(0.195)
Bremen	-0.749	(0.607)
Baden-Wuerttemberg	0.165	(0.184)
Hamburg	-0.035	(0.242)
Hesse	0.012	(0.198)
Mecklen. Wes.-Pom.	0.536*	(0.261)
Lower Saxony	0.189	(0.217)
North Rhine-West.	-0.013	(0.179)
Rhineland-Palat.	-0.074	(0.229)
Saxony	0.529*	(0.269)
Schleswig-Holstein	-0.089	(0.247)
Saarland	-0.056	(0.540)
Saxony-Anhalt	0.317	(0.234)
Thuringia	0.229	(0.339)
Constant	-2.475***	(0.152)
Observations	8,220	

Note: The table gives the regression estimates for participation conditional on the collected covariates. The sample represents the pool of the invited candidates from the largest platform where the number of listings that a real estate agent offered was available when collecting the data. The map depicts the locations of all the responses from this subsample. Overall, participation appears regionally balanced and largely independent of firm size. Significance levels: ***, 0.001, **, 0.01, *, 0.05.

³¹Although most real estate agencies are run by fewer than 2-3 agents, some larger firms exist with offices across Germany.

Additional Exploratory Evidence

Demographics

Several survey items ask real estate agents about a seller’s age, gender, experience on real estate and the regulation of real estate agents, and the corresponding price of the object. Given the limitation of sampling real estate agents, some variables are collected as coarse intervals. Table A.2 presents the estimates for the propensity to negotiate the real estate agent’s commission conditional on the characteristics of the home seller.

Table A.2: Correlates With the Negotiation Decision of Sellers

	Dependent variable: Negotiated (1 = Yes)
Female	−0.672** (0.217)
Age 41-50	−0.009 (0.342)
Age 51-60	−0.367 (0.338)
Age 61-70	−0.832* (0.379)
Age 71-80	−1.027 (0.566)
Age 80+	−1.562 (1.098)
Experience real estate	0.051 (0.065)
Knowledge regulation	−0.157** (0.054)
Price 200,001 - 400,000	−0.220 (0.354)
Price 400,001 - 600,000	−0.146 (0.361)
Price 600,001 - 800,000	0.708 (0.389)
Price 800,001 - 1,000,000	1.084* (0.435)
Price 1,000,001 - 1,200,000	1.233* (0.571)
Price 1,200,001 - 1,400,000	0.914 (0.639)
Price greater 1,400,001	1.360** (0.429)
Sending wave FE	Yes
Observations	1,062

Note: Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

The model suggests that female home sellers negotiate significantly less. Compared to men, they are only half as likely to demand a lower commission rate. Although in line with findings from similar contexts in which the option to negotiate is not explicit (e.g. Leibbrandt & List, 2015), the magnitude is notable. Similarly, I find that sellers beyond retirement age are less likely to negotiate.

Interestingly, experience on the real estate market fails to predict the home sellers tendency to negotiate, whilst the regulatory knowledge of real estate agents does. However, the direction of this effect is unexpected: when home sellers appear³² to be more

³²Specifically, the survey item asked: “How much did your last seller know about the current legal

knowledgeable about how real estate agents are regulated, they exhibit less inclination to demand a lower commission rate. Although speculative, this effect may reflect a common misconception about the reform, in that splitting the obligation to pay is communicated as if the reform also mandated a fixed 3% commission rate for both. As a result, home sellers may be considered well informed about regulation, despite misunderstanding that the commission rate is not fixed but freely negotiable. Finally, higher priced homes are associated with a significantly higher propensity for sellers to negotiate with the real estate agent. This correlation appears natural: individuals selling a higher value property have higher stakes when demanding a lower commission and will likely have a higher socio-economic status.

Real Estate Agents' Beliefs

Next to demographic traits, real estate agents are also questioned about their beliefs regarding why home sellers demand a lower commission or not. The options are based on the conjectures from the findings of the price increase and reflect the seller's perception of the incidence, and the perceived level of reference commission rates. For sellers who did not negotiate, real estate agents had the following choices:

- The seller expects a higher selling price with the agent, which exceeds the commission cost [Incidence]
- The seller is guided by the regionally typical commission rate or similar listings [Reference commission]
- The seller is unaware that the commission rate can be negotiated [Knowledge]
- Other reasons

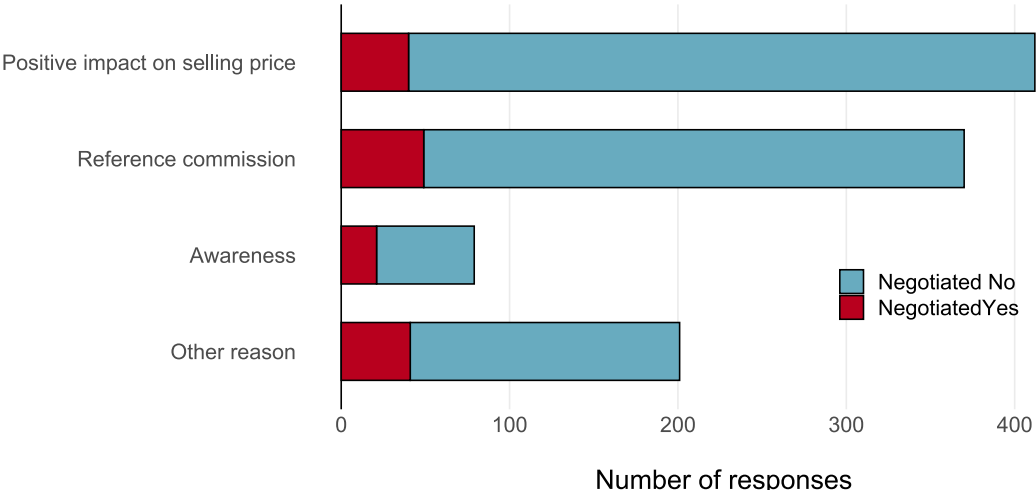
If sellers did negotiate, an inverse set of options is provided:

- The seller expects a lower selling price with the agent, as the buyer also pays more commission [Incidence]
- The seller observed other listings with a lower commission rate [Reference commission]
- The seller received a recommendation to negotiate the commission rate [Knowledge]
- Other reasons

framework concerning the commissioning of real estate agents?"

The results suggest that real estate agents believe that the reference commission and the ability of a real estate agent to fetch a higher (or insufficiently high) price are important explanations for the negotiation behavior of home sellers (Figure A.12). These dimensions are even the most prominent when real estate agents select other reasons. When a seller did not negotiate, approximately 2/3 of real estate agents selecting other reasons answered that customers are willing to pay for a higher commission due to the surplus value added by the service.³³ Similarly, when a seller did negotiate, the other most prominent reason cited was that the seller wanted to save money. This justification implies that the seller did not believe that a real estate agent fetches a higher selling price that offsets the commission cost.

Figure A.12: Estimated Reasons for Negotiation Behavior



Note: This figure shows the proportion of the reasons that real estate agents selected to explain why their most recent seller negotiated or not. Real estate agents selecting “Other reason” for why a home seller decided to negotiate most often provided a variation of “The home seller wanted to save money.”

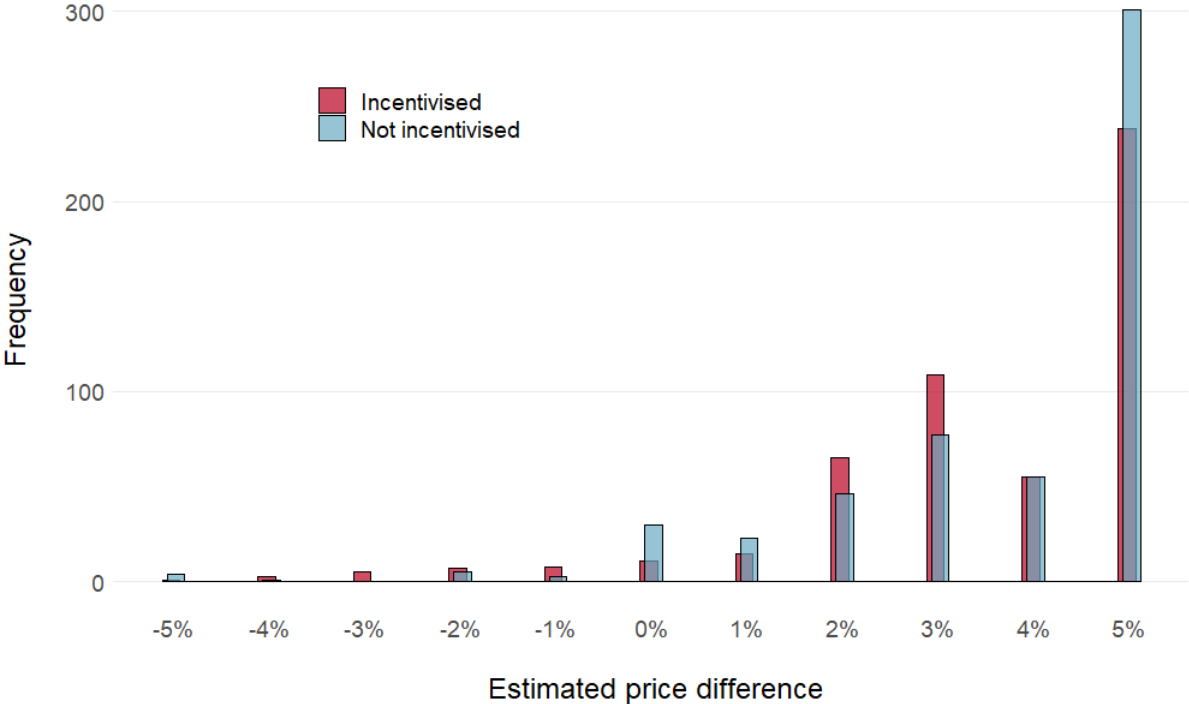
All the inferences drawn from this section are contingent on the subjects’ truthful reporting. Some options may be more prone to social desirability concerns than others: stating that a home seller is unaware of the opportunity to negotiate may be less socially desirable than indicating that the offered service quality is so exceptional that a seller would not dare to demand a lower commission rate. Nonetheless, the results support the explanatory role of the variables highlighted in the theoretical considerations. Home sellers’ attention to negotiate may be related to the reference level of commission rates

³³Typical answers included “The seller sees the value of our service” and “We offer a worry-free full-service portfolio which the customer acknowledged.”

and the perceived incidence.

Supplementary Figures

Figure A.13: Estimated Price Difference to Listings for Sale by Owner



Note: The histogram depicts the frequency of estimations given by real estate agents which price difference real estate agents achieve compared to listings for sale by owner.