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Agency and Incentives: Vertical Integration in the Mortgage Foreclosure Industry*

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Abstract

In many U.S. states, the law firms that represent lenders in foreclosure proceedings must hire auctioneers to carry out the foreclosure auctions. We empirically test whether processing times differ for law firms that integrate the mortgage foreclosure auction process compared with law firms that contract with independent auction companies. We find that independent firms are able to initially schedule auctions more quickly, but when postponements occur, they are no faster to adapt. Since firms schedule the initial auction before contracting, independent auction companies have an incentive to conform to the law firms' schedules in order to secure the contracts. We argue that this is evidence of a cost of integration stemming from poorly aligned incentives within the firm.

Keywords: vertical integration, mortgage foreclosure
JEL Codes: D23, G21, G28, L22, L85

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In many U.S. states, law firms that process mortgage foreclosures are required to hire private auctioneers to sell the properties that secure delinquent mortgages. In Massachusetts, several law firms use in-house auctioneers, while others hire outside auctioneers to provide the same service. This setting, where otherwise similar transactions are conducted by firms with different organizational forms, allows us to measure the impact of vertical integration on performance, specifically the impact on the foreclosure timeline. We study over 3,300 foreclosure auctions in Suffolk County, Massachusetts, between 2006 and 2010 and find that integrated firms took one to three months longer to initially schedule each auction.

This initial scheduling delay indicates a cost to integrating in this industry. We explain this result by considering the timing of contracting between the law firm and auctioneer. An independent auction company, which has not yet been contracted for a given auction when the auction date is set, has an incentive to agree to the law firm's scheduling preferences. In contrast, the integrated auctioneer lacks the market incentive to schedule quickly, leading to the observed delay. This is consistent with the property rights argument that vertical integration may impose costs when residual rights of control (in this case, scheduling the auction) are allocated to a party with poor incentives (Grossman and Hart, 1986).

When rescheduling becomes necessary, however, independent firms schedule new auctions no faster than their integrated counterparts. This suggests that integrated firms in this industry are no better at adapting to unforeseeable events. Since contracting has already occurred when rescheduling becomes necessary, the independent auctioneers no longer have a greater incentive to reschedule quickly. In the absence of incentive differences, we may expect the integrated firms to be able to better coordinate rescheduling (Williamson, 1975; Bajari and Tadelis, 2001; Tadelis, 2002). However, we find no difference between the performance of firms with different organizational forms.

To ensure that our estimates are consistent, we use a two-stage least squares approach in which we instrument for the law firm's integration decision. During our period of study, Freddie Mac did not allow integrated auctioneers in foreclosure sales for loans it backed. We exploit this fact for our empirical identification by using the fraction of the originator's loans backed by Freddie Mac as well as the fraction of the law firm's business in a given year that comes from Freddie Mac as instruments for the organizational form.

Beyond contributing to the empirical make-or-buy literature, our results have practical relevance to the mortgage industry.[1] As discussed further in Cordell et al. (2015), severity rates (losses from loans that end in foreclosure) increase by between 0.5 and 1 percentage

[1]See Lafontaine and Slade (2007) for a review of the make-or-buy literature. Notably, Baker and Hubbard (2003, 2004) and Woodruff (2002) also find support for the property rights argument. Forbes and Lederman (2009, 2010) also test whether integrated firms are better able to adapt, but they find that integrated firms do perform better than independent firms in the airline industry.

point per additional month in the foreclosure timeline. On loans that are typically several hundred thousand dollars, the one- to three-month delay incurred by using an integrated firm leads to substantial costs, particularly multiplied over the large volume of foreclosures completed.

1 Industry Background

In each U.S. state, one of two types of foreclosure procedures is primarily used, though in some states both types occur. Eighteen states require what is known as judicial foreclosure, in which the lender petitions the court, which rules on the foreclosure and instructs the local sheriff's department to sell the property at auction. In contrast, 32 states and the District of Columbia allow for power-of-sale foreclosure, in which the lender can foreclose and carry out the auction without court supervision (Gerardi, Lambie-Hanson, and Willen, 2013). Our study is set in Suffolk County, Massachusetts, where power-of-sale foreclosure is used almost exclusively. As the foreclosure process is similar across power-of-sale states, our results should be generalizable to not only the rest of Massachusetts but also to these other states.

1.1 The Mortgage Foreclosure Process in Massachusetts

A brief description of the milestones in the foreclosure process is necessary for understanding the context of our study.[2] Although the timing varies by servicer,[3] once a borrower becomes 60- to 90-days delinquent on his mortgage (the equivalent of missing three to four monthly payments), the servicer sends a letter notifying him of his default and warning that if he does not become current on his payments, the balance of his mortgage will be accelerated (i.e., the full amount of the remaining principal, plus overdue interest and fees, must be paid) within a certain number of days.[4] If the borrower fails to make good on the missed payments or to pay off the mortgage, the servicer hires an attorney to begin foreclosure proceedings.

In Massachusetts, the attorney then files a foreclosure complaint in court to ensure that the property does not belong to an active or recently discharged military servicemember.[5]

[2]We thank the numerous foreclosure attorneys and auctioneers working in the Boston area who generously volunteered their time to explain to us the intricacies of the foreclosure process and scheduling procedures. We rely heavily on these discussions to supplement the information contained in Massachusetts General Law, Chapter 244: Foreclosure and Redemption of Mortgages.

[3]Different from the mortgage holder, the servicer is an agent of the mortgage holder or group of investors who own mortgage-backed securities.

[4]The number of days before acceleration varies by lender and state. Currently, Massachusetts requires lenders to wait 150 days between sending the notice of default and accelerating payments for most borrowers.

[5]Despite the presence of the courts in this process, this is different from judicial foreclosure, in which the court reviews the default itself.

If the borrower proves that he is an active servicemember within 20 days, then he can stop the foreclosure proceedings. Otherwise, the foreclosure attorney may schedule a foreclosure auction, which must be publicized in a local newspaper three times in consecutive weeks leading up to the auction.

In about 25 percent of the foreclosures in our data set, the auction is postponed from its initially scheduled date. Postponements commonly occur following borrower actions such as filing for bankruptcy or attempting to sell the property, though delays can also occur if the servicer has not completed and assembled all the required paperwork leading up to a sale.[6] In the event of a postponement, a representative of the auction company must travel to the property at the scheduled time and announce both that the auction has been postponed and the date and time for which the auction is rescheduled.

When the auction goes forward, it is conducted on the lawn or sidewalk in front of the property, and third-party bidders compete to purchase the home. The lender has a reservation price, which is generally based on the unpaid principal of the mortgage or a fraction of the perceived current market value of the property. Unless the reservation price is well below the perceived value of the property, the property typically does not attract a third-party bid, and the mortgage holder (also referred to as the mortgage investor) takes possession of, or "buys back," the property.[7] Following a buyback, the mortgage investor, which now holds title to the property, hires a local real estate agent to sell the property.

At the conclusion of the auction, regardless of whether it results in a buyback or third-party sale, the foreclosure process is considered complete, and the lender's attorney finalizes the paperwork with the servicer and files a foreclosure deed with the county registry of deeds. We focus on the attorney's involvement in this process, specifically, from filing the foreclosure complaint to filing the foreclosure deed. For a summary of this process, see Figure 1.

1.2 Organizational Forms and Contracting Arrangements

Our interest lies in the contracting relationship between the law firm and auction company, and, in particular, which party has control over scheduling the auction.[8] Three types of contracting arrangements are prevalent in the industry. First, a law firm may use an in-house team of auctioneers, in which case the auctioneers are typically given scheduling control.

[6]Following various legal and public relations events, postponements have become more common. Rarely, attorney-driven postponements occur, such as when auctions are found to have been inadequately advertised.

[7]Properties bought at foreclosure auction sell at a discount partly due to the risk buyers take on by purchasing a property as-is with no formal inspection, so if the lender's reservation price is at or above the perceived market value, a sale is extremely unlikely (Lambie-Hanson et al.).

[8]Our understanding of which party has control over scheduling is based on interviews with industry professionals. So, while we are confident that we are representing the typical practices, the precise scheduling procedures of any particular firm may differ, and some measurement error may then enter our data.

Second, a law firm may contract with an independent auction company on an ad hoc basis to conduct the auction *after* the firm has chosen (and often advertised) the auction date. Third, a law firm may enter a long-term arrangement with an independent auction company to exclusively conduct the law firm's auctions. As we explain in greater detail, some law firms use in-house auctioneers to conduct the majority of their auctions but also sometimes employ independent auctioneers.

We refer to law firm–auction company pairs as integrated if the auction company is in-house or employed through exclusive contract, since we assume that in either of these scenarios, the auction company controls scheduling. We use this convention primarily to maintain consistency with the concept from Grossman and Hart (1986) that ownership is the allocation of residual rights of control (here, the right to decide when to hold the auction). This classification is equivalent, in our case, to another commonly used definition of integration, that two firms are integrated if all of the production of either the upstream or downstream firm takes place with one partner (Perry, 2007).

Contracting between the lenders and law firms is done on a per-foreclosure basis, with law firms being paid a flat rate for each case they handle. Since a large share of mortgages that go into foreclosure are backed by Fannie Mae or Freddie Mac, these government–sponsored enterprises (GSEs) set the industry standards both in terms of how much the law firm is paid and the particular services the law firm is required to perform.[9] In exchange for this payment, the firm is responsible for each step from filing the foreclosure complaint to filing the foreclosure deed, including arranging for the auction.[10]

1.3 Market Structure and Recent Trends

We examine data for Massachusetts' Suffolk County, which includes Boston and three other municipalities: Chelsea, Revere, and Winthrop. While more than 65 law firms processed residential mortgage foreclosures in Suffolk County from 2006 through 2010, many of these firms oversaw only one or two cases during that time.

A single industry leader processed 30 to 45 percent of foreclosures completed each year,

[9]For 31 states, including Massachusetts, Fannie Mae also maintained a Retained Attorney List for the time period covered by our data, which was a list of attorneys who were eligible to receive referrals for foreclosures or bankruptcies relating to Fannie Mae loans. See Fannie Mae Announcement 08-19 at www.efanniemae.com/sf/guides/ssg/annltrs/pdf/2008/0819.pdf (last accessed 8/18/2015) for more details on the payment schedule for and responsibilities of the law firms that processed Fannie Mae foreclosures, as well as for which states a Retained Attorney List was maintained.

[10]The law firm initially pays the auctioneer's fees and other expenses, to be reimbursed by the servicer after the foreclosure deed is filed (which is commonly three to nine months after the auctioneer is compensated). Law firms compensate auctioneers if an auction is postponed or cancelled (at a lower rate). Since auctions are often postponed, occasionally in excess of five or six times, these fees may end up being significant.

and six other law firms had more than 4 percent of the market share each. Four medium-sized firms each processed between 1 and 2.5 percent of the market share. The remaining foreclosures were conducted by about 50 firms that each processed only a handful. Since integrating seems to be a viable option for only those larger firms, we restrict our main analysis to the seven largest firms (those with market shares over 4 percent). Our results are stable to the selection of our sample of interest, however, as we discuss in Section 5.

Among the seven largest firms, three used in-house auctioneers to conduct a majority of their auctions, and two were engaged in long-term, exclusive contracts with independent auction companies. Of these five law firm–auction company pairs we consider integrated, over 95 percent of each auction company's business was with the paired law firm.[11] Table 1 displays the number of foreclosures processed by the seven largest law firms, and the particular auction companies each used from 2006 to 2010. We bold those pairs that we consider integrated. We also underline the three instances in which the law firm legally owns the auction company.

Figure 2 displays the volume of foreclosures in Suffolk County and the share of these transactions completed by integrated pairs during the time period we study. The fraction of foreclosures that are processed by integrated pairs holds relatively steady over time at about 60 percent, with March 2006 being an extreme outlier, driven by the relatively few foreclosure auctions held that month. Overall, about 70 percent of the foreclosures in our large law firm sample are conducted by integrated pairs.

2 The Firm's Decision: Make-or-Buy

To carefully examine the incentives that could impact the law firm's production decisions, we introduce a simple model. We first consider a firm's profit, π, from processing a given foreclosure, i,

$$\pi_i = p - l_i - \beta(a_i + \gamma r_i) + \zeta(a_i), \tag{1}$$

where p is the flat fee paid to the law firm by the servicer, l_i is the cost of the legal services, a_i is the auctioneer's fee for conducting the auction, r_i is the fee for each postponement, γ is the expected number of postponements, β is the firm's discount factor (or, alternatively, the real interest rate) on the fees paid to the auctioneer before being reimbursed by the servicer, and $\zeta(a_i)$ is the profit that the firm gains only if it uses an in-house auctioneer (the difference between the auctioneer's fee and the amount billed to the servicer).

[11] In Section 5, we show that our results on the impact of integration on auction scheduling are robust to separately classifying exclusively contracted and in-house auctioneers.

The overall profits a firm makes processing foreclosures during a given period of time, Π^t, depends not only on the per-transaction profit but also on the number of foreclosures the firm completes in period t. This quantity,

$$Q^t = Q(R(Q^{t-1}, E(\bar{d}, \eta)), M^t), \tag{2}$$

depends on the state of the market in period t, M^t, and the reputation of the firm $R(\cdot)$. The reputation of the firm is increasing in firm size (measured by the number of foreclosures processed in the last period, Q^{t-1}) and the firm's efficiency $E(\cdot)$, which is decreasing in the average total processing duration, $\bar{d}$, and the firm's frequency of processing errors, η. The total profit from processing foreclosures during time period t is thus

$$\Pi^t = \sum_{i=1}^{Q^t} \pi_i. \tag{3}$$

Since the price is almost always fixed by the industry standards based on the GSE guidelines, the firm chooses two things: l_i, the amount of legal and administrative resources to devote to a transaction, and a_i, the auctioneer. Aside from the direct profit that is potentially gained by using an in-house auctioneer, whether the firm chooses to integrate the auction process could affect the firm's profits through both the costs it encounters and its reputation.

An external auction company typically will have fixed rates that it charges for completing, canceling, and postponing an auction. Alternatively, in-house auctioneers may accept lower per-auction compensation in exchange for the firm guaranteeing the auctioneer a minimum amount of work. Additionally, using an auctioneer who is able to schedule the auctions quickly may enhance the firm's reputation for being efficient, thus resulting in the law firm being hired more frequently in the future.

Two testable hypotheses consistent with established make-or-buy theory emerge from our basic model of profit.

Hypothesis 1 *A law firm that integrates the auction process is better able to secure an upstream input (auctioneers).*

If Hypothesis 1 is correct, and firms use in-house auctioneers or long-term contracts to ensure that they have a licensed auctioneer available and thus avoid unnecessary delay, we would expect transactions processed by firms with in-house auctioneers to, all else equal, have shorter overall processing times. More precisely, we would expect the time from the

foreclosure complaint to when the auction is initially scheduled to be shorter for integrated pairs.

Hypothesis 2 *The firm employs an in-house auctioneer to mitigate the hold-up problem that exists when the auction needs to be rescheduled.*

If a firm contracts with an independent auctioneer to conduct a particular auction, the auctioneer will have less incentive to reschedule quickly if the auction is postponed, since he already has the contract. In the data, we should then see shorter durations for the average postponement under in-house auctioneers as opposed to independent auctioneers.

Aside from these testable hypotheses, law firms may choose to integrate to gain profit from conducting the auction themselves. Since legal services revenue is capped at a per-foreclosure level, ancillary services have become a secondary stream of income for some law firms. Even the exclusive contract arrangement provides a similar benefit to the law firm. One attorney explained that his firm profits in two ways from an exclusive arrangement. First, it attracts more servicers with lower auction fees. Second, his law firm benefits from lower fees because it has to front the expenses until it is reimbursed by the servicer, which can take over a year.

As we see in the data, however, not all firms are integrated. As we note previously, not all servicers permit use of an in-house auctioneer. One attorney suggested that the perceived conflict of interest—the integrated law firm now has an interest in the foreclosure being completed—may pose legal and ethical issues for the firm. Further, the smallest law firms will lack the scale for in-house or exclusive auction services while others may be reluctant to invest in forming an in-house auction company, because of the temporary nature of the mortgage crisis.

Questions of profitability, scale, and the legal and ethical issues surrounding integration go beyond the scope of this paper. Instead, we focus on testing the two hypotheses presented here concerning securing inputs and mitigating the potential hold-up problem.

3 Data and Methods

After every foreclosure auction, the attorney processing the foreclosure files several documents with the county registry of deeds, including, but not limited to, the foreclosure deed, an affidavit declaring that all the correct notification and sale procedures were followed in accordance with state law, and an example of the advertisements published in a local newspaper to announce the auction.

We examined the records for each foreclosure in Suffolk County from 2006 through 2010 and retrieved several variables of interest, including the date the auction was initially scheduled; the subsequent dates, if any, of rescheduled auctions; the number of postponements, if applicable; the date the foreclosure deed was filed; the law firm hired by the servicer; the auctioneer; the auction company; the mortgage holder; the price the property fetched at auction; whether a third party bought the property; and a unique identifier for the foreclosure, the book and page number of the documents at the registry of deeds.

The auctioneer information can only be found in the affidavit, so it is not available for foreclosures that have been initiated but not completed. This restricts our analysis to a sample of 5,200 foreclosures. We merge this data set with property-level data from the Warren Group, a company that provides New England real estate data. The Warren Group data include the date that the foreclosure complaint was filed, information on mortgages taken out by the borrower (such as the originator and whether the loan was a purchase-money mortgage), bankruptcy filings, and basic property characteristics.

We match the data using the deed book and page from the registry of deeds and are able to match over 95 percent of the records. We then restrict our sample to only foreclosures on single-family homes, two-family homes, three-family homes, and condominiums, leaving us with a sample of 4,703 observations.[12] However, we are unable to retrieve the date the foreclosure complaint was filed for 970 observations, and our sample falls to 3,733.[13] When we further restrict our sample to only those foreclosures processed by large firms, our final sample falls to 3,311 foreclosures.

In terms of the foreclosure timeline, we capture the time from the complaint being approved to the first scheduled auction, as well as the time from the complaint being approved to the date the auction actually occurs. The mean durations are 201 and 214 days, respectively (see Table 2 for summary statistics). The difference between the two is the average total amount of time an auction is postponed once scheduled.

Nearly all postponements are requested by the servicer, but the time it takes to reschedule is a potential measure of adaptation between the law firm and auction company. Auctions can be — and often are — rescheduled more than once. We, unfortunately, do not observe the length of each postponement in our data; instead, we study the average postponement duration (the total time postponed divided by the number of postponements for a given

[12]The initial sample of 5,200 foreclosures includes numerous other types of properties, such as parking spaces, time shares, and commercial real estate. We exclude these from our analysis. Our sample includes the vast majority of residential parcels in the county, excluding just apartment buildings of four or more units. Since 2000, there have been only about 100 foreclosures on those types of properties.

[13]Complaint information is not available for some cases because they are exempt from the military servicemember protection process, such as if the borrower is a corporation, rather than an individual.

foreclosure), which has a mean of about one month for those auctions that were postponed. There is wide variation, however, with some postponements lasting only a few hours and others several months.

Given the idiosyncratic nature of each foreclosure, particularly long and short timelines appear in our data. We conduct robustness around outliers in several ways, displaying results in Section 5, but we ultimately decide to estimate our main models using winsorized dependent variables at the 10th and 90th percentiles. Our results are consistent if we instead drop outliers, do not winsorize, or winsorize at different percentiles.

Our primary focus is on the impact of organizational form on the processing timeline, so it is important to note that the timeline itself changes significantly from 2006 through 2010. The average time from the foreclosure complaint to the auction dramatically increases during this period (from 200 to 300 days), and so does the frequency of postponements (see Figure A-1 in the Appendix). Among auctions that are postponed at least once, the average duration of the postponement does not significantly change over time.

To test our hypotheses, we would like to regress the duration of particular stages in the foreclosure timeline on organizational form, as well as time cohorts and borrower and property control variables. Hypothesis 1, that firms integrate the auction process to secure the upstream input (auction services), would be supported in the data if integrated firms were associated with shorter initial scheduling times (from the foreclosure complaint to the first scheduled auction), while Hypothesis 2 would be supported if integrated firms reschedule more quickly.

In both cases, we are interested in the impact of the integration decision on the duration of a particular period. Therefore, we would like to estimate

$$Duration_i = \mathbf{F_i'}\beta + \mathbf{T_i'}\delta + \mathbf{X_i'}\gamma + \epsilon_i, \tag{4}$$

where $Duration_i$ is the number of days a particular stage in the foreclosure process takes, winsorized at the 10th and 90th percentiles to mitigate the impact of outliers. $\mathbf{F_i'}$ is a dichotomous variable indicating vertical integration; $\mathbf{T_i'}$ includes dichotomous variables for the time period in which the foreclosure auction occurs; and $\mathbf{X_i'}$ includes borrower and loan characteristics such as whether the loan is subprime, the property's ZIP code, the year the borrower purchased the property, the type of property (single-family home, two-family, three-family, or condominium), and whether the borrower filed for bankruptcy.

Organizational form may be endogenous, however. If the firm believes that a particular measure of performance (for example, how long it takes to process a foreclosure) is important, then it may decide whether to integrate based, in part, on that measure. As a result,

using the measure of performance as the dependent variable and organizational form as an independent variable in an ordinary least squares regression may result in reverse causality and inconsistent estimates.

On the other hand, if the firm does not view a particular measure to be important when deciding whether or not to integrate, one has to question whether it is a meaningful measure of performance.[14] We use the foreclosure timeline precisely because it is one of the few outcomes that is both observable to researchers and meaningful to mortgage servicers. The servicers have a large volume of accounts to oversee, which makes monitoring individual cases difficult. Despite this, they try to prevent avoidable delays. For example, any postponement of the auction by the attorney must be cleared with the servicer.[15]

To combat the threat of endogeneity, we limit our study to a period in which no auction company begins hiring in-house auctioneers. By doing so, we view the decision of whether or not to hire in-house auctioneers as predetermined. For firms that use either only in-house auctioneers or only independent auctioneers, this ensures the firms do not choose the organizational form based on the foreclosure duration, though a few firms, including the industry leader, do use both types of auctioneers.

Another potential concern then emerges if the firms that use both types of auctioneers consciously track "faster" cases through their in-house auctioneers, perhaps to reduce lag time and complete a greater volume of auctions in a given period. When we investigated this issue in our interviews, we learned that firms that use both types of auctioneers typically do so because they are prohibited from using in-house auctioneers to conduct certain auctions. The most prominent example is loans backed by Freddie Mac.

Most of the mortgages processed by an integrated law firm that contracts externally for the auction are, in fact, owned by Freddie Mac. The other large GSE, Fannie Mae, does not require auctioneers to be independent and, as a result, firms with in-house auctioneers do not typically contract externally for these auctions. Because Freddie Mac loans should not be systematically different from Fannie Mae loans, the selection of an alternative organizational form (i.e., a law firm with its own auction company contracting out a particular auction) for Freddie Mac cases should be viewed as effectively random.

We instrument for the integration decision with two instrumental variables that exploit Freddie Mac's refusal to allow the use of in-house auctioneers and estimate our models using two-stage least squares. The first instrument is the proportion of the originator's loans in our data set that are backed by Freddie Mac. The second instrument is the proportion of

[14]See Masten (1993) for a thorough discussion of the pitfalls of estimating the impact of integration on performance.

[15]One attorney told of being fired after postponing an auction due to blizzard conditions, even after supplying the servicer with news accounts documenting the severity of the storm.

foreclosures processed by the law firm in the same auction year that involve Freddie Mac.[16]

The originator instrument is primarily (negatively) correlated with integration through the likelihood that the particular loan of interest is in fact backed by Freddie Mac. The second instrument has this feature as well, but it also may be indirectly correlated with integration in that a firm that does a great deal of Freddie Mac business has less incentive to use in-house auctioneers — the proportion of business for which they could use in-house auctioneers is smaller.

For these instruments to be valid, they need to be correlated with the integration decision but uncorrelated with the timeline other than through the integration decision. We see no reason to expect either instrument to be correlated with the timeline other than through the integration status, and the Sargan-Hansen test supports this claim.[17] The first-stage results are shown in Table A-1. The F-statistic on the excluded instruments provides evidence that we do not suffer from weak instruments.

Last, we estimate all the models clustering the standard errors on law firm–auction quarter. This ensures that our standard errors are valid even if the error term is correlated with these clusters.

4 Results

As displayed in Table 3, our IV estimates indicate that integrated firms take, on average, about 1 to 3 months longer to schedule the initial auction than do independent law firm–auction company pairs. This contradicts Hypothesis 1, that firms may integrate to secure the services of an auction company in order to achieve faster scheduling times. Rather, this result suggests that there exists a cost to integrating along the time dimension, which is consistent with the institutional context. When a law firm schedules the auction internally, control of scheduling is typically allocated to the auctioneer. The auction company or auctioneer has incentives other than minimizing the processing time, such as optimizing travel schedules, which may create agency problems.

Alternatively, when the auction is scheduled with an independent auction company, the law firm controls the scheduling. When the law firm contracts with the auction company, it has a specific date in mind and often has begun to advertise that date. Since this negotiation

[16]Both of these measures are calculated using our data set of Suffolk County foreclosures. Because we only observe GSE involvement when properties are bought back by the mortgage holders at foreclosure auction, these calculations are based on the 89 percent of our sample that experience a buyback.

[17]The null hypothesis of the Sargan-Hansen test is that the instruments are valid. Essentially, it tests whether one of the instrumental variables is correlated with the residuals after estimating the equation using the other instrument. For our main model, the p-value is 0.2122, so we do not reject this null hypothesis.

takes place before contracting, the independent auction company has an incentive to agree to the law firm's schedule in order to secure the contract. This result is robust across the years in our sample, though the estimates are most precise for 2008, which had the greatest volume of foreclosures of any year.

Borrowers with subprime loans experience slightly longer foreclosure timelines, and borrowers who file for bankruptcy, particularly Chapter 13, have much longer timelines.[18] As part of either bankruptcy process, a judge will grant an automatic stay of the foreclosure. For Chapter 7, this stay is usually shorter, and as Li, White, and Zhu (2011) explain, the owner will lose her home to foreclosure unless she promptly repays her mortgage arrears. Chapter 13 allows for a restructuring of debts that should enable the borrower to avoid foreclosure altogether; however, if she fails to stay current on the new repayment plan, the foreclosure is eventually completed.

The magnitude of the delay in scheduling the original auction amounts to considerable cost when spread over the volume of foreclosures conducted. The mortgage holder is unable to recoup lost mortgage payments from the borrower or sell the property until the foreclosure is complete. The typical delay is at least four weeks, based on the lower bound of the 95 percent confidence intervals of the IV estimates. This amounts to roughly one-seventh of the mean time from the complaint to the actual auction. As properties sit in ownership limbo for longer periods, deferred maintenance and even vandalism may reduce the amount that the mortgage holder can ultimately recover when selling the collateral (Cordell et al., 2015; Lambie-Hanson).

The average amount of time an auction is postponed is not significantly different by organizational form. At the time of a postponement, the independent auction company has already contracted to conduct the auction and no longer has an incentive to schedule as quickly as possible to please the law firm, and so it may take its own schedule into greater consideration (as the integrated firm has done all along). So, now the incentives within both organizational forms are comparable, and we do not observe the adaptation benefits predicted by the literature.

[18] Capozza and Thomson (2006) find that the time period from delinquency to foreclosure auction is four times longer for subprime than for prime borrowers. Our results are much smaller, but we do not include the pre-foreclosure time period in our timeline (the time period when borrowers have begun to miss payments, but the servicer has not yet begun foreclosure proceedings). Also, Capozza and Thomson (2006) study loans in 2001, and it is unclear if their finding applies to the recent mortgage crisis.

5 Robustness Checks and Model Extensions

Our finding that integrated law firms are slower to schedule initial auctions is robust to using a variety of alternative specifications and subsamples, as summarized in Table 4. First, we investigate our choice to winsorize the dependent variable at the 10th and 90th percentiles, which constrains its range to 84 to 399 days, as shown in Table 2. As shown in models 2 and 3 of Table 4, the integrated coefficient is larger, though less precisely estimated when the dependent variable is instead winsorized at the 5th and 95th percentiles or not winsorized at all.

Similarly, in model 4, the results indicate a positive, statistically significant impact of integration on the natural log of the time from the complaint to the initial auction. Evaluated at the sample mean, 201 days, the coefficient of 0.34 implies that integration is associated with a 68-day longer timeline, which is very similar to our 65-day effect in the main model. We prefer the winsorized estimates, since they are easier to interpret.

Our next set of robustness checks concerns the timing of the auction. In our main specifications, we control for the year the auction occurs. As Figure A-1 in the Appendix shows, however, foreclosure timelines grew rapidly during some years. For example, the average time from complaint to auction was approximately 150 days in January 2008 and about 100 days longer by the end of the year. We examine the sensitivity of our results to our specification of time, using more granular auction quarter and month cohorts (models 5 and 6, respectively). Estimates from these alternative specifications are very similar to our main specification.

One might question whether the effect of integration is driven primarily by law firms using in-house auctioneers rather than exclusively contracted auction companies. In model 7, we redefine integration as using an in-house auctioneer to conduct sale i. The coefficient falls to 46 days, but it is still strongly significant and falls within the 95 percent confidence interval of our main model estimate.

The same can be said for in-house integrated firms when we include a separate control for exclusive contract relationships in model 8. Integration in the form of exclusive contracts is associated with a 94-day increase in timelines, though again, with a wide confidence interval that contains the in-house integration coefficient. The relative effect on timelines of the two types of integration is ambiguous. We could expect in-house auctioneers to be faster, if they experience greater oversight or have incentives that are more closely aligned with the law firm. On the other hand, they may perceive their business as guaranteed, leading them to take longer to schedule auctions.

More generally, unobservable firm-level heterogeneity that is correlated with the integra-

tion decision may threaten the validity of the results we have presented. In other words, we may mistakenly attribute effects to the integration status of the firm that are actually spurious. For example, if risk-averse firms both process foreclosures more quickly and are less likely to hire in-house auctioneers, we may conclude that integration slows the foreclosure timeline when in fact our results are confounded.[19]

We first combat this threat by including a set of dichotomous controls for the identity of the law firms in model 9. The effect of integration is 40 days and is still strongly significant, and none of the law firm controls are statistically significant at the 0.05 threshold. In model 10, we go one step further, restricting the sample to just the cases processed by the industry leader, which uses both in-house and independent auctioneers. Although the integrated coefficient is smaller (34 days), it is statistically significant and still within the confidence interval of our main model's results. When we estimate our model including all large law firms *except* the industry leader, we find an integration effect of 45 days (see model 11).

Another source of potential heterogeneity in foreclosure processing comes from the GSEs. Because we rely on indicators of a loan's status as Freddie Mac and the proportion of loans a law firm processes that are backed by Freddie Mac, one concern may be that Freddie Mac imposes different foreclosure procedures on servicers that affect timelines. To isolate the effect of integration, we restrict the sample in model 12 to just GSE-backed mortgages—that is, those backed by Freddie Mac and Fannie Mae.

The types of loans these GSEs back are similar, and the GSE associated with a mortgage is arguably random. While the two GSEs differ somewhat, they share a common regulator (the Federal Housing Finance Agency), that works to harmonize their policies and procedures, including the rules the servicers working for them must follow. When we restrict the model to the 600 properties that Freddie Mac or Fannie Mae buy back at foreclosure auction, we find an integration effect of 42 days, which is statistically significant at the 0.05 level.

Our finding that there is an economically meaningful, statistically significant positive effect of integration on timelines persists when we broaden and narrow our sample in other ways. We have focused on the seven largest law firms in our main results, since they process over 88 percent of the foreclosures in Suffolk County. They specialize in foreclosure processing and are sufficiently large to make integration possible.

The other firms in our data set can roughly be categorized as one of two types. Law firms in the first group, which we call "medium" firms, have a market share between 1 and 2.5 percent, or in other words, the firms processed about 40 to 90 foreclosures in our data set.

[19]See Ackerberg and Botticini (2002) for discussion on how unobserved principle and agent characteristics may impact estimated coefficients if incentives exist for particular types of agents to contract with particular types of principles.

The firms in the other group, the "small" firms, process only a few foreclosures in our data set—and most commonly, just a single foreclosure. These foreclosures are often atypical and are usually of mortgages not originated by large lenders, but rather granted by an individual or small investment trust.

Despite the differences in these types of firms, we find in models 13 and 14 that adding them to our sample does not have a material impact on our findings. Likewise, our results are similar when we exclude the 88 observations in our data set for which there is a Chapter 7 or Chapter 13 bankruptcy filing in model 15.

Finally, we estimate our main model using an alternative set of instrumental variables. We continue to use the law firm's Freddie Mac share, but in lieu of the originator's Freddie Mac share, we use a dichotomous variable indicating that loan i was backed by Freddie Mac. Because we only observe Freddie Mac status for properties bought back at foreclosure auction, we must exclude third-party sales from the sample (model 16). We find a similar effect of integration status using this alternative identification approach.

6 Conclusion

We use a unique data set on mortgage foreclosures to evaluate the incentives and agency problems law firms representing lenders face when deciding whether to integrate auction services. We analyze whether the processing times differ for foreclosures in which law firms integrate the auction process rather than use an independent auction company. We find that the initial scheduling time is shorter when firms contract externally, but that this difference disappears when auctions must be rescheduled.

In the initial scheduling process, independent auction companies have a market incentive to agree to the time frame offered by the law firm, while integrated auctioneers are generally given scheduling control and lack the same incentives. However, once an outside company has contracted to conduct the auction, that incentive is gone, and so the classic *ex post* hold-up problem exists, and they reschedule more at their leisure. We believe that the longer initial scheduling duration for integrated firms provides support for Grossman and Hart (1986) by enumerating a cost firms face when auctioneers are allocated (some degree of) scheduling control.

One remaining question is why law firms are unable to better monitor and control auctioneers' scheduling. The broad geographic scope of a typical auctioneer's business means that scheduling his auctions is not standardized. An auctioneer may rarely visit Nantucket to conduct auctions, for example, and this makes his scheduling constraints less transparent to the law firm. The rapid changes in the landscape of the foreclosure industry, as documented

by Cordell et al. (2015), perhaps occupied the law firms' and servicers' attention during this time period. Large-scale moratoria and policy interventions may have obscured the more modest, though economically important, increases in timelines that we find.

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Figure 1. The Foreclosure Process in Massachusetts

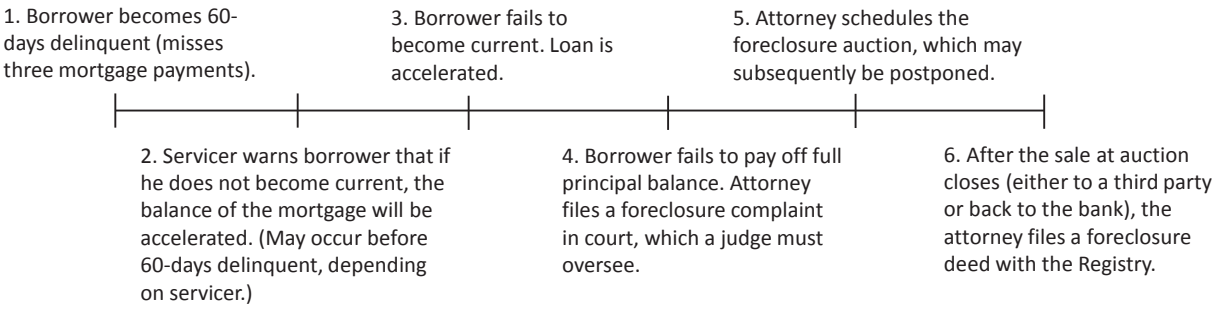

Figure 2. Volume and Integration

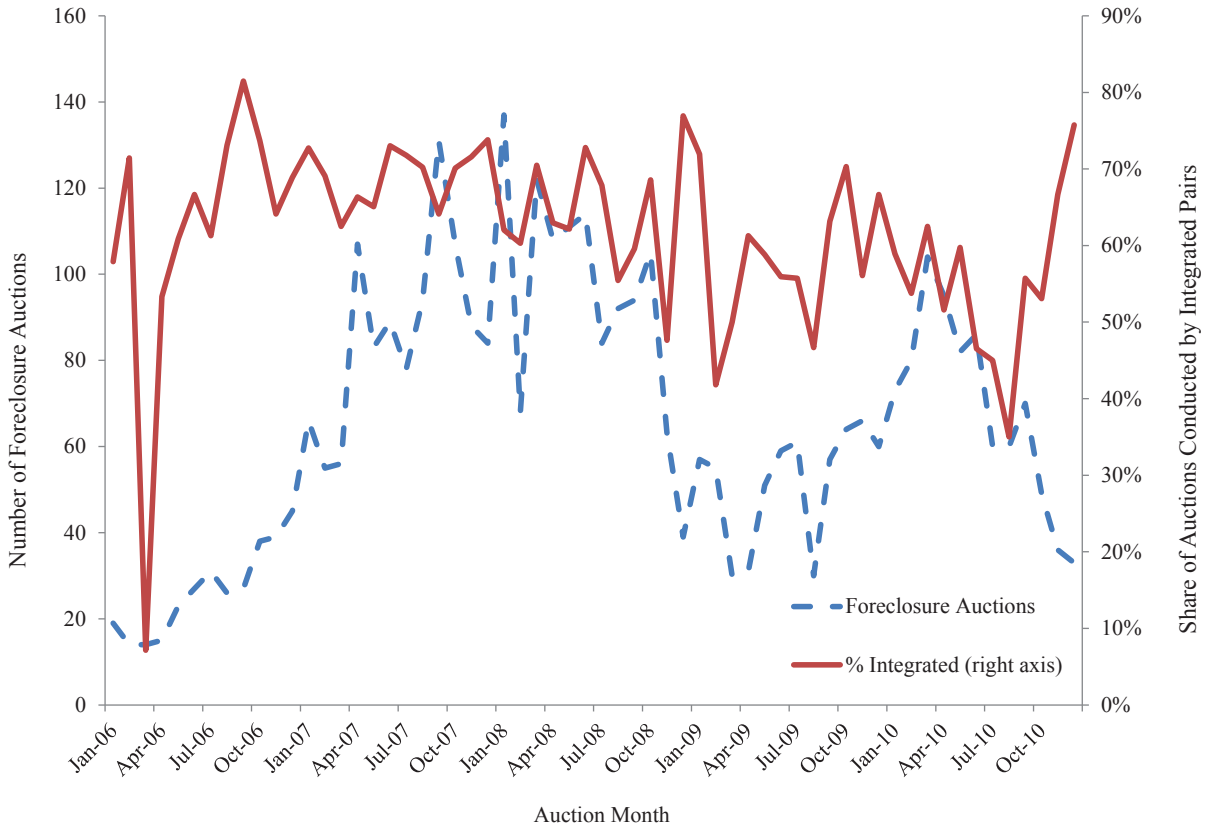

Table 1. Number of Observations for Each Law Firm–Auction Company Pair

	Law Firm								
	A	B	C	D	E	F	G	H	Total
a	1	0	0	**268**	0	0	0	0	269
b	0	0	**1,501**	0	0	0	0	1	1,502
c	27	0	0	0	0	0	0	11	38
d	0	44	0	0	0	0	0	16	60
e	0	0	0	5	0	0	0	46	51
f	**293**	0	0	0	0	0	0	0	293
g	0	0	0	0	0	0	0	11	11
h	0	0	0	0	0	9	0	53	62
i	0	0	0	0	0	1	**192**	3	196
j	0	17	0	0	9	0	0	44	70
k	1	163	0	1	0	149	0	0	314
l	0	0	186	0	1	0	0	117	304
m	0	23	0	0	54	0	0	9	86
n	0	15	1	1	0	242	0	71	330
o	0	0	0	0	**96**	0	0	4	100
other	0	2	2	2	4	1	0	36	47
Total	322	264	1,690	277	164	402	192	422	3,733

Note: Integrated pairs are displayed in bold text. In-house auctioneers are also underlined.

Table 2. Summary Statistics for Main Sample, by Integration Status

	Independent	Integrated	All
Outcomes (in days)			
Petition to initially scheduled auction			
Mean	192	204	201
SD	131	147	143
Range	31–1,065	31–1,060	31–1,065
Petition to initially scheduled auction (winsorized)			
Mean	180	190	187
SD	89	101	98
Range	84–399	84–399	84–399
Average postponement time			
Mean	34	32	33
SD	19	18	18
Range	1–116	0–121	0–121
Average postponement time (winsorized)			
Mean	33	32	32
SD	15	14	14
Range	13–60	13–60	13–60
Controls			
Auction year (%)			
2006	6	9	8
2007	20	29	26
2008	27	29	29
2009	17	15	16
2010	29	18	21
Purchase year (%)			
Before 2000	19	21	20
2000–2004	25	27	27
2005–2006	44	45	45
2007–2008	12	7	8
Subprime mortgage (%)	40	42	41
Prime mortgage (%)	60	58	59
Purchase mortgage (%)	54	53	54
Nonpurchase mortgage (%)	46	47	46
No bankruptcy	96	98	97
Chapter 7 (%)	2	1	2
Chapter 13 (%)	2	1	1
Property type			
Single-family (%)	22	23	23
Two-family (%)	22	25	24
Three-family (%)	19	21	20
Condominium (%)	37	31	33
Property becomes bank owned (%)	89	89	89
Bank owned, backed by Freddie Mac (%)	20	0	6
Property sold to third party (%)	11	11	11
Instruments			
Mortgage originator's % Freddie Mac (mean)	10	5	6
Law firm's % Freddie Mac (mean)	9	5	6
Observations	961	2,350	3,311

Note: Some percentages do not sum to 100 due to rounding. Dependent variables are winsorized at the 10th and 90th percentiles.

Table 3. Petition to Originally Scheduled Auction and Average Postponement Duration, in Days

	(1)	(2)	(3)	(4)	(5)
	Petition to Auction				**Postponement**
		Auction Year			
	Full Sample	2006-07	2008	2009-10	Full Sample
Integrated	65.37**	54.70~	53.18**	69.08*	-5.40
	(17.14)	(30.97)	(14.72)	(27.58)	(5.40)
2007 auction	7.32	-	-	-	-3.72
	(12.01)	-	-	-	(2.70)
2008 auction	70.84**	-	-	-	2.21
	(12.71)	-	-	-	(2.98)
2009 auction	105.66**	-	-	-	0.16
	(12.25)	-	-	-	(2.83)
2010 auction	97.09**	-	-	-	2.13
	(13.35)	-	-	-	(2.72)
Purchased 2000–2004	1.79	-5.47	0.37	2.71	-0.85
	(5.80)	(11.58)	(8.89)	(9.31)	(1.32)
Purchased 2005–2006	-14.49*	-43.36**	-11.87	8.07	-0.37
	(7.15)	(11.57)	(10.48)	(11.12)	(1.50)
Purchased 2007–2008	-11.76	-49.38**	-23.16	13.61	-2.40
	(8.99)	(12.64)	(14.44)	(13.21)	(2.69)
Subprime mortgage	10.70**	5.70	17.81**	11.05	1.64
	(3.63)	(5.52)	(5.54)	(7.20)	(1.23)
Nonpurchase mortgage	-5.28	-16.15~	-6.47	5.57	-0.94
	(5.00)	(8.93)	(7.08)	(10.17)	(1.39)
Chapter 7	29.31*	-	-	24.49~	-2.11
	(13.32)	-	-	(13.76)	(3.03)
Chapter 13	110.36**	151.58**	-	105.94**	-2.22
	(16.01)	(35.30)	-	(16.79)	(2.82)
Single-family	16.21**	17.65**	9.98	16.41*	1.16
	(4.81)	(6.50)	(12.64)	(7.04)	(1.29)
Two-family	10.94*	11.94	7.89	11.92	2.84*
	(4.74)	(7.39)	(5.51)	(11.62)	(1.35)
Three-family	15.42**	17.09*	9.01	18.62~	4.16**
	(4.84)	(7.18)	(7.13)	(10.16)	(1.27)
Constant	143.80**	190.66**	181.88**	163.14**	16.45**
	(22.10)	(30.23)	(25.38)	(50.35)	(4.87)
ZIP code dummies	Yes	Yes	Yes	Yes	Yes
Observations	3,311	1,137	950	1,224	876
R-squared	0.14	0.02	0.07	0.05	0.04

Notes: IV regressions with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. **, *, and ~ indicate statistical significance at 1, 5, and 10 percent levels, respectively. Omitted categories include auctions conducted in 2006, borrowers purchasing their homes before 2000, prime mortgages, purchase mortgages, and condominiums.

Table 4. Robustness Tests for Petition to Originally Scheduled Auction, in Days

Model	Description	Coefficient	SE	Observations
(1)	Main model, dependent variable winsorized at 10th and 90th percentiles	65.37**	(17.14)	3,311
(2)	Dependent variable winsorized at 5th and 95th percentiles	73.74**	(20.11)	3,311
(3)	Dependent variable not winsorized	81.76**	(22.92)	3,311
(4)	Natural log of dependent variable	0.34**	(0.09)	3,311
(5)	Auction quarter cohorts (in lieu of year)	71.57**	(17.54)	3,311
(6)	Auction month cohorts (in lieu of year)	68.64**	(17.73)	3,311
(7)	Alternative definition of integrated: in-house auctioneer	46.26**	(15.26)	3,311
(8)	Alternative definition of integrated:			3,311
	in-house auctioneer	41.60**	(15.48)	
	exclusively contracted auctioneer	93.51**	(31.72)	
(9)	Including law firm dummies	39.76**	(14.25)	3,311
(10)	Industry leader only	33.60*	(16.72)	1,690
(11)	Excluding industry leader	44.75**	(7.65)	1,621
(12)	GSE-backed mortgages only	42.26*	(17.97)	600
(13)	Including medium-sized law firms	74.73**	(19.55)	3,633
(14)	Including small- and medium-sized law firms	74.90**	(19.51)	3,733
(15)	Excluding observations with bankruptcies	63.54**	(16.39)	3,223
(16)	Alternative IV (Freddie Mac), excluding third-party sales	45.23**	(9.76)	2,947

Notes: IV regressions with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. Unless otherwise noted, the controls included are those incorporated in Model 1 of Table 3. **, *, and ~ indicate statistical significance at 1, 5, and 10 percent levels, respectively. Model 13 includes a law firm size dichotomous control, and model 14 includes two controls (one for small firms and one for medium firms). GSE stands for government-sponsored enterprise, which indicates that a loan was backed by Fannie Mae or Freddie Mac.

Appendix

Figure A-1. Processing Time from Foreclosure Complaint to Completed Auction and Number of Postponements

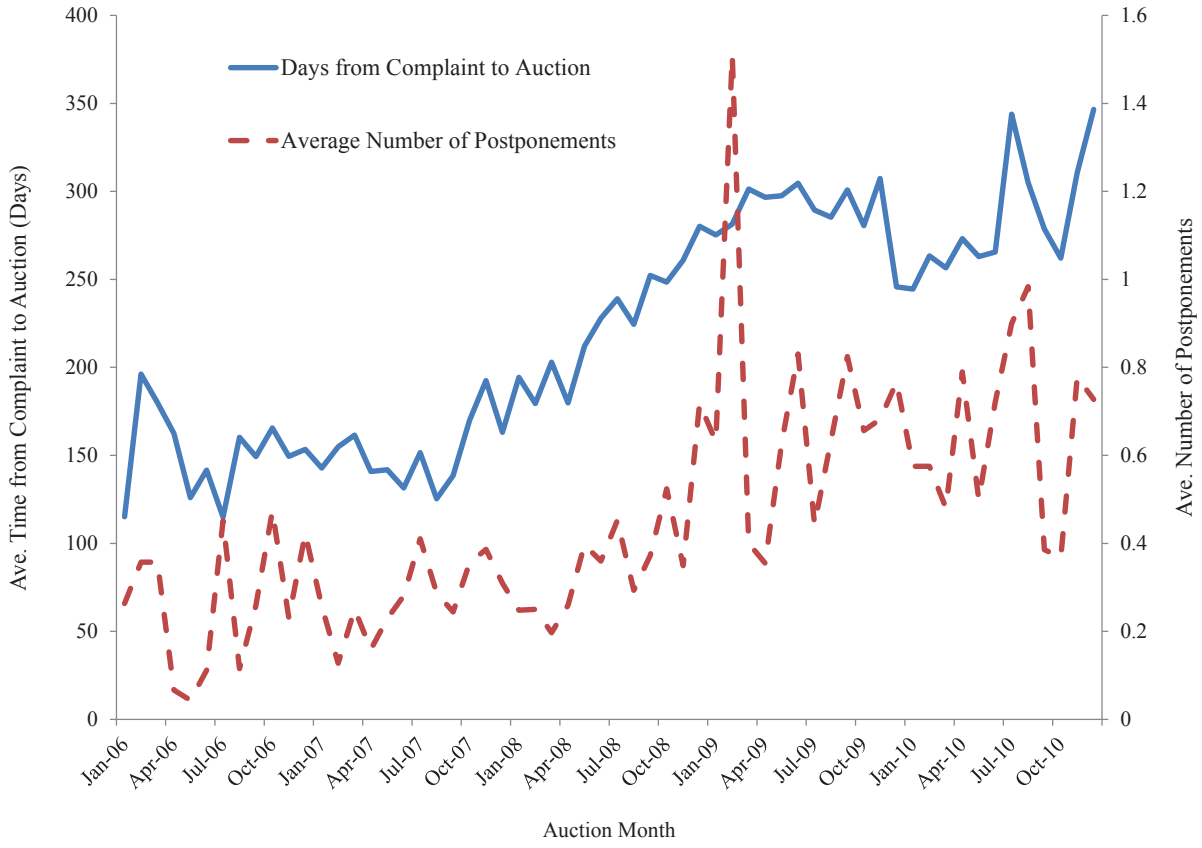

Table A-1. First Stage Model Results

	(1) Main Model	(2) GSE Only	(3) Industry Leader	(4) Excluding Industry Leader	(5) Alternative IV	(6) Time Postponed
Originator's % Freddie Mac	-0.70**	-0.79**	-0.87**	0.02	-	-0.76**
	(0.09)	(0.14)	(0.09)	(0.07)	-	(0.17)
Law firm's % Freddie Mac	-1.57*	-2.03*	-	-5.14**	-1.22~	-0.64
	(0.68)	(0.91)	-	(0.36)	(0.68)	(0.77)
Freddie Mac	-	-	-	-	-0.68**	-
	-	-	-	-	(0.08)	-
2007 auction	0.04	-0.29*	-0.02	0.10	0.05	0.04
	(0.11)	(0.15)	(0.05)	(0.14)	(0.11)	(0.15)
2008 auction	0.06	-0.20	0.00	0.14	0.06	0.11
	(0.12)	(0.14)	(0.05)	(0.14)	(0.12)	(0.15)
2009 auction	0.07	-0.12	-0.06	0.20	0.08	0.04
	(0.13)	(0.17)	(0.08)	(0.13)	(0.12)	(0.17)
2010 auction	0.04	-0.11	-0.09	0.12	0.06	0.01
	(0.13)	(0.13)	(0.10)	(0.13)	(0.13)	(0.16)
Purchased 2000–2004	-0.02	-0.02	-0.03	-0.03	-0.02	-0.04
	(0.02)	(0.05)	(0.02)	(0.03)	(0.02)	(0.05)
Purchased 2005–2006	-0.03	-0.20**	-0.06~	-0.02	-0.02	-0.13*
	(0.03)	(0.06)	(0.03)	(0.04)	(0.03)	(0.05)
Purchased 2007–2008	-0.08*	-0.19*	-0.06	-0.07	-0.08~	-0.22**
	(0.04)	(0.07)	(0.04)	(0.05)	(0.04)	(0.07)
Subprime mortgage	-0.12**	-0.02	0.02	-0.12**	-0.10**	-0.05
	(0.03)	(0.08)	(0.02)	(0.03)	(0.03)	(0.04)
Nonpurchase mortgage	-0.01	-0.08	-0.04~	0.02	0.00	-0.11**
	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.04)
Chapter 7	-0.07	0.07	0.01	-0.15*	-0.06	-0.15
	(0.06)	(0.13)	(0.05)	(0.07)	(0.08)	(0.12)
Chapter 13	-0.14	-0.12	0.03	-0.17~	-0.13	-0.06
	(0.09)	(0.20)	(0.06)	(0.09)	(0.09)	(0.14)
Single-family	0.01	-0.06	0.03	-0.02	0.01	0.07
	(0.03)	(0.06)	(0.02)	(0.03)	(0.03)	(0.05)
Two-family	0.03	0.03	0.05~	-0.03	0.00	0.10*
	(0.02)	(0.07)	(0.03)	(0.03)	(0.02)	(0.04)
Three-family	0.01	-0.03	0.04~	-0.05	-0.01	0.07
	(0.02)	(0.06)	(0.02)	(0.03)	(0.03)	(0.05)
Constant	1.05**	0.97**	0.71*	0.93**	0.84**	0.26
	(0.11)	(0.16)	(0.31)	(0.14)	(0.14)	(0.19)
ZIP code dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,311	600	1,690	1,621	2,947	876
F stat of excl. instruments	64.56	41.43	91.93	103.68	146.06	16.49
Prob. > F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Notes: IV regressions with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. **, *, and ~ indicate statistical significance at 1, 5, and 10 percent levels, respectively. Omitted categories include auctions conducted in 2006, borrowers purchasing their homes before 2000, prime mortgages, purchase mortgages, and condominiums. Originator's % Freddie Mac and Law Firm's % Freddie Mac are expressed in decimal form. GSE stands for government-sponsored enterprise, which indicates that a loan was backed by Fannie Mae or Freddie Mac.