

Competition in Online Markets: When Banks Compete, Do Consumers Really Win?

Abdullah Al-Babrani

Abstract

The perceived objective of price comparison sites is to aggregate price quotes from several firms. They are expected to reduce consumers' search costs and lead to more competitive markets. In this paper, I examine the difference in the prices consumers pay on comparison sites relative to traditional shopping methods. Using a unique data set, a mortgage firm's pricing strategies on Lendingtree.com, a price comparison site, and in traditional markets are examined. The results indicate that lendingtree.com and traditional consumers pay the same price on average. The presumed benefits from lower search cost on lendingtree.com do not result in lower mortgage prices.

Price comparison sites have developed as the Internet and online markets have matured. The perceived objective of these sites is to aggregate price information from multiple suppliers. Through one click, consumers are able to observe a list of prices from participating firms. A quick search on the Internet reveals that price comparison sites exist for most products. For example, consumers can search for air travel (Kayak.com), hotels (Hotels.com), or mortgages (Lendingtree.com) and receive a list of prices. Price comparison sites have reduced the marginal cost of search and thus are presumed to create more competitive markets (Stigler, 1961).

The benefits of price comparison sites would be most evident in decentralized markets where consumers must undertake costly search and where the final price is determined through a negotiation process. Allen, Clark, and Houde (2010) find that mortgage markets are decentralized and the rate on a mortgage is a function of both search and negotiation by the consumer. In the mortgage market, consumers searching for a mortgage through Lendingtree.com would be able to gather quotes from multiple lenders. While Lendingtree.com consumers receive quotes from up to five lenders, 39% of U.S. consumers and 45% of Canadian borrowers have reported that they only obtain one mortgage quote (Allen, Clark, and Houde, 2010).¹ Consumers benefit through the lower cost of search on Lendingtree.com and through the ability to negotiate by generating competing offers between the lenders on the site. Furthermore, the Lendingtree.com slogan, "When banks compete, you win" suggests that consumers searching and negotiating on the site can expect to receive lower priced mortgage contracts than consumers purchasing through direct channels with retailers. In this paper, I evaluate whether online price comparison sites, like Lendingtree.com, actually reduce the price customers pay relative to other markets.

To conduct the analysis, I use micro-level data from a mortgage firm that originated loans through two methods: (1) direct contact with customers and (2) through Lendingtree.com. To test for the competitiveness of Lendingtree.com, I compare the final negotiated mortgage prices that customers receive when applying through Lendingtree.com relative to the rates received by customers applying directly to the lender. A major advantage of this approach is, by examining a single firm's prices, firm heterogeneity as the source of price differences between Lendingtree.com and direct origination prices is eliminated. Any differences between the prices can be attributed to differences in search cost and consumers' negotiation power. Another advantage is that the dataset provides actual transaction prices and not quoted prices. Research examining the competitiveness of online markets has suffered from the limitation of using only quoted prices (Ghose and Yao, 2011). Allen, Clark, and Houde (2010) find that there is a difference between quoted and transaction prices in mortgage markets. Therefore, having actual transaction prices provides a more accurate comparison between Lendingtree.com and direct origination markets and thus provides a more accurate measure of relative market competitiveness.

After controlling for observable loan and consumer characteristics, I find that consumers who shop and obtain a mortgage through Lendingtree.com pay the same price as consumers who purchase their loan directly through the lender. The expected gains from additional quotes that Lendingtree.com customers receive do not result in lower prices. For some loan types, the prices Lendingtree.com customers pay are higher than prices paid by direct customers. This is contradictory to the findings of Woodward and Hall (2010), which show that the average customer would pay \$1,000 less for a mortgage if mortgage brokers consider two additional quotes when shopping. The gains from lower search cost and the competing offers, which Lendingtree.com presumably provides to the consumer, are not supported by my findings.

Literature Review

The introduction of online markets was expected to lead to "frictionless commerce" and allow consumers to compare prices more easily (Brynjolfsson and Smith, 2000). Stigler (1961) shows that firms will compete in a Bertrand setting when consumers' search costs are zero. If search costs are not entirely eliminated, which they are not in current online markets, then Stahl (1989) finds that prices will approach Bertrand pricing as search costs decrease and the dispersion of prices becomes less extreme. Therefore, most empirical studies examining the impact of the Internet on the market have focused on the dispersion of quoted prices as the measure of market competitiveness. I use actual transaction prices as the measure of market competitiveness, and thus more accurately measure the impact to the consumer.

Lee (1998) studies the car market and finds that prices in online markets are on average higher than in conventional retail markets. The findings may be capturing the variation in quality of cars and thus the price is measuring a heterogeneous product. It is important to control for firm characteristics and product quality when comparing market competitiveness. Bailey (1998) controls for product quality and examines books, CDs, and software and finds that online prices are higher as well. Also testing the market for

books and CDs, Brynjolfsson and Smith (2000), find that online prices are less dispersed and are on average 9%–16% lower than conventional markets. In the market for life insurance, Brown and Goolsbe (2002) find that in areas where the proportion of the population using the Internet increases, prices for life insurance fall. They estimate that the Internet has caused prices to fall by as much as 5%.

Studies exploring the competitiveness of online markets have provided inconclusive evidence of the gains from online commerce.² In this study, I contribute to the literature by investigating the competitiveness of price comparison sites by controlling for firm heterogeneity and product heterogeneity, and by using transaction prices rather than quoted prices. Furthermore, I investigate the role of price comparison sites, which aggregate prices from participating firms and are expected to further reduce the search cost to consumers.

Price comparison sites represent a move one step closer to frictionless commerce. Price comparison sites allow firms to compete for customers by listing their prices at a single site. Customers are no longer required to visit each firm's website, and can observe price quotes from participating firms at one site. These "clearinghouses" are in essence "gatekeepers" of information (Baye and Morgan, 2001). In their model, Baye and Morgan (2001) find that in equilibrium, gatekeepers provide consumer access to information for no charge, but charge participating firms a subscription fee or advertising fee. Prices are expected to be dispersed but the average price listed on the price comparison site is expected to be less than the prices at firms not listing on the site. In an empirical test, Baye, Morgan, and Scholten (2004) explore the market competitiveness of shopper.com, a price comparison site, and find that price dispersion is lower on the site. Their results support that price comparison sites allow more firms to compete and therefore result in more competitive markets relative to traditional markets.

Baye and Morgan (2004) extend their initial model by exploring the market outcome for a firm that can price discriminate between consumers who shop through the gatekeeper or through the firm's website. They find that, with a probability of one, prices listed on the price comparison site will be lower than the price the firm lists on its own site. Therefore, findings in research comparing the market competitiveness of online and traditional retail markets will be influenced by the nature of the online market. These findings suggest that prices on comparison sites will be lower than prices on firms' individual sites, which will in turn be lower than prices in traditional retail markets. In this paper, I extend the literature by using transaction prices rather than quoted prices, controlling for product and firm heterogeneity, and examining the role of price comparison sites and their impact on market competitiveness.

Lendingtree.com's Effect on Mortgage Prices

The application process on Lendingtree.com requires customers to provide personal information including social security number, the requested loan amount, and preferred loan program. The consumer's social security number allows Lendingtree to obtain a credit score for each applicant. After the customer completes the required information, each application is submitted to five firms on the network. Although Lendingtree's

advertising suggests that all possible firms will compete for their business, Lendingtree.com restricts the number of quotes the customer receives. Lendingtree.com suggests that by using a complex predictive modeling system they are able to match lenders and customers to ensure the highest probability of success.

This matching process takes into account customer credit score, the loan program requested, the lender's customer service performance, and the lender's past success with the requested loan program and credit score. A competing firm is allowed to provide up to three distinct quotes to each customer. The three quotes can be differentiated by loan type (fixed, adjustable-rate mortgage, or home equity line of credit), duration, and/or closing costs. If the applicant meets the credit score requirements for all five network firms, the applicant will receive a maximum of 15 offers. However, the firms choosing to offer a quote cannot observe how many other firms are competing for the client or which firms they are competing against. If the applicant's credit score or the loan requested does not meet the guidelines for available products, firms can choose not to provide a quote. It is possible that the applicant receives no offers when applying, although this is rare and more likely firms will provide the customer with a quote on alternative loan products.

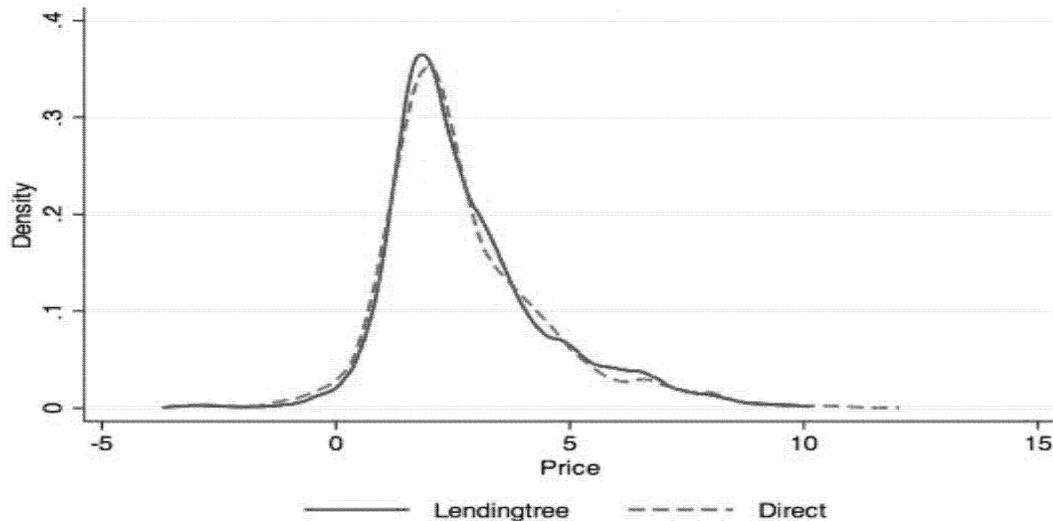
The ability of consumers to obtain a large number of quotes when searching online suggests that consumers will be able to negotiate lower mortgage prices than consumers searching in the direct market. A direct consumer, shopping in the traditional mortgage markets, will incur higher search costs and may reveal consumer characteristics that will divulge their willingness to pay. Morton, Zettelmeyer, and Silva-Risso (2003) find that minorities pay higher prices for cars in offline markets, but not in online markets. They conclude that the anonymity of online markets reduce the sellers' ability to assess the consumer's willingness to pay. In the mortgage market, this would imply that lendingtree.com consumers would receive lower wages than the direct consumer.

Data and Variables

The data are provided by a mortgage firm that formerly operated in conventional retail markets, had an online website presence, and an application channel through the price comparison site, Lendingtree.com.³ This firm provided its customer database purged of any customer identifying information. The database includes all loan applications submitted to the firm from 2002 to 2007. During that time span, the firm received 41,054 loan applications.

My focus is to examine actual transactions, which limits the sample to completed transactions (i.e., closed loans). I restrict the sample period to include data from 2002 to 2006. Management's decision to cease operations was made public in early 2007, so to eliminate any bias introduced by this information the 2007 data are excluded. The analysis is restricted to a homogenous product, which are loans classified as "agency" loans by Fannie Mae and Freddie Mac. Agency loans have identical risk and do not impose any interest rate adjustment to the note rate as long as the customer is approved for the product. Therefore, variations in the price of the mortgage will not be due to differences in risk but to the customers' ability to negotiate the price. The homogenous sample has

Exhibit 1. Price Dispersion: Lendingtree and Direct Market



Kernel density graph of the distribution of prices in the Lendingtree and direct market. Includes all loans originated from 2003 to 2006. The price is defined as the APR minus the 10-year Treasury. Negative values are possible for adjustable-rate mortgages and pay-option ARMs where the APR is less than the 10-year Treasury.

3,411 loans. Exhibit 1 provides the distribution of prices for loans originated on lendingtree.com and for the direct loans.

Mortgages are priced using two-part pricing. To estimate the price differential between Lendingtree.com and direct consumers, mortgage prices must be defined first. The true cost of a mortgage must include the interest rate of the mortgage and fees or “points” paid to the broker (Black, Boehm, and DeGennaro, 2003). A consumer can reduce their interest rate if they are willing to pay higher upfront fees to the lender. Therefore, the price of a mortgage must control for the endogeneity between interest rate and points. Baye and Morgan (2001) provide evidence of dispersion in mortgage interest rates but do not control for variations in points paid.

To define the price of the mortgage, I construct an annual percentage rate (APR) that takes into account the total price, interest rate, and points paid by the consumer. The APR is a function of the interest rate at time t , default and prepayment risk, and any upfront fees paid:

$$APR_{it} = f(I_i(R_t, K_{jt}, D(X_i), P(X_i)), U(X_i)). \tag{1}$$

The mortgage interest rate I_i is a function of the prevailing market interest rates R at time t and firm j 's cost of capital at time t , K_{jt} . $D(X_i)$ and $P(X_i)$ represent individual i 's default and prepayment risk, respectively. By restricting the sample of loans to only FNMA and FHLMC agency loans, I am restricting the sample to loans that have been determined to have identical risk. Additionally, in a single firm analysis, the cost of capital can be

Exhibit 2. Summary Statistics

Dependent Variable	Lendingtree.com	Direct	All Loans
Interest Rate	6.33	6.32	6.33
Commission ^a	1329.27	942.31	1211.73
APR	6.51	6.48	6.50
Price	2.15	2.23	2.17
Credit Score ^a	672.51	681.32	675.22
Loan-to-Value (LTV) ^a	62.22	49.73	58.41
Loan amount (\$1,000) ^a	141.99	134.18	139.66
Fixed loans	0.93	0.92	0.93
Cash Out ^a	0.61	0.39	0.54
Purchase mortgages ^a	0.11	0.32	0.17
Second lien mortgages ^a	0.13	0.17	0.15
10-Year Mortgages	0.02	0.03	0.02
15-Year Mortgages	0.15	0.14	0.15
20-Year Mortgages	0.08	0.08	0.08
25-Year Mortgages	0.01	0.01	0.01
30-Year Mortgages	0.74	0.74	0.74
2002 ^a	0.00	0.11	0.03
2003 ^a	0.11	0.24	0.15
2004 ^a	0.30	0.16	0.26
2005 ^a	0.40	0.33	0.38
2006 ^a	0.19	0.15	0.18
<i>N</i>	2378	1013	3411

Notes: This table includes summary statistics for the sample of closed loans from 2002 to 2006.

^aThe variable name identifies the variables that are statistically different between lendingtree.com and direct customers as identified by a difference in means test.

assumed to be constant across all loans (Stengel and Glennon, 1999). Finally, I can replace R_t with the 10-year Treasury rate at time t .⁴ I subtract the 10-year Treasury rate from the APR to measure the price paid by the consumer above the risk and interest rate premium. The dependent variable *Price* is the price consumers paid above default and interest rate risk. The results in Exhibit 2 show that Lendingtree.com consumers paid on average 2.14% above default and interest rate risk while direct customers paid a slightly higher price of 2.21%. The minor difference between the two distributions is that prices in the direct market are slightly more dispersed.

Summary statistics for Lendingtree.com and direct customer loans are provided in Exhibit 2. There is a statistical variation between the explanatory variables in the two groups. A difference in means test reveals differences in the amount of commission charged, credit score, loan-to-value, cash-out, purchase, second lien loans, and the origination by year variables. The dataset includes information on the type of loans originated. Exhibit 3 provides definitions for the mortgage variables.

Exhibit 3. Definitions of Loan-Level Variables

Variable	Definition
Expense to Income	Housing payment/gross income.
Debt to Income	Total debt payment/gross income.
Loan-to-Value	Equity invested in the property.
Fixed Loan	Interest on loan is constant.
Adjustable-Rate Mortgage (ARM)	Loans with variable interest rate.
Term of Loan	Loan duration: 10, 15, 20, 25, 30 or 40 years.
Loan Amount	Loan amount of the loan.
Credit Score	A measure of consumer's credit worthiness.
Lien Position	In the case of foreclosure or sale of the house, the lien position determines who receives funds first. It is important in the case where sale/foreclosure proceeds are less than total mortgage debt outstanding.
Refinance Type	Rate and term or cash out.
Purchase	Loans made to consumers to purchase a home.
Prepayment penalty	Before the recent financial crisis, most states allowed the lender to impose a prepayment penalty on mortgages for a specific time frame. Usually it ranges from 3 to 5 years, and the penalty can vary from 1% to 9%. Prepayment penalties are usually associated with Subprime loans. Agency loans do not have a prepayment penalty.

The ratio of loan amount relative to home value (LTV) represents the amount of equity the consumer has invested in the property. As the LTV ratio increases, the amount of equity decreases. The average mortgage loan has a loan amount of \$139,660 and a LTV of 58%.

Dummy variables indicate whether the loan is classified as a cash-out, purchase or second-lien loan. If a loan is not a cash-out, purchase, or second-lien loan, then the loan was originated as a rate-and-term refinance. Cash-out loans are refinance loans in excess of the previously outstanding loan amount. Consequently, the consumer is extracting equity and receiving cash from the proceeds of the loan. Roughly 54% of the loans are classified as cash-out refinances. Second-lien loans are loans placed in second priority position to receive funds in the event of a foreclosure or short sale. They account for 15% of mortgage originations. Loans originated to fund a purchase of a home account for 17% of the loans. Therefore, rate-and-term refinancing makes up the remaining 14% of loans. Rate-and-term loans are refinance loans to adjust the duration of the loan (term), or more likely between 2002 and 2006, to take advantage of lower interest rates in the market (rate).

Although the loans in the sample are classified as agency loans, and therefore have the same default risk, there are variations in loan and consumer characteristics. Loans originated through Lendingtree.com account for 70% of all loans in the sample. The major difference between direct consumers and Lendingtree.com consumers is in the purchase and cash-out variables. Direct customers are relatively more likely to request a mortgage

to purchase a new home, while Lendingtree.com consumers are more likely to request a cash-out refinance mortgage. Purchase loans account for 32% of direct mortgages, but only 11% of Lendingtree.com mortgages, whereas 61% of Lendingtree.com loans and 39% of direct loans are cash-out loans.

Empirical Analysis and Regression

To estimate the impact of Lendingtree on the mortgage price consumers' pay, I use the following specification:

$$Price_i = \beta_0 + \beta_1 X_i + \beta_2 Lendingtree.com + \beta_3 X_i * Lendingtree.com + \varepsilon_i. \quad (2)$$

The X matrix is composed of loan and consumer characteristics: loan-to-value, credit score, loan duration, loan type, and year controls.

I include an indicator variable *lendingtree.com* that is one if the loan was originated through the online channel and zero otherwise. To measure whether consumer and loan characteristics are priced differently in the online channel, I interact the *lendingtree.com* indicator with the X matrix.

Results

The results of the price equation are reported in Exhibit 4. For most loan and consumer variables, the coefficients are insignificant. These results are expected since the sample is restricted to agency loans that have identical risk pricing. For the insignificant coefficients, consumers were not able to negotiate prices based on specific loan or consumer characteristics. In the case of credit score, loan amount, fixed mortgages, and 30-year mortgages, the coefficient is statistically significant.

As consumers credit worthiness increases, the price they pay falls. An increase in the credit score by 10 units reduces the price a consumer pays by 5 bps. Similarly, loan amount and prices are negatively related. For every additional \$10,000 borrowed, the price decreases 6 bps. As expected, relative to adjustable-rate mortgages, fixed loans are priced higher. Loan duration is positively related to prices. However the results indicate that this positive relationship is only evident with 30-year mortgages. Relative to 10-year mortgages, the 30-year loan is priced 71 bps.

The variable of interest is the *lendingtree.com* indicator. The results indicate that *lendingtree.com* customers do not receive any discounts relative to direct loans. The coefficient is negative but statistically insignificant, consequently there is no evidence that the *lendingtree.com* consumer benefits by shopping online and from receiving more quotes. One possible explanation is that the *lendingtree.com* discount maybe observed through the interaction of the indicator with the loan variables. However those results are insignificant for the most part. In fact, the statistical significant coefficients are positive rather than negative. Consumers shopping through *lendingtree.com* for a 25-year mortgage will pay 1.71% more than a 10-year consumer. Consumers purchasing a new home and searching for a mortgage on *lendingtree.com* will receive a price 34 bps higher on the online channel.

Exhibit 4. Mortgage Price Regression

Dependent Variable (<i>Price</i>)	Coeff.	t-Stat.
Lendingtree.com	-0.343	(0.51)
Credit Score	-0.005	(8.68)**
Loan Amount (\$1,000)	-0.006	(11.59)**
Fixed	1.312	(8.95)**
30-Year Mortgage	0.710	(2.83)**
25-Year Mortgage	0.082	(0.17)
20-Year Mortgage	0.494	(1.76)
15-Year Mortgage	0.059	(0.22)
Loan-to-Value	-0.001	(0.82)
Cash-out	-0.012	(0.12)
Purchase	0.102	(0.91)
Second	0.001	(0.01)
Year 2006	-0.626	(3.97)**
Year 2005	0.102	(0.76)
Year 2004	0.099	(0.64)
Enforcement Law	-0.004	(0.13)
Coverage law	-0.024	(0.80)
Lendingtree.com* Credit score	-0.001	0.12
Lendingtree.com* Loan Amount	0.001	(2.04)*
Lendingtree.com* Fixed	-0.132	(0.73)
Lendingtree.com* 30-Year Mortgage	0.093	(0.30)
Lendingtree.com* 25-Year Mortgage	1.708	(2.87)**
Lendingtree.com* 20-Year Mortgage	0.285	(0.83)
Lendingtree.com* 15-Year Mortgage	0.196	(0.60)
Lendingtree.com* Loan-to-Value	-0.001	(0.57)
Lendingtree.com* Cash-out	0.083	(0.70)
Lendingtree.com* Purchase	0.349	(2.38)**
Lendingtree.com* Second	-0.070	(0.36)
Lendingtree.com* Year 2006	0.368	(1.59)
Lendingtree.com* Year 2005	0.150	(0.72)
Lendingtree.com** Year 2004	0.144	(0.64)
Lendingtree.com* Coverage Law	0.014	(0.41)
Lendingtree.com* Enforcement law	-0.020	(0.65)
Constant	5.199	(9.34)**

Notes: The number of observations is 3,361 and the R² is 0.25. The absolute value of t-statistics is in parentheses.

* Significant at the 5% level.

** Significant at the 1% level.

Selection Bias

One possible concern is that consumers' shopping decisions are a function of their search cost or other unobserved characteristics. If consumers shopping online have unobserved characteristics that make them more likely to shop online but also affects the price of a mortgage, then the estimates obtained from the regression in equation (2) would be biased. To test for the role of unobserved characteristics on mortgage price, I employ a switching regression, full information estimator (FIML) (Lee, 1978).

The switching regression is similar to the Heckman selection. A probit of market choice is estimated in the first stage of the Heckman selection correction specification, which then allows estimation of the price equation in the second stage. The switching model simultaneously estimates the market choice probit and price equations and is therefore efficient (Lokshin and Sajaia, 2004). For identification purposes, the Probit model requires exclusion restrictions. I include distance of the property from the firm's office. Consumers farther from the home office incur a higher search cost of visiting the firm and would be more likely to shop through *lendingtree.com*. While a larger distance will increase search costs, it should not affect the price the consumer pays for a mortgage. Additionally, census data on education by ZIP Code are used as exclusion restrictions. More-educated consumers maybe more likely to be familiar with the benefits of the Internet and therefore more likely to shop online, however higher education should not directly impact the price of a mortgage.

The results to the switching regression are reported in Exhibit 5. The results indicate that consumers shopping methods are random and selection based on unobservable characteristics is unsubstantiated. In the switching regression, the coefficients ρ_1 and ρ_2 are statistically insignificant and thus the error term in the market-choice probit model and the errors from the price equations are uncorrelated. The insignificance of the correlation coefficients implies that the propensity to shop online and the price equation are in fact exogenous. Furthermore, the coefficients from the OLS estimation in Exhibit 4 and the coefficients from the switching model in Exhibit 5 are very similar. For example, the coefficient of 25-year mortgage originated in the *lendingtree.com* market (*Lendingtree.com* 25 Year Mortgage*) in Exhibit 4 is 1.708. This coefficient is approximately equal to the difference between the 25-year mortgage coefficient for the *Lendingtree.com* price equation in Exhibit 5 (1.770) and the coefficient for the direct market for the 25-year term ($1.770 - 0.050 = 1.720$). In Exhibit 5, the coefficient for loan amount in the *Lendingtree.com* price equation is -0.005 and -0.006 in the direct market equation. Subtracting the direct coefficient from the *Lendingtree.com* coefficient yields 0.001 ($-0.005 - (-0.006)$), which is exactly the coefficient of loan amount for the *Lendingtree.com* loans in the OLS estimation. These results imply that the OLS coefficients do not suffer from selection bias.

Since selection bias does not play a role in pricing, consumer search in online markets does not affect the price they pay for a mortgage. Without selection into market type based on unobservable qualities as a concern, the estimation method can be estimated using the OLS specification. The results, however, do indicate that some observables are predictive of market choice. As the loan-to-value ratio increases, consumers are more likely to search through *lendingtree.com* for a mortgage. Consumers shopping for cash-

Exhibit 5. Switching Regression to Control for Market Selection

Variable	Price		Price		Probit	
	Lendingtree.com	Z	Direct	Z	Lendingtree.com	Z
Credit Score	-0.006*	12.57	-0.006*	7.98	-0.001	1.93
Loan Amount (\$1,000)	-0.005*	15.66	-0.006*	10.38	0.004	1.09
Fixed	1.166*	11.18	1.286*	8.13	0.134	1.38
30-Year Mortgage	0.804*	4.68	0.628*	2.55	-0.046	0.28
25-Year Mortgage	1.770*	5.42	0.050	0.10	0.130	0.42
20-Year Mortgage	0.784*	4.15	0.496	1.69	0.046	0.25
15-Year Mortgage	0.257	1.42	-0.011	0.04	-0.008	0.04
Loan to Value	-0.0001	0.08	0.002	1.26	0.003*	2.60
Cash-out	0.074	1.27	0.019	0.10	0.159*	2.68
Purchase	0.529*	5.22	-0.005	0.03	-0.897*	12.04
Second	0.120	1.28	0.190	1.39	-0.126	1.57
Year 2006	-0.555*	5.19	-0.676*	3.53	0.919*	11.04
Year 2005	-0.041	0.42	0.065	0.38	0.944	13.56
Year 2004	-0.638	0.62	0.080	0.37	1.200*	15.54
Enforcement Law	-0.014	0.80	-0.011	0.29	-0.113*	6.39
Coverage law	-0.008	0.49	-0.040	1.03	-0.617*	3.62
Distance					0.005*	5.04
Education					-0.016	1.36
Constant	4.922*	12.65	5.093*	7.62	0.507	1.32
Ins 1 and Ins 2	0.201*	13.12	0.282*	11.89		
r1 and r2	-0.139	-1.89	0.079	0.49		
σ	1.220	0.02	1.330	0.03		
$\rho1$ and $\rho2$	-0.138	0.07	0.079	0.16		

Notes:

* Significant at the 5% level.

out loans are more likely to shop online, and consumers purchasing a new home are more likely to shop through the direct market.

This research has two limitations; the search behavior of the consumer is unobserved, and it is assumed that price is the variable determining firm choice. Firstly, it is unknown if consumers shop in both markets or not, and I assume that consumers select one market type and do not enter the other. I also assume that consumers search methods resemble those found by Lee and Hogarth (2000), Lacko and Pappalardo (2007), the Federal Reserve Board (2009), and Woodward and Hall (2010), which is that direct customers observe fewer quotes than customers shopping through price comparison sites.

The other limitation is the assumption that consumers pick the lowest-priced product and that firm and product reputation do not impact their decision. However, this is a common assumption in empirical analysis estimating the impact of the Internet on market outcomes. In this research, control for limitations found in previous empirical tests. I also control for several limitations. I control for firm heterogeneity by examining a single firm's

price strategy. I also examine transaction prices and not quoted prices. In addition, I test the competitiveness of a gatekeeper and online market in a decentralized market, which would benefit most from a reduction in search costs and providing the consumer with competing offers. By controlling for the limitations in the literature, I contribute to the research measuring the competitiveness of online markets and price comparison sites.

Conclusion

Much effort has been devoted to measuring the competitiveness of online markets relative to traditional retail markets. According to economic theory, a reduction of search cost and the ability of consumers to generate competing offers leads to lower prices in online markets. However, research has been inconclusive about the market competitiveness.

I extend this research by focusing on a mortgage price comparison site, which reduces the cost of search by aggregating price information from multiple firms. Mortgage markets are decentralized markets such that consumers must conduct costly search and the final price is determined through a negotiation process. The benefits of price comparison sites are more likely to be experienced in the mortgage market.

I find that the price comparison site, Lendingtree.com, does not reduce the price customers pay. On Lendingtree.com, customers are presumed to receive more quotes than customers that shop directly at the lender. However, these additional quotes do not translate to more competitive pricing. The Lendingtree.com slogan, “When banks compete, you win” is not supported by this empirical evidence.

Endnotes

- ¹ Lacko and Pappalardo (2007) find the modal number of loan quotes a borrower considers is two. A study by the Federal Reserve Board (2009) finds that more than 50% of borrowers only consider one quote when shopping for a mortgage.
- ² See Bakos (2000) and Smith, Bailey, and Brynjolfsson (2000) for surveys of literature on Internet markets. See Baye, Morgan, and Scholten (2004) and Pan, Ratchford, and Shankar (2004) for summaries of empirical results.
- ³ Customers that applied to the firm through either conventional retail methods or through the firm’s website are classified as direct customers.
- ⁴ The standard approach in mortgage literature is to use the 10-year Treasury as a measure of market interest rates.

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