


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 initially to schedule auctions more quickly; however, 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 that stems from poorly aligned incentives within the firm.

Keywords Vertical integration · Make-or-buy · Mortgage foreclosure · Foreclosure auctions

JEL Classification D23 · G21 · G28 · L22 · L85

The views expressed in this paper are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

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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 effect of vertical integration on performance, specifically the impact on the duration of the foreclosure. We study over 3300 foreclosure auctions in Suffolk County, Massachusetts, between 2006 and 2010 and find that integrated firms took approximately 2 months longer to initially schedule each auction.

This initial scheduling delay indicates a cost to vertical integration 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). We argue that the dramatic changes in foreclosure durations and processing rules over the course of our study period made it more difficult for law firms to monitor durations and demand timely scheduling.

When the rescheduling of auctions becomes necessary, however, independent firms schedule new auctions no faster than do their integrated counterparts. This suggests that integrated firms in this industry are no better (but also no worse) at adapting to unforeseeable events. Since contracting has already occurred when the 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 time period of study, Freddie Mac did not allow integrated auctioneers in foreclosure sales for the loans that it backed. We exploit this fact for our empirical identification by using the fraction of the originator's loans that are 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 is discussed in Cordell et al. (2015), severity rates (losses from loans that end in foreclosure) increase by between 0.5 and 1 % point per additional month of the foreclosure duration. On loans that are typically several hundred thousand dollars, the 2-month delay incurred by using an

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 do independent firms in the airline industry.

integrated firm leads to substantial costs, particularly when multiplied over the large volume of foreclosures that are completed.

1 Industry Background

When a borrower takes out a mortgage on a home, the property serves as collateral. If the borrower does not repay the loan according to the mortgage contract, the lender is entitled to foreclose on the borrower and take possession of the home, selling it to recoup the losses that it experiences from any unpaid principal, interest, and fees.

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, where 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 et al. 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 not only to 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 60–90 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 If the borrower proves that he is an active servicemember within

² We thank the numerous foreclosure attorneys and auctioneers 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 that is 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 During much of our study period, Massachusetts required lenders to wait 90 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.

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 % 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 of 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 of the sale 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 a 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 Fig. 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. By creating its own auction company the law firm gains access to a dedicated pool of auctioneers. Further, if the law firm is able

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 that are bought at foreclosure auctions sell at a discount partly due to the risk that buyers take on by purchasing a property as-is with no formal inspection; consequently, if the lender’s reservation price is at or above the perceived market value, a sale is extremely unlikely (Lambie-Hanson et al. 2015).

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.

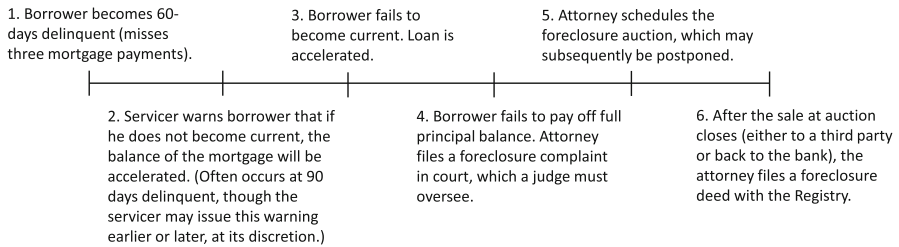


Fig. 1 The foreclosure process in Massachusetts

to charge the servicer a fee above cost for in-house auction services (which is the industry consensus), then the law firm is able to increase its per-foreclosure profits.

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 into a formal or informal agreement with an independent auction company to conduct the law firm's auctions exclusively, often at a lower cost per auction than if scheduled ad hoc.

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.⁹ 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 that they handle. Since a large share of mortgages 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 that the law firm is required to perform.¹⁰ 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.¹¹

⁹ To our knowledge, no bonuses or other added compensation for prompt scheduling were offered to auctioneers in Massachusetts during our study period.

¹⁰ For 31 states, including Massachusetts, Fannie Mae also maintained a "Retained Attorney List" for the time period that is 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 (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.

¹¹ 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 9 months after the auctioneer is

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 30–45 % of foreclosures that were completed each year, and six other law firms had more than 4 % of the market share each. Five medium-sized firms each processed between 1 and 2.5 % 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 %). Our results are stable to the selection of our sample of interest, however, as we discuss in Sect. 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 % of each auction company's business was with the paired law firm.¹² Table 1 displays the number of foreclosures that were processed by the seven largest law firms and the particular auction companies that 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 that were completed by integrated pairs during the time period we study. The fraction of foreclosures that were processed by integrated pairs held relatively steady over time at about 60 %, with March 2006 being an extreme outlier, which was driven by the relatively few foreclosure auctions that were held that month. A focus on the subsample of large law firms reveals that about 70 % of the foreclosures were conducted by integrated pairs.

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

In order to examine carefully the incentives that could affect 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 ,

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

where p is the flat fee that is 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

Footnote 11 continued

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.

¹² Our results on the impact of integration on auction scheduling are robust to classifying exclusively contracted and in-house auctioneers separately.

Table 1 Number of observations for each law firm/auction company pair

Auction company	Law firm								Total
	A	B	C	D	E	F	G	H	
a	1	0	0	<u>268</u>	0	0	0	0	269
b	0	0	<u>1501</u>	0	0	0	0	1	1502
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	<u>293</u>	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	1690	277	164	402	192	422	3733

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

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 that are paid to the auctioneer before the law firm is 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 that is billed to the servicer).

The overall profits that a firm makes from 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 that 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 that were 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 .¹³ The total profit from processing foreclosures during time period t is thus

¹³ Processing errors can include a variety of issues, such as failure to properly advertise a foreclosure sale, which can stall or invalidate a foreclosure.

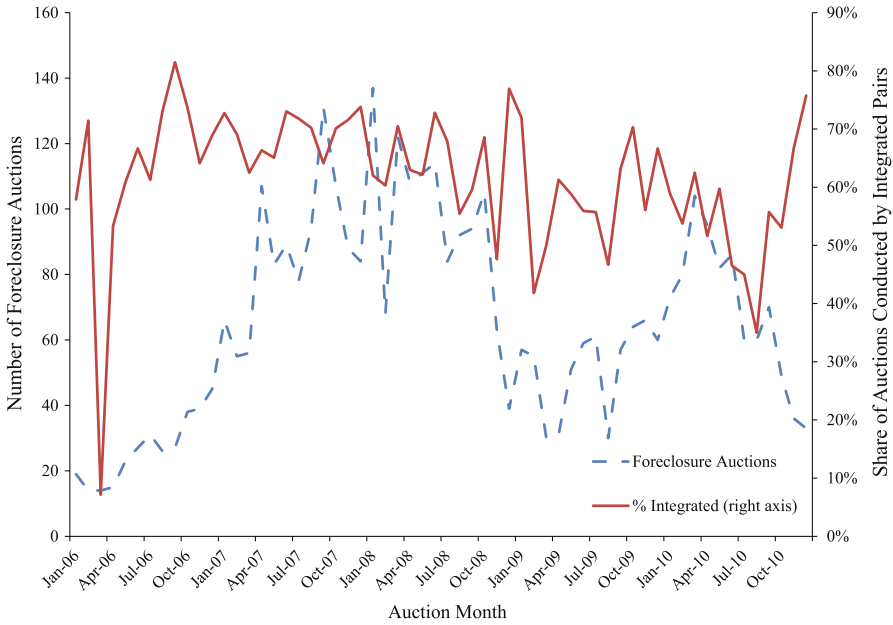


Fig. 2 Volume and integration

$$\Pi^t = \sum_{i=1}^{Q^t} \pi_i. \quad (3)$$

The price (attorney's fee) is almost always fixed in the industry to the GSEs' approved foreclosure fees for that state. This leaves the law firm to choose the quality of legal services to provide and the auction company to conduct the auction. These choices affect cost directly through: l_i , the amount of legal and administrative resources to devote to a transaction; a_i , the cost of auction services; and $\zeta(\cdot)$, the potential profit that accrues to the firm by using an in-house auctioneer. Indirectly, the firm's choices could affect the firm's profits through the reputation that is gained for the speed and quality of services that it provides.

2.1 Testable Hypotheses

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

Hypothesis 1 By integrating, the law firm is better able to secure access to an auctioneer when needed.

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 that are processed by firms with in-house auctioneers (all else equal) to have shorter overall processing times. More

precisely, we would expect the time from the foreclosure complaint to the initial scheduled date for the auction 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 compared to independent auctioneers.

2.2 Further Considerations Outside the Testable Hypotheses

Any study that hopes to measure performance differences between types of organizational forms must also consider why, if one form performs better than the others, multiple types of organizational forms still exist in an industry. In our case, if vertical integration results in longer durations, as we find below, why might the use of in-house auctioneers persist?

Aside from any potential foreclosure duration costs or benefits, law firms may choose to use in-house auctioneers to increase profits. Since legal services revenue is capped at a per-foreclosure level, ancillary services such as auctions and title work have become a secondary stream of income for some law firms.

Law firms can charge mortgage servicers more than they pay their in-house auctioneers. First consider the alternative arrangement: In a typical independent auction company, several auctioneers work for a sole proprietor. The law firm pays the proprietor and is later reimbursed by the servicer. The proprietor (“the auction company”) pays the auctioneer for carrying out the sale, and it pays the office overhead costs, keeping any remaining profit.

A law firm with an in-house auction company similarly utilizes a team of auctioneers, pays the auctioneers for services that they provide, and charges the mortgage servicer for auction costs. The law firm can capture the profit that otherwise accrues to the owner of the auction company. The law firm may also be better able to control costs by sharing overhead expenses (office space and support staff, for example).¹⁴

The exclusive contract arrangement with an independent auction company 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 business from servicers by securing lower auction fees through the exclusive contract. Second, by keeping auction costs lower, the law firm has to front less money: Each auction costs several hundred dollars, and it can take the servicer over 1 year to reimburse the law firm for these auction expenses.

¹⁴ Anecdotally, some auctioneers suggested that the per-foreclosure pay is lower for some in-house auction companies. We have no wage data to support this claim, but it is plausible that law firms could better guarantee auctions to conduct in exchange for lower per-foreclosure rates (compared to independent auction companies).

As we see in the data, however, not all firms are integrated. Law firms may be reluctant to invest in forming an in-house auction company because of the (anticipated) temporary nature of the mortgage crisis and the fixed costs that are associated with switching to an in-house auction team. Also, in some cases (e.g., Freddie Mac-backed mortgages) use of an in-house auctioneer is prohibited. Several individuals in the industry (attorneys and auctioneers) suggested that the perceived conflict of interest—the integrated law firm now has an interest in the foreclosure's being completed—may pose ethical and, potentially costly, legal issues for the law firm.

Questions of profitability, scale, and the legal and ethical issues surrounding integration are complex, and fully exploring these issues goes beyond the scope of this paper. However, we hope to convey that the law firm's decision about auction services, after weighing the costs and benefits of each type of organizational form, was sufficiently complex that different firms reasonably came to different conclusions.

Last, if these differences in performance are meaningful, why did servicers allow these differences to persist instead of demanding better monitoring or switching to more efficient law firms? We argue that monitoring the law firms' performance is always difficult for servicers, but especially so during this turbulent period for the industry. Servicers are concerned about the auction fees, the time it takes for the foreclosure to be completed, and the potential for poor legal work that would invalidate the foreclosure. During this time period, foreclosure durations across the country were rapidly increasing, to varying degrees across jurisdictions, as volume swelled. The differences in durations that we shed light on in this paper would be of secondary concern, even given the large cost implications. We think it unlikely that servicers during this volatile time could adequately monitor the effects of law firm/auction company organizational form on foreclosure durations even if they thought to do so.

We test for performance on a particular metric—the foreclosure duration—while law firms and servicers must consider many other (unobservable) aspects of performance. Findings of support for a particular organizational form should thus be treated with appropriate caution.

3 Data and Methods

After every foreclosure auction, the attorney who is processing the foreclosure files several documents with the county registry of deeds, including, but not limited to: the foreclosure deed; an affidavit that declares that all of the correct notification and sale procedures were followed in accordance with state law; and an example of the advertisements that were 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 that the auction was initially scheduled; the subsequent dates, if any, of rescheduled auctions; the number of postponements, if applicable; the date that the foreclosure deed was filed; the law firm that was hired by the servicer; the auctioneer; the auction company; the mortgage holder; the price that 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 be found only 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 5200 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 that were 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 % of the records. We then restrict our sample to only foreclosures on single-family homes, two-family homes, three-family homes, and condominiums, which leaves us with a sample of 4703 observations.¹⁵ However, we are unable to retrieve the date that the foreclosure complaint was filed for 970 observations; consequently, our sample falls to 3733.¹⁶ When we further restrict our sample to only those foreclosures that are processed by large law firms, our final sample falls to 3311 foreclosures.

In terms of the foreclosure duration, we capture the time duration from the date of approval of the foreclosure complaint to the first scheduled auction, as well as the time duration from the complaint approval to the date that the auction actually occurs. The difference between the two time durations is the amount of time that an auction is postponed once scheduled. The mean time from the complaint to the first scheduled auction is 201 calendar days in our sample (see Table 2 for summary statistics).

Nearly all postponements are requested by the servicer, but the time that 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 study the average postponement duration (the total time postponed divided by the number of postponements for a given foreclosure), which has a mean of about 1 month for those auctions that were postponed. There is wide variation, however, with some postponements lasting only a few hours and others lasting several months.

It is important to note that typical foreclosure timelines changed significantly from 2006 through 2010. The average time from the foreclosure complaint to the auction dramatically increased during this period—from 150 to over 300 calendar days—and so did the frequency of postponements (see Fig. 3 in the “Appendix”). Among auctions that were postponed at least once, the average duration of the postponement did 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

¹⁵ The initial sample of 5200 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 and excludes just apartment buildings of four or more units. Since 2000, there have been only about 100 foreclosures on those types of properties.

¹⁶ 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.

Table 2 Summary statistics for main sample, by integration status

	Independent	Integrated	All
<i>Outcomes (in days)</i>			
Time duration from foreclosure petition approval to initially scheduled auction			
Mean	192	204	201
SD	131	147	143
Range	31–1065	31–1060	31–1065
Time duration from foreclosure petition approval 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
<i>Controls</i>			
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

Table 2 continued

	Independent	Integrated	All
Property becomes bank owned (%)	89	89	89
Bank owned, backed by Freddie Mac (%)	20	0	6
Property sold to third party (%)	11	11	11
<i>Instruments</i>			
Mortgage originator's % Freddie Mac (mean)	10	5	6
Law firm's % Freddie Mac (mean)	9	5	6
Observations	961	2350	3311

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

(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

$$Duration_i = \mathbf{F}'_i\beta + \mathbf{T}'_i\delta + \mathbf{X}'_i\gamma + \epsilon_i, \quad (4)$$

where $Duration_i$ is the number of calendar days that 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 that indicates 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 that 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 have the potential problem of 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.¹⁷ We use the foreclosure duration 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 a scheduled auction by the attorney must be cleared with the servicer. To combat the threat of endogeneity, we limit our study to a period in which no auction company begins hiring in-house

¹⁷ See Masten (1993) for a thorough discussion of the pitfalls of estimating the impact of integration on performance.

auctioneers. By doing so, we view the decision as to whether or not to hire in-house auctioneers as predetermined. Another potential concern then emerges if the law 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 that are backed by Freddie Mac.

Most of the mortgages that are 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’s loans and borrowers should not be systematically different from Fannie Mae’s, 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 independent of borrower and loan characteristics.

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 foreclosures processed by the law firm in the same auction year that involve Freddie Mac.¹⁸

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 duration other than through the integration decision. We see no reason to expect either instrument to be correlated with the duration other than through the integration status, and the Sargan–Hansen test supports this claim.¹⁹ The first-stage results are shown in Table 5. The F-statistic on the excluded instruments provides evidence that we do not suffer from weak instruments.

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

¹⁸ Both of these measures are calculated using our data set of Suffolk County foreclosures. Because we observe GSE involvement only when properties are bought back by the mortgage holders at foreclosure auction, these calculations are based on the 89 % of our sample that experience a buyback.

¹⁹ 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.

4 Results

As displayed in Table 3, our IV estimates indicate that integrated firms take, on average, about 2 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 property rights theory of the firm in this institutional context. When a law firm schedules the auction internally, control of scheduling is typically allocated to the auctioneer. The internal 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 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.²⁰

When we separate integrated pairs into those with in-house auctioneers and those with exclusively contracted, external auctioneers, we find no statistically significant difference in the coefficients ($p = 0.17$, Table 3, model 2). The relative effect on foreclosure durations 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, if in-house auctioneers take their business for granted, they may take longer to schedule. In the interest of parsimony, we estimate the remaining models grouping together these two types of integration.²¹

The other controls in the main model behave as expected: Borrowers with subprime loans experience slightly longer foreclosure durations, and borrowers who file for bankruptcy—particularly Chapter 13—have much longer durations.²² As

²⁰ In Table 6 we display the models separately by time period. An alternative approach is to pool the auctions in one model and interact the auction time period with integration status. When doing so, we find that these interaction terms are statistically indistinguishable from each other and from zero ($p = 0.52$), which leads us to conclude that the effect of integration does not materially differ over our sample period. Finally, while our main specifications control for the year that the auction occurs, our results are very similar when we instead control for the month or quarter of the auction. These results are available upon request.

²¹ We also test the robustness of our results by redefining “integrated” as having in-house auctioneers only and pooling exclusively contracted auctioneers with independent ones, in case we misunderstand the incentives of the exclusively contracted auctioneers. (Neither our institutional understanding nor the data suggest that this is the case, however). When we pool all independent auctioneers together, our main result is still statistically significant at the 1 % level, with in-house auctioneers taking, on average, 45 days longer compared to all independent auctioneers (full results are available upon request).

²² 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 (the time period when borrowers have begun to miss payments, but the servicer has not yet begun foreclosure proceedings) in our timeline. Also, Capozza and Thomson (2006) study loans in 2001, and it is unclear if their finding applies to the recent mortgage crisis.

Table 3 Time duration from foreclosure petition approval to initially scheduled auction, and average postponement duration, in days

	(1) Foreclosure petition approval to auction	(2)	(3) Postponement	(4)
Integrated	65.37** (17.14)		-5.40 (5.40)	
Integrated: in-house		41.60** (15.48)		-7.81 (6.00)
Integrated: exclusive		93.51** (31.72)		21.67 (30.65)
2007 auction	7.32 (12.01)	10.17 (8.99)	-3.72 (2.70)	-3.11 (3.05)
2008 auction	70.84** (12.71)	73.00** (9.42)	2.21 (2.98)	3.24 (3.48)
2009 auction	105.66** (12.25)	106.49** (9.41)	0.16 (2.83)	1.27 (3.46)
2010 auction	97.09** (13.35)	98.23** (10.30)	2.13 (2.72)	3.44 (3.30)
Purchased 2000–2004	1.79 (5.80)	2.79 (5.69)	-0.85 (1.32)	0.18 (1.86)
Purchased 2005–2006	-14.49* (7.15)	-14.49* (6.91)	-0.37 (1.50)	-0.094 (1.56)
Purchased 2007–2008	-11.76 (8.99)	-12.43 (8.96)	-2.4 (2.69)	-1.59 (2.86)
Subprime mortgage	10.70** (3.63)	8.93** (3.43)	1.64 (1.23)	1.34 (1.20)
Nonpurchase mortgage	-5.28 (5.00)	-4.39 (4.90)	-0.94 (1.39)	-0.54 (1.49)
Chapter 7	29.31* (13.32)	28.45* (13.40)	-2.11 (3.03)	-1.95 (3.12)
Chapter 13	110.36** (16.01)	103.77** (15.78)	-2.22 (2.82)	-2.47 (2.81)
Single-family	16.21** (4.81)	17.12** (4.75)	1.16 (1.29)	1.78 (1.41)
Two-family	10.94* (4.74)	12.57** (4.71)	2.84* (1.35)	3.16* (1.37)
Three-family	15.42** (4.84)	16.65** (4.87)	4.16** (1.27)	4.02** (1.30)
Constant	143.80** (22.10)	112.80** (35.54)	16.45** (4.87)	15.00** (5.09)

Table 3 continued

	(1) Foreclosure petition approval to auction	(2)	(3) Postponement	(4)
ZIP code dummies	Yes	Yes	Yes	Yes
Observations	3311	3311	876	876
R-squared	0.14	0.168	0.04	-0.02

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 % levels, respectively. Omitted categories include auctions conducted in 2006, borrowers purchasing their homes before 2000, prime mortgages, purchase mortgages, and condominiums

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 et al. (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 auction year controls indicate larger average foreclosure durations in 2008 through 2010, as compared to 2006 and 2007. This is consistent with the data on foreclosure durations that are displayed in Fig. 3. Other work has also shown that during our study period, foreclosures took increasingly lengthy times to complete, thanks to a variety of policy and procedural changes in the industry (Cordell et al. 2015).

The magnitude of the delay in scheduling the original auction amounts to considerable cost when spread over the volume of foreclosures that are 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 4 weeks, based on the lower bound of the 95 % 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 2015).

As can also be seen in Table 3, the average amount of time that 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 that are predicted by Williamson (1975), Bajari and Tadelis (2001), and Tadelis (2002). In fact, very few of our controls are significant at predicting postponement durations, though they were meaningful in estimating initial scheduling delays. This may be because postponements are more commonly affected by borrower actions, and these idiosyncrasies are difficult to observe in our data.

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 84–399 days (see 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 duration, which is very similar to our 65-day effect in the main model.

Unobservable firm-level heterogeneity that is correlated with the integration 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 duration when in fact our results are confounded.²³

We first combat this threat by including in model 5 a set of dichotomous controls for the identity of the law firms. The effect of integration is to lengthen the process by 40 days and is still strongly significant, and none of the law firm controls are statistically significant at the 0.05 threshold. In models not shown, we go a step further and restrict the sample to just the cases that were processed by the industry leader and cases *excluding* the industry leader, but we find no statistically different effect of integration between those two subsamples.

To isolate further the effect of integration and net out the effects of servicer behaviors and borrower and loan traits, we restrict the sample in model 6 to just those loans that were backed by Freddie Mac and Fannie Mae. The types of loans that these GSEs back are similar, and the GSE that is associated with a specific mortgage is arguably random. While the two GSEs differ somewhat, they share a common regulator (the Office of Federal Housing Enterprise Oversight until July 2008 and thereafter the Federal Housing Finance Agency) that works to harmonize their policies and procedures, including the rules that 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, and while smaller, still falls within the 95 % confidence interval of our main model estimate.

Our finding that there is an economically meaningful, statistically significant positive effect of integration on foreclosure durations persists when we broaden and narrow our sample in other ways. We have focused on the seven largest law firms in

²³ See Akerberg and Botticini (2002) for a discussion of how unobserved principle and agent characteristics may affect estimated coefficients if incentives exist for particular types of agents to contract with particular types of principles.

Table 4 Robustness tests for time duration from foreclosure petition approval 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)	3311
(2)	Dependent variable winsorized at 5th and 95th percentiles	73.74**	(20.11)	3311
(3)	Dependent variable not winsorized	81.76**	(22.92)	3311
(4)	Natural log of dependent variable	0.34**	(0.09)	3311
(5)	Including law firm dummy variables	39.76**	(14.25)	3311
(6)	Including Fannie Mae and Freddie Mac mortgages only	42.26*	(17.97)	600
(7)	Including medium-sized law firms	74.73**	(19.55)	3633
(8)	Including small- and medium-sized law firms	74.90**	(19.51)	3733
(9)	Excluding observations with bankruptcies	63.54**	(16.39)	3223
(10)	Alternative IV (Freddie Mac), excluding third-party sales	45.23**	(9.76)	2947

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 % levels, respectively. Model 7 includes a law firm size dichotomous control, and model 8 includes two controls (one for small firms and one for medium firms)

our main results, since they process over 88 % 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 be categorized roughly as one of two types: The five law firms in the first group, which we call “medium” firms, each have a market share between 1 and 2.5 %; they each processed about 40 to 90 foreclosures in our data set. 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 that were not originated by large lenders, but rather were granted by an individual or small investment trust.

Despite the differences in these types of firms, we find in models 7 and 8 that adding them to our sample does not have a material effect on our findings. Likewise, our results are similar when, in model 9, we exclude the 88 observations in our data set for which there is a Chapter 7 or Chapter 13 bankruptcy filing.

Finally, in model 10 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 that indicates whether loan i was backed by Freddie Mac. Because we observe Freddie Mac status only for properties that were bought back at foreclosure auction, we must exclude third-party sales (those that are not bought back by the lender) from the sample. We find a similar effect of integration status using this alternative identification approach.

6 Discussion and Conclusion

We use a unique data set on mortgage foreclosures to evaluate the incentives and agency problems that law firms that represent mortgage lenders face when the law firms decide 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 there is no difference in scheduling speed when auctions are postponed and must be rescheduled.

In the initial scheduling process, independent auction companies have a market incentive to agree to the time frame that is 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 appear to 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 that firms face when auctioneers are allocated more control over scheduling.

So why do law firms not monitor and control auctioneers' scheduling better? And why do they bother with in-house auctioneers at all, given this paper's results? There are certainly benefits to integration that do not involve scheduling. Attorneys hire in-house auctioneers because doing so creates another source of profits. Attorneys may also want to establish exclusive relationships with auction companies in order to secure their services at a lower cost, which may make them more attractive to their clients, the mortgage servicers, and attract more business in the future.

As for the added duration costs that we identify, based on what we learned in our interviews, it is not clear that attorneys are aware of or are particularly concerned about these costs—at least during our study period. We learned that attorneys want cases to be carried out quickly both to please the servicer and to expedite their payment, but these incentives may not be enough to cause them to invest the time and energy to monitor and manage the auctioneers. Our data capture only the initial years of the mortgage crisis, though. These law firms were not doing large volumes of foreclosures in the years prior to 2007, and we cannot rule out the possibility that over time the attorneys became more cognizant of scheduling delays and acted to minimize them.

Even if they had the will to manage the auctioneers to achieve the fastest foreclosure durations possible, monitoring the auctioneers and identifying differences in the durations would have been challenging. As documented by Cordell et al. (2015), foreclosure timelines were increasing dramatically during this period, which would have made it difficult for attorneys and servicers to compare the durations of cases over time.²⁴ The large-scale moratoria and policy interventions

²⁴ There are also industry-specific nuances at play. The broad geographic scope of a typical auctioneer's business means that the scheduling of 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.

that Cordell et al. study may have also distracted these parties and obscured the more modest, though economically important, increases in durations that we find.

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Appendix

See Fig. 3 and Tables 5 and 6.

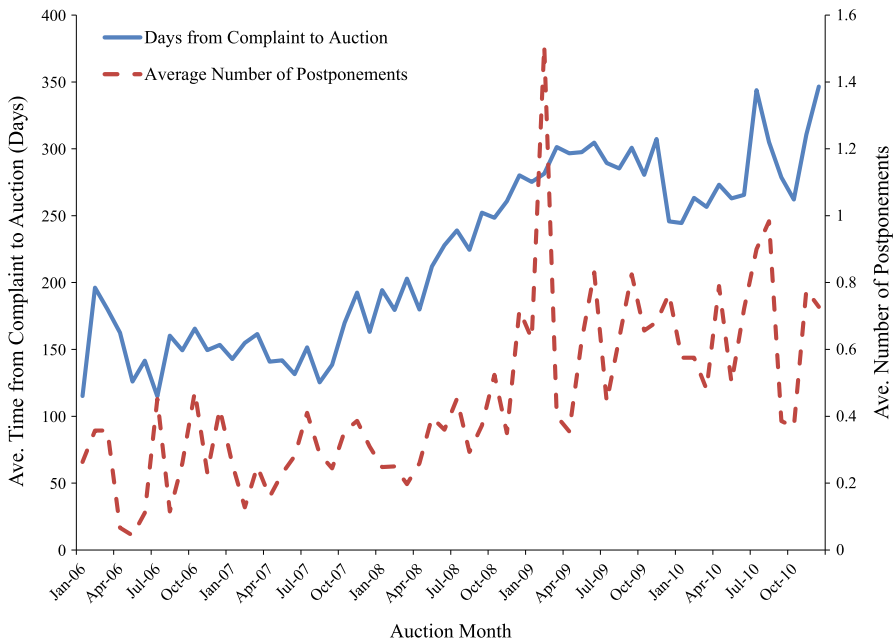


Fig. 3 Processing time from foreclosure complaint to completed auction and number of postponements

Table 5 First-stage model results

	(1) Main model	(2) GSE Only	(3) Alternative IV	(4) Time Postponed
Originator's % Freddie Mac	-0.70** (0.09)	-0.79** (0.14)		-0.76** (0.17)
Law Firm's % Freddie Mac	-1.57* (0.68)	-2.03* (0.91)	-1.22~ (0.68)	-0.64 (0.77)

Table 5 continued

	(1) Main model	(2) GSE Only	(3) Alternative IV	(4) Time Postponed
Freddie Mac			-0.68** (0.08)	
2007 auction	0.04 (0.11)	-0.29* (0.15)	0.05 (0.11)	0.04 (0.15)
2008 auction	0.06 (0.12)	-0.2 (0.14)	0.06 (0.12)	0.11 (0.15)
2009 auction	0.07 (0.13)	-0.12 (0.17)	0.08 (0.12)	0.04 (0.17)
2010 auction	0.04 (0.13)	-0.11 (0.13)	0.06 (0.13)	0.01 (0.16)
Purchased 2000–2004	-0.02 (0.02)	-0.02 (0.05)	-0.02 (0.02)	-0.04 (0.05)
Purchased 2005–2006	-0.03 (0.03)	-0.20** (0.06)	-0.02 (0.03)	-0.13* (0.05)
Purchased 2007–2008	-0.08* (0.04)	-0.19* (0.07)	-0.08 ~ (0.04)	-0.22** (0.07)
Subprime mortgage	-0.12** (0.03)	-0.02 (0.08)	-0.10** (0.03)	-0.05 (0.04)
Nonpurchase mortgage	-0.01 (0.03)	-0.08 (0.05)	0 (0.03)	-0.11** (0.04)
Chapter 7	-0.07 (0.06)	0.07 (0.13)	-0.06 (0.08)	-0.15 (0.12)
Chapter 13	-0.14 (0.09)	-0.12 (0.20)	-0.13 (0.09)	-0.06 (0.14)
Single-family	0.01 (0.03)	-0.06 (0.06)	0.01 (0.03)	0.07 (0.05)
Two-family	0.03 (0.02)	0.03 (0.07)	0 (0.02)	0.10* (0.04)
Three-family	0.01 (0.02)	-0.03 (0.06)	-0.01 (0.03)	0.07 (0.05)
Constant	1.05** (0.11)	0.97** (0.16)	0.84** (0.14)	0.26 (0.19)
ZIP code dummies	Yes	Yes	Yes	Yes
Observations	3311	600	2947	876
F stat of excl. instruments	64.56	41.43	146.06	16.49
Prob. > F	<0.0001	<0.0001	<0.0001	<0.0001

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 % 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

Table 6 Time duration from foreclosure petition approval to initially scheduled auction, in days

	(1)	(2)	(3)	(4)
	Petition to auction			
	Full sample	Auction year		
2006–2007		2008	2009–2010	
Integrated	65.37** (17.14)	54.70~ (30.97)	53.18** (14.72)	69.08* (27.58)
2007 auction	7.32 (12.01)	–	–	–
2008 auction	70.84** (12.71)	–	–	–
2009 auction	105.66** (12.25)	–	–	–
2010 auction	97.09** (13.35)	–	–	–
Purchased 2000–2004	1.79 (5.80)	–5.47 (11.58)	0.37 (8.89)	2.71 (9.31)
Purchased 2005–2006	–14.49* (7.15)	–43.36** (11.57)	–11.87 (10.48)	8.07 (11.12)
Purchased 2007–2008	–11.76 (8.99)	–49.38** (12.64)	–23.16 (14.44)	13.61 (13.21)
Subprime mortgage	10.70** (3.63)	5.70 (5.52)	17.81** (5.54)	11.05 (7.20)
Nonpurchase mortgage	–5.28 (5.00)	–16.15~ (8.93)	–6.47 (7.08)	5.57 (10.17)
Chapter 7	29.31* (13.32)	–	–	24.49~ (13.76)
Chapter 13	110.36** (16.01)	151.58** (35.30)	–	105.94** (16.79)
Single-family	16.21** (4.81)	17.65** (6.50)	9.98 (12.64)	16.41* (7.04)
Two-family	10.94* (4.74)	11.94 (7.39)	7.89 (5.51)	11.92 (11.62)
Three-family	15.42** (4.84)	17.09* (7.18)	9.01 (7.13)	18.62~ (10.16)
Constant	143.80** (22.10)	190.66** (30.23)	181.88** (25.38)	163.14** (50.35)
ZIP code dummies	Yes	Yes	Yes	Yes
Observations	3311	1137	950	1224
R-squared	0.14	0.02	0.07	0.05

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 % levels, respectively. Omitted categories include auctions conducted in 2006, borrowers purchasing their homes before 2000, prime mortgages, purchase mortgages, and condominiums

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