

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

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## Abstract

In most US 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 to law firms that contract with independent auction companies. We find that unintegrated 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 contract. We argue that this is evidence of a cost of integration stemming from poorly aligned incentives within the firm.

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# 1 Introduction

In many US states, law firms that process mortgage foreclosures on behalf of banks are required to hire private auctioneers to carry out auctions to sell the properties that secure delinquent mortgages. In Massachusetts, several law firms utilize in-house auctioneers to conduct foreclosure auctions, while others hire independent 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 find that integrated firms, which, unlike independent firms, typically allocate scheduling responsibilities to auctioneers, take one to three months longer to initially schedule each auction. However, when rescheduling becomes necessary, unintegrated firms schedule new auctions no faster than their integrated counterparts.

To ensure that our estimates are consistent, we utilize a two-stage least squares approach in which we instrument for the law firm's integration decision with a dichotomous variable that indicates whether the mortgage is backed by Freddie Mac. Since Freddie Mac does not allow integrated firms to process foreclosures for its loans, this variable is highly correlated with whether the law firm utilizes an in-house auctioneer when processing a given foreclosure. Further, while Freddie Mac (and Fannie Mae) loans may differ from much of the rest of our sample in terms of borrower credit quality and underwriting standards (Ellen et al., 2011), we find no evidence to suggest that the duration measures for the particular stage of the foreclosure process that we study should be correlated with the mortgage holder other than through the integration status of the law firm.<sup>1</sup>

Our first result, that integrated firms initially schedule auctions more slowly than unintegrated firms, suggests that there is a cost to integrating in this industry. We explain this result by considering the timing of contracting between the law firm and auctioneer. An unintegrated auction company, which has not yet been contracted for a given auction when

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<sup>1</sup>Though it is difficult to test for the second requirement, our data suggest that, at least in-sample, there is no difference in the durations of the various stages of the foreclosure process between foreclosures on Freddie Mac loans and foreclosures on non-Freddie Mac loans processed by unintegrated firms.

the auction date is set, has an incentive to conform to the law firm’s agenda and agree to hold the auction as scheduled. In contrast, the auctioneer employed by an integrated firm (referred to below as an in-house 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).

That integrated firms do not reschedule more quickly than unintegrated firms suggests that integrated firms in this industry are no better at adapting when unforeseeable events arise. 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.

A large number of studies test hypotheses based on, and largely supporting, transaction cost economics (that greater asset specificity is correlated with greater integration), while much less empirical work discusses the implications of the property rights arguments.<sup>2</sup> Baker and Hubbard (2003, 2004), who explore the “make or buy” decision in trucking, are notable exceptions. Both examine how the adoption of new technology impacts “...the agency costs that can arise when the driver does not own the truck, and the bargaining costs (both ex ante and ex post) that can result when the driver does own the truck.” They find that technology that improves the ability to monitor drivers generally encourages trucking companies to use their own trucks rather than for-hire carriages, which suggests that the trucking industry is cognizant of the agency costs of integration. Our results similarly focus on the relationship between agency and bargaining costs by exploiting the timing of the contracting between the law firm and auctioneer, but differ in that we directly measure the impact of integration on one aspect of performance.<sup>3</sup>

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<sup>2</sup>See Lafontaine and Slade (2007) for a review of the make-or-buy literature.

<sup>3</sup>See Woodruff (2002) for another example of a contracting relationship that is better described by the property rights framework: the Mexican footwear industry. Since retail managers’ knowledge of fashion is difficult for the manufacturer to observe, the property rights framework suggests that managers have stronger incentives to maintain and enhance their knowledge when they are independent. Woodruff (2002) finds that in those segments where fashion turnover is high and knowledgeable

In addition to Baker and Hubbard (2003, 2004), this paper is closely related to the work on airline delays and organizational form studied by Forbes and Lederman (2009, 2010). Forbes and Lederman (2009) find that city pairs with more uncertain weather conditions (and thus a larger number of rescheduled flights) are more likely to be served by regional airlines that are owned by major airlines rather than regional airlines that are contracted by major airlines. Forbes and Lederman (2010) test whether organizational form impacts the average departure delay and find that integrated airlines perform better. In contrast, our results indicate that integrated firms in the mortgage foreclosure industry are no better able to adapt to unanticipated changes.

## 2 Industry Background

The mortgage foreclosure process in the United States is highly regulated and differs substantially by state. In general, there are two types of legal procedures that foreclosure sales in a particular state may follow (though in some states both types of sales occur). Eighteen states primarily utilize what is known as judicial foreclosure, where the lender petitions the court, and the court completes the foreclosure by auctions that are typically run by the local sheriff's department. In contrast, thirty-two states and the District of Columbia allow for power-of-sale foreclosure, in which the borrower agrees at the time the mortgage is originated that the lender has the right to foreclose and carry out the auction without court supervision.<sup>4</sup> Our study focuses on the greater Boston area, and so our institutional setting is Massachusetts, where power-of-sale foreclosure is used almost exclusively. As the foreclosure process is largely similar across power-of-sale states, our results should be generalizable to not only the rest of Massachusetts, but also to these other states.

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retailers more important, integration is less prevalent.

<sup>4</sup>See Gerardi et al. (2013) for a thorough discussion of the distinction between judicial and power-of-sale foreclosure.

## 2.1 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.<sup>5</sup> Although the timing varies by lender, once a borrower becomes about 90-days delinquent on his mortgage (which is the equivalent of missing 4 monthly payments), the lender 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.<sup>6</sup> If the borrower fails to make good on the missed payments or to pay off the mortgage, the lender or servicer hires an attorney to begin foreclosure proceedings.<sup>7</sup> 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 armed forces' servicemember.<sup>8</sup> If the borrower proves himself to be 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. Not infrequently, and in about 25 percent of our observations, the auction is postponed from its initially scheduled date to a later date.<sup>9</sup> 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.<sup>10</sup> In the

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<sup>5</sup>We again 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.

<sup>6</sup>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.

<sup>7</sup>Different from the mortgage holder, the servicer is an agent of the mortgage holder or the group of investors who own mortgage-backed securities. The servicer is the party who typically hires the foreclosure attorney.

<sup>8</sup>Despite the presence of the courts in this process, this is still different from judicial foreclosure, in which the court reviews the foreclosure itself.

<sup>9</sup>Postponement or cancellation of a scheduled auction was, as of Fall 2012, much more common than the scheduled auction actually going forward, with only about 25 percent of auctions in Massachusetts occurring when initially scheduled (authors' calculations using data from the Warren Group). In our sample of completed auctions in which canceled auctions and right-censored foreclosures are omitted, about 75 percent of the auctions took place as initially scheduled.

<sup>10</sup>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.

event of a postponement, a representative of the auction firm 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 being sold and third-party bidders compete to purchase the home, with the sale going to the highest bidder. 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 reserve price is well below the perceived value of the property, the property typically does not attract a third-party bid, and the bank takes possession of or “buys back” the property.<sup>11</sup> Following a bank buyback, the lender, which now holds title to the property, hires a local real estate agent to market the property as real estate owned (REO).

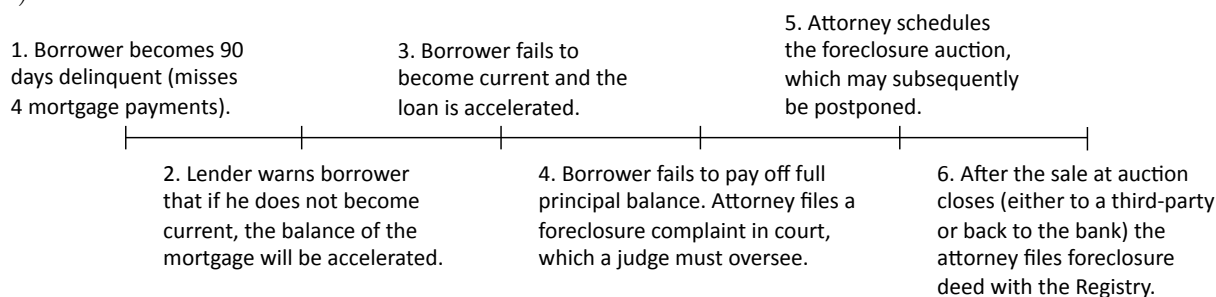


Figure 1: Timeline of the foreclosure process in Massachusetts

At the conclusion of the auction, regardless of whether it results in a bank 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.<sup>12</sup> We focus on the attorney’s involvement in the process, specifically, from filing

<sup>11</sup>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 reserve price is at or above the perceived market value, a sale is extremely unlikely.

<sup>12</sup>The filing of the deed occurs after the sale has closed. In the case of a third-party buying the property, the buyer pays a deposit to the law firm at the auction, with the remaining balance due at closing. Typically the buyer is required to close within

the foreclosure complaint to filing the foreclosure deed. For a summary of this timeline, see Figure 1.

## 2.2 Organizational Forms and Contracting Arrangements

Our interest lies with the contracting relationship between the law firm and auction company, and, more particularly, which party has control over scheduling the auction. Three types of contracting arrangements are prevalent in the industry. First, a law firm may utilize an in-house team of auctioneers, in which case we assume the auctioneers are given scheduling control.<sup>13</sup> 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 conduct a large share of the firm’s auctions. When the firm contracts with an auction company to conduct all of the firm’s auctions, we assume control of scheduling is given to the auction company. Some law firms employ a combination of the first two contracting arrangements to conduct the auctions, with the majority conducted by in-house auctioneers, and the remainder by an independent firm.<sup>14</sup>

We examine data for Massachusetts’ Suffolk County, which includes Boston and three other municipalities: Chelsea, Revere, and Winthrop. While more than sixty-five 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. In order to ensure that we are evaluating transactions conducted by firms for which each of the three contracting arrangements above is possible, we limit most of our analysis to a group of seven law firms that each had above 4 percent of the market share.<sup>15</sup> Of those seven largest firms, three used in-house auctioneers to conduct a majority of their auctions and two were engaged in

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30 days, but with increased legal scrutiny and greater case volume, lenders are often taking longer to examine the foreclosure documentation, further delaying the closing of the sale.

<sup>13</sup>Our understanding of which party has control over scheduling is based on interviews with industry professionals. So while 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.

<sup>14</sup>As we discuss later, some mortgage holders forbid law firms from utilizing in-house auctioneers when processing foreclosures for loans that they own. Therefore, firms that utilize in-house auctioneers must contract externally for these auctions.

<sup>15</sup>Our results are stable to the selection of our sample of interest. We present robustness results in Section 6.

long-term, exclusive contracts with independent auction companies.

We refer to law firm-auction company pairs as integrated if scheduling control has been allocated to the auction company, either through the law firm employing in-house auctioneers or having an exclusive contracting relationship with one external firm.<sup>16</sup> 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). Of the five law firm-auction company pairs we consider integrated, at least 96 percent of each auction company's business was with the paired law firm.

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.<sup>17</sup> In Massachusetts, law firms are paid a flat \$1400 per foreclosure (recently increased from \$1300), with the possibility of \$200 more if the property is sold to a third party. 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.

The law firm initially pays the auctioneer's fees and other operating 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.

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<sup>16</sup>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).

<sup>17</sup>For 31 states, including Massachusetts, Fannie Mae also maintained a "Retained Attorney List" for the time period covered by our data, which is a list of attorneys who are eligible to receive referrals for foreclosures or bankruptcies relating to Fannie Mae loans. See Fannie Mae Announcement 08-19, at <https://www.efanniemae.com/sf/guides/ssg/annltrs/pdf/2008/0819.pdf> (last accessed 1/12/2012) for more details on the payment schedule for and responsibilities of the law firms that process Fannie Mae foreclosures, as well as for which states a "Retained Attorney List" is maintained.



## 2.3 Market Structure and Recent Trends

Over the primary time period we study, 2006 through 2010, one industry leader processed 30 to 45 percent of foreclosures completed each year in Suffolk County. Six other law firms processed a sizable number of foreclosures, each having more than 4 percent of the market share. Four medium-sized firms each processed between 1 and 2.5 percent of the foreclosures during this time. The remaining foreclosures were conducted by about fifty firms that processed only a handful of foreclosures each. Since integrating seems to be a viable option for only those larger firms, we restrict our main analysis to the largest seven firms (those with market shares over 4 percent), but we ensure that our results are robust to our sample selection in Section 6.

Table 1 displays the number of foreclosures processed by the seven major law firms and the particular auction companies each used, including independent and in-house auctioneers.<sup>18</sup> We have highlighted those pairs that we consider integrated. In three of these instances the law firm legally owned the auction company, but in all five pairs the auction company worked nearly exclusively with the law firm.

Law Firm	Auction Company															Total
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	Other	
A	35	378	1	-	-	-	1	-	-	-	-	-	-	-	-	415
B	-	-	214	54	-	-	-	-	29	19	-	-	20	-	2	338
C	4	-	1	-	1,793	261	-	-	-	1	-	-	-	-	3	2,063
D	-	-	1	-	-	-	312	-	-	1	-	-	-	7	2	323
E	-	-	-	-	-	1	-	118	64	-	-	-	10	-	5	198
F	-	-	206	-	-	-	-	-	-	316	16	1	-	-	1	540
G	-	-	-	-	-	-	-	-	-	-	-	243	-	-	-	243
Other	20	1	-	25	1	138	-	5	12	90	86	7	70	59	69	583
Total	59	379	423	79	1,794	400	313	123	105	427	102	251	100	66	82	4,703

Table 1: Law Firm-Auction Company Pairs

Figure 2 displays the volume of foreclosures in Suffolk County and the share of these

<sup>18</sup>As discussed further in Section 4, we collected deed information for all of the foreclosures conducted in Suffolk County from 2006 through 2010. We discard the records where we are unable to retrieve the date the foreclosure complaint was granted and foreclosures of non-residential properties. We are left with the sample discussed in this section.

transactions completed by integrated pairs during the time period we study.<sup>19</sup> 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 62 percent of the foreclosures in our sample are conducted by integrated pairs.

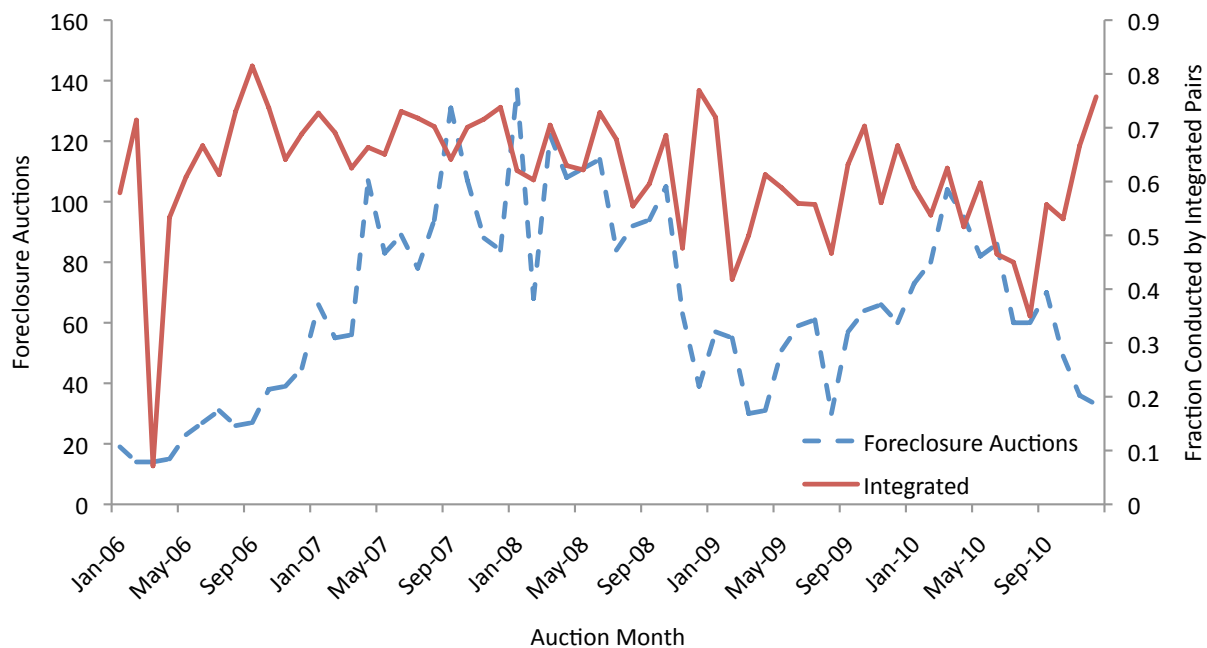


Figure 2: Volume and Integration

### 3 The Firm’s Decision: Make-or-Buy

In order to carefully examine the incentives that could impact the law firm’s production decisions, we introduce a simple model of firm profit. We first consider a firm’s profit,  $\pi$ , from processing a given foreclosure  $i$ ,

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

<sup>19</sup>The volume of foreclosures processed dipped dramatically following statutory changes enacted in August 2008 and May 2010 that extended the period of time borrowers had to cure their defaults before lenders could accelerate their mortgage payments.

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,  $\gamma$  is the expected number of postponements,  $\beta$  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 the servicer).<sup>20</sup>  $\gamma$  is taken as exogenous because postponements depend primarily on borrower and servicer actions.

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

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

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  $\eta$ . The total profit from processing foreclosures during time period  $t$  is thus

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

Since the price is almost always fixed by the industry standards based on the Fannie Mae guidelines discussed in Section 2.2, 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, our primary focus, could affect the firm’s profits through both the costs it encounters and its reputation. An external auction company

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<sup>20</sup>We do not consider the possibility that the foreclosure is cancelled. A borrower may be able to sell the property in a short sale or, alternatively, the servicer may cancel the foreclosure auction if the borrower declares bankruptcy (only to reinstate proceedings after the bankruptcy is settled). We omit cancellations from this simple model for two reasons. First, it is uncertain what happens to the law firm’s compensation in the case of cancellations, as this may depend on the reason for the cancellation, though auctioneers receive a fixed cancellation fee. Second, we do not directly observe cancellations in our data, only completed foreclosure auctions.

will typically 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, utilizing 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.

For many law firms, the cost of employing an in-house auctioneer is prohibitive given the small number of foreclosures they process. As a result, for much of the paper we restrict our analysis to those large firms for whom having an in-house auctioneer is feasible. For those firms, several plausible hypotheses for why they might choose to integrate come from our basic model of their profit. We first enumerate these possibilities below before trying to distinguish between them in the data.

**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 utilize 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 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. Thus, the firm is able to process cases more quickly, enhance its reputation, and gain more contracts. This may not be relevant if there is a highly-competitive market for auctioneers.

**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 or she 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.

**Hypothesis 3.** *A law firm that integrates the auction process is better able to control costs*

*or capture additional revenue, offering a lower per-auction wage in return for guaranteed auction services.*

Essentially, if law firms are less risk-averse than auction companies, they will assume more of the risk of the “market” for foreclosure cases declining, while in exchange paying a lower per-auction salary (and thus increasing their profits). Since we do not observe the fees charged by different auctioneers, Hypothesis 3 is difficult to evaluate with our data, though, anecdotally, it is one of the main reasons attributed by industry professionals for why a law firm would integrate the process. One could argue that if such a mutually-beneficial trade (increased risk for a lower wage) could be made, we would expect to see one organizational form dominate the industry.<sup>21</sup> However, since there is significant heterogeneity in firm size, and further, since law firms (and auction companies) vary significantly in the degree of specialization and the geographic scale on which they operate, such an argument seems implausible in this context.

## 4 Data and Methods

After every foreclosure auction in Suffolk County, the attorney processing the foreclosure must file 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 publicize the auction. The registry of deeds then makes these documents publicly available (and for our time period of interest available online).

By examining the records for each foreclosure in Suffolk County from 2006 through 2010, we retrieve 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 bank; 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,

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<sup>21</sup>Hart and Moore (1990) develop a model that shows that an industry will typically converge to a particular organizational form. We unfortunately lack the necessary temporal scope in our data to test this prediction.

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 not been completed, including cancelled auctions and right-censored foreclosures.<sup>22</sup> This restricts our analysis to a sample of 5,200 foreclosures. We merge this dataset with Warren Group property-level data, which include the date that the foreclosure complaint was filed, allowing us to estimate the duration of the attorney's involvement in the case (roughly the length of time from filing the foreclosure complaint to filing the foreclosure deed) and observe some property and borrower characteristics, described in Table 2.<sup>23</sup> 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 the sample described in Table 1 of 4,703 observations.<sup>24</sup> However, we are unable to retrieve the date the foreclosure complaint is filed for 862 observations, and our sample falls to 3,841.<sup>25</sup> When we further restrict our sample to only those foreclosures processed by large firms with auctions conducted in 2006 through 2010 for which we have assessor's data on property characteristics, our final sample falls to 3401 foreclosures.

In Table 2 we define our primary variables of interest and in Table 3 provide summary statistics. In terms of the foreclosure timeline, we capture the duration from the complaint being approved to the first scheduled auction, as well as the duration from the complaint being approved to the date the auction is finally completed. The mean durations are 200 and 216 days, respectively. The difference between the two is the average total amount of time an auction is postponed once scheduled. But since nearly all postponements are requested by the servicer, the meaningful measure of adaptation between the law firm and auction company is the amount of time it takes to reschedule following each postponement. We do not observe the length of each postponement in our data and instead capture only when

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<sup>22</sup>As discussed in footnote 9, we track a sample of all foreclosures initiated with data coming from auctioneers websites. This information is not available for all auctioneers, however, and only covers the past few years.

<sup>23</sup>The Warren Group is a private company that collects, processes, and sells New England real estate data.

<sup>24</sup>The initial sample of 5200 foreclosures includes numerous other types of properties, like parking spaces, time shares, and commercial real estate. We exclude these from our analysis.

<sup>25</sup>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.

Variable name	Definition
Complaint to auction	Number of days from when the complaint is filed before the auction occurs
Complaint to first sched. auction	Number of days from when the complaint is filed before the first scheduled auction date
Average postponement duration	Average amount of time of each postponement, given there is at least one postponement
Integrated	Equals 1 if the foreclosure attorney uses an in-house auctioneer or an auction company with which it has an exclusive arrangement
FHLMC	Equals 1 if the property is bought back by Freddie Mac
Subprime	Equals 1 if borrower ever took out a subprime loan
Purchase year pre-2000	Equals 1 if borrower purchased before 2000
Purchase year 2000-04	Equals 1 if borrower purchased during 2000 through 2004
Purchase year 2005-06	Equals 1 if borrower purchased during 2005 or 2006
Purchase year post-2006	Equals 1 if borrower purchased after 2006 (no borrower in our data purchased after 2008)
Refinanced	Equals 1 if borrower refinanced original mortgage
1-family home	Equals 1 if property is a single-family home
2-family home	Equals 1 if property is a two-family home
3-family home	Equals 1 if the property is a three-family home
Condo	Equals 1 if the property is a condominium unit
Third-party	Equals 1 if the auction results in a third-party sale
Price	Price the property sells for at auction if a third-party buys the property

Table 2: Variable Names and Definitions

the auction was first scheduled and when it actually took place, so we utilize 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 at least once).

Variable name	N	Mean	S.D.	Min	Max
Duration from complaint to auction	3401	216.69	146.66	31	1065
Duration from complaint to first scheduled auction	3401	201.17	143.12	31	1065
Average postponement duration	899	32.69	18.33	0	121
Integrated	3401	0.709	0.454	0	1
FHLMC	3401	0.057	0.232	0	1
Subprime	3401	0.590	0.492	0	1
Purchase year pre-2000	3401	0.213	0.409	0	1
Purchase year 2000-04	3401	0.262	0.440	0	1
Purchase year 2005-06	3401	0.439	0.496	0	1
Purchase year post-2006	3401	0.086	0.281	0	1
Refinanced	3401	0.496	0.500	0	1
1-family home	3401	0.228	0.419	0	1
2-family home	3401	0.241	0.428	0	1
3-family home	3401	0.202	0.401	0	1
Condo	3401	0.330	0.470	0	1
Third-party	3401	0.120	0.325	0	1
Price	407	213,586	174,685	11,000	2,615,000

Table 3: Summary Statistics

Our primary focus is on the impact of organizational form on the processing timeline, so it is important to note that the processing timeline itself changes significantly from 2006 through 2010. The overall time from the foreclosure complaint to the completion of the auction dramatically increases during this period (from 200 to 300 days), but 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. By industry standards, the typical postponement is for about a month, but there is wide variation, with some postponements lasting only a few hours and others several months.<sup>26</sup>

As a first pass to test our hypotheses, we regress the duration of particular stages in

<sup>26</sup>For example, during some periods of our sample, if the borrower declared bankruptcy certain servicers would automatically postpone three months. More recently, they simply cancel the auction and start proceedings again after the bankruptcy is settled.



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 first estimate

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

using ordinary least squares (OLS), where  $Duration_i$  is the number of days a particular stage in the foreclosure process takes, and  $\mathbf{F}'_i$  is a set of dichotomous variables for the firm type that processes foreclosure  $i$ .<sup>27</sup> In our main specifications, we restrict our sample to firms that process a large volume (market share greater than 4 percent), in which case  $\mathbf{F}'_i$  is simply a single dichotomous variable indicating integration status, but in Section 6 we also investigate the timelines of small and medium firms.  $\mathbf{T}'_i$  includes dichotomous variables for the time period in which the foreclosure auction occurs.  $\mathbf{X}'_i$  includes borrower characteristics such as whether the borrower has ever taken out a subprime loan, the property’s zip code, the year the borrower purchased the property, and the type of property (single-family home, two-family, three-family, or condominium).<sup>28</sup> We control for borrower characteristics, since the borrower may cause significant delays in the process by trying to negotiate loan terms with the lender or by initiating bankruptcy proceedings. However, we find that our results are not sensitive to controlling for borrower characteristics, and we report results from these more parsimonious specifications. Even though substantial variation exists in the processing times and average postponement times of the law firm–auction company pairs in our dataset, it seems plausible that the variation might be driven by something unique about the workings of a particular law firm–auction company pair during a particular time period. If this is the case, we are, in a sense, overstating our sample size. To confront this possibility, we cluster our standard errors on the law firm–auction company–quarter combination.

<sup>27</sup>We do not use a hazard model since there is no right-censoring of foreclosures in our dataset.

<sup>28</sup>We use the U.S. Department of Housing and Urban Development’s list of subprime mortgage lenders to identify subprime loans, following Gerardi et al. (2007).

Endogeneity is the primary concern when attempting to measure the impact of integration on performance. For example, firms may start offering their own auction services or may “track” cases to in-house auctioneers rather than independent auction company partners if processing time is correlated with integration status. Specifically, if the firm believes that a particular measure of performance (for example, the number of days it takes to process a foreclosure) is important, then the firm may decide whether to integrate based, in part, on that measure. Thus, using the measure of performance as the dependent variable and organizational form as an independent variable may result in reverse causality and inconsistent estimates. On the other hand, if the firm does not view the measure to be important when deciding whether or not to integrate, one has to question whether it is a meaningful measure of performance.<sup>29</sup>

We utilize the foreclosure timeline precisely because it is one of the few observable outcomes that is meaningful to firms. Though the process is often opaque for mortgage holders and servicers, making monitoring difficult, they ensure that the process is moving in a timely fashion to the best of their ability. For example, any postponement by the attorney to the originally scheduled auction date and time must be cleared with the servicer.<sup>30</sup> To begin to account for the threat of endogeneity, we limit the time period of study to a period during which no auction company begins hiring in-house auctioneers, 2006 through 2010. By doing so, we view the decision of whether or not to hire in-house auctioneers as pre-determined. For firms that utilize 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 utilize both types of auctioneers.

Another potential concern then emerges if the firms that utilize both types of auctioneers consciously track “faster” cases through their in-house auctioneers, in order, 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 some mortgage holders and servicers refuse to allow in-house

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<sup>29</sup>See Masten (1993) for a thorough discussion of the pitfalls of estimating the impact of integration on performance.

<sup>30</sup>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.

auctioneers to conduct auctions. The most prominent example of a mortgage holder with this policy is Freddie Mac (the Federal Home Loan Mortgage Company, also referred to as FHLMC). By examining a subsample of our data for which we can observe the mortgage holder, we learn that most of the mortgages in cases where an integrated firm hires out to an independent auction company are in fact owned by Freddie Mac. In other words, there is little evidence that law firms “track” cases purposefully to integrated or non-integrated auctioneers based on unobservable characteristics of the mortgages or borrowers. 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 take advantage of Freddie Mac’s refusal to utilize in-house auctioneers by instrumenting for the integration decision with a dichotomous variable (FHLMC) that equals one if the mortgage holder is Freddie Mac, and the foreclosure results in a bank buyback.<sup>31</sup> Since Freddie Mac does not allow law firms that process loans it owns to utilize in-house auctioneers, this variable is highly correlated with the integration decision. Further, at face value, the processing time of Freddie loans should not systematically differ from other loans in our sample, so this dichotomous variable should not be correlated with our duration measures except through the integration status of the firm. And in fact, when we compare Freddie loans processed by unintegrated firms with other loans processed by unintegrated firms, we find no statistically significant (or economically meaningful) difference in the duration from complaint to initial auction.<sup>32</sup> We re-estimate the model using two-stage least squares (and refer to these results below as the IV estimates), with the first stage reported in the Appendix.

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<sup>31</sup>We do not observe whether the mortgage is backed by FHLMC if the property is bought by a third party at auction. Third-party sales make up 12 percent of the observations in our sample.

<sup>32</sup>FHLMC-backed loans have a mean duration of 193.7 days, with a 95 percent confidence interval of [184.1, 203.2]. Other cases processed by non-integrated firms have a mean duration of 190.4 days with a 95 percent confidence interval of [174.5, 206.3].

A related threat to validity arises if unobservable firm-level heterogeneity is correlated with the integration decision. We then may misattribute 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.<sup>33</sup> To combat this threat we re-estimate our models for the subsample of cases processed by the industry leader, which uses both in-house and external auctioneers, in order to eliminate the possibility that unobserved firm heterogeneity correlated with integration status is confounding our results.

## 5 Results

As displayed in Table 4, our OLS estimates indicate that integrated firms take, on average, about 24 days longer to schedule the initial auction than non-integrated law firm–auction company pairs. This amounts to about  $\frac{1}{8}$  of the mean processing time (from complaint to auction). 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 that aligns with of 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, and since the transaction is within the firm, may face agency problems. This is not to say that this organizational form is not preferable, as by optimizing, say, its travel schedule, the auction may be able to be performed at lower cost.

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 auction company has an incentive to agree to the law firm’s schedule in order to secure the contract.

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<sup>33</sup>See Akerberg 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.

Dependent variable:	Duration from complaint to first scheduled auction		Average postponement duration	
	(1)	(2)	(3)	(4)
Integrated	24.822*** (6.844)	23.957*** (6.965)	-1.356 (1.581)	-1.909 (1.685)
2007 Auction	1.832 (12.066)	10.120 (11.287)	-4.926 (3.681)	-6.264* (3.615)
2008 Auction	67.867*** (12.792)	81.578*** (12.382)	1.267 (3.863)	0.328 (3.838)
2009 Auction	116.347*** (12.792)	133.917*** (12.130)	-0.604 (3.829)	-0.086 (3.925)
2010 Auction	111.906*** (13.876)	132.545*** (14.728)	0.608 (3.615)	0.749 (3.671)
Subprime	-	17.042*** (5.603)	-	1.432 (1.518)
Single family home	-	35.324*** (7.382)	-	1.504 (1.440)
2 family home	-	30.551*** (6.536)	-	3.217** (1.585)
3 family home	-	32.439*** (7.771)	-	6.227*** (1.881)
Refinanced	-	-11.383* (6.220)	-	-2.122 (1.660)
Purchased 2000-04	-	5.914 (7.967)	-	-0.500 (1.661)
Purchased 2005-06	-	-14.612 (9.719)	-	0.302 (1.614)
Purchased post-2006	-	-22.625* (12.094)	-	-3.370 (2.766)
Constant	121.058*** (11.215)	182.535*** (17.052)	34.214*** (3.590)	38.780*** (4.926)
Zipcode	Not Included	Included	Not Included	Included
Observations	3401	3401	899	899
R-squared	0.110	0.144	0.016	0.055

Table 4: OLS regressions with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

On the other hand, the average amount of time the auction is postponed is not significantly different by organizational form, though the point estimate is slightly shorter (by about 1.5 days, or about  $\frac{1}{20}$  of the mean postponement duration) if an integrated firm is processing the foreclosure. At the time of a postponement, in the unintegrated case, the auction company has already contracted to conduct the auction and no longer has 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 in the OLS estimates.

The borrower and property control variables included in the models behave as expected. As discussed above, the overall duration of the process grows dramatically as the foreclosure crisis progresses and servicers adjust to larger volumes of foreclosures and legal challenges to industry documentation practices. As a robustness check in Section 6, we include alternative time cohorts and show that our results are unaffected. Borrowers who take out a subprime loan experience longer foreclosure timelines, which may indicate that those borrowers are more likely to file for bankruptcy, causing a lengthy delay in the process.<sup>34</sup> The negative (and increasingly large) purchase cohort coefficients are consistent with borrowers who purchased earlier having greater equity in their homes and fighting the process more than those who purchased more recently and have built less equity.

To examine whether our OLS estimates are consistent, we show the results from the second stage of our two-stage least squares estimation in Table 5 (time from complaint to first scheduled auction) and Table A-2 in the Appendix (average postponement duration).<sup>35</sup> The first two columns of each table report the results for the entire sample of foreclosures processed by large law firms. The IV point estimate for the delay in initial scheduling by integrated firms increases to over 45 days in our model that controls for borrower and

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<sup>34</sup>The finding that subprime borrowers experience longer foreclosure durations is consistent with Capozza and Thomson (2006), who find that the time period from delinquency to foreclosure auction is four times longer than for prime borrowers. This relationship could also be driven by the servicers involved if subprime mortgage servicers are slower in processing foreclosures. We examine servicers and bankruptcy in Section 6 using a specially-matched sample of our data.

<sup>35</sup>The first stage is reported in Table A-1 in the Appendix. The F statistics in the first stage regressions indicate that we do not suffer from a weak instrument.

Dependent variable:	Duration from complaint to first scheduled auction			
	Full Sample		Industry Leader Only	
	(1)	(2)	(3)	(4)
Integrated	64.006*** (14.902)	45.683*** (13.790)	51.046*** (11.031)	37.359*** (10.935)
2007 Auction	1.004 (14.228)	9.557 (12.253)	17.626* (10.095)	24.966** (10.265)
2008 Auction	69.159*** (15.088)	82.016*** (13.364)	86.322*** (9.967)	101.666*** (10.373)
2009 Auction	119.546*** (14.989)	135.534*** (13.171)	126.708*** (12.642)	146.997*** (13.626)
2010 Auction	117.992*** (16.174)	135.739*** (15.616)	132.761*** (13.021)	155.943*** (14.140)
Subprime	-	17.393*** (5.470)	-	20.188*** (7.253)
Single family home	-	34.779*** (7.307)	-	23.775*** (8.842)
2 family home	-	29.628*** (6.472)	-	28.916*** (9.047)
3 family home	-	31.830*** (7.701)	-	29.998*** (9.530)
Refinanced	-	-11.118* (6.114)	-	-6.908 (8.846)
Purchased 2000-04	-	6.276 (7.903)	-	20.270* (10.392)
Purchased 2005-06	-	-13.828 (9.612)	-	1.399 (10.788)
Purchased post-2006	-	-20.715* (11.700)	-	-13.713 (14.713)
Constant	91.272*** (16.636)	160.588*** (20.038)	72.803*** (13.625)	-16.125 (29.712)
Zipcode	Not Included	Included	Not Included	Included
Observations	3401	3401	1745	1745
R-squared	0.095	0.139	0.113	0.161

Table 5: IV regressions with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. (3) and (4) are estimated using foreclosures processed by industry leader, with heteroskedasticity-consistent standard errors reported. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

property characteristics (Table 5, Model 2). If anything, these results suggest that the OLS estimates with regards to the impact of integration on the duration from complaint to auction were biased towards zero. However, it should be noted that despite these differences, none of the estimates of our parameter of interest are statistically different from each other at the 5 percent significance level. As shown in Table A-2, the IV estimates do not show evidence of integrated firms being able to reschedule postponed auctions more quickly, confirming the OLS estimates and contradicting Hypothesis 2, that firms utilize in-house auctioneers to avoid a rescheduling hold-up problem.

Columns 3 and 4 in Tables 5 and A-2 report the IV results for those foreclosures in our sample processed by the industry leader, which handles about 40 percent of the foreclosure cases in Suffolk County each year. In addition to making up a large share of foreclosures, this firm is unique in processing a large number of foreclosures using both in-house auctioneers and an independent auction company, allowing us to examine within-firm variation in outcomes by integration status. This analysis on a single firm avoids the possibility that unobserved firm-level heterogeneity correlated with integration status is actually driving our results.<sup>36</sup> The estimates for this industry leader-only regression are not significantly different from our main sample, though slightly closer to zero.<sup>37</sup>

The magnitude of the delay in original processing time, spread over the volume of foreclosures conducted, amounts to considerable cost, as the mortgage holder is unable to recoup lost mortgage payments from the borrower or sell the property until the foreclosure is complete. Further, while a delay, using our lower bound from 95 percent confidence intervals of the IV estimates, of three to four weeks (roughly  $\frac{1}{8}$  of the mean foreclosure time) may at first appear economically insignificant, 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 (Lambie-Hanson, 2013).

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<sup>36</sup>OLS results regarding the industry leader are consistent with IV estimates reported in Tables 5 and A-2 and are available upon request.

<sup>37</sup>It is also worth noting, given the large volume the industry leader processes, that our results do not substantially change when we omit this industry leader from our sample. In other words, our results are not driven by the industry leader.



## 6 Robustness Checks and Model Extensions

In this section we first examine the possibility that servicer tracking of foreclosures is driving our results. We then examine the robustness of our results to alternatively-specified time cohorts and sample selection.

Note that cases are not randomly assigned to law firms, and differences in borrower, loan, and servicer traits could explain away our results if more difficult or time-consuming cases happen to be assigned to law firms that have in-house auctioneers. While we control for some observable borrower and loan characteristics (discussed in Section 4), unobserved characteristics (particularly the identity of the servicer) could still be driving our results. In discussions with industry professionals, particularly with the attorneys, it was clear that, as the client, the servicer has a strong influence over how the foreclosure is carried out. While the process is fairly standardized across servicers, some servicers may potentially be more likely to postpone auctions if they are more amenable to negotiating with borrowers who are seeking mortgage modifications or short sales, even in this late stage of default. While our discussions with industry professionals have indicated that the outcomes we consider, the initial scheduling time and the scheduling time after a postponement, should not be driven by the servicer, it is certainly plausible that heterogeneity among servicers could exist and could bias our results.

Controlling for the servicer of the loan would help confirm that no difference between these loans exist. Unfortunately, we do not observe the servicer in our main two datasets (from the registry of deeds and the Warren Group). Servicer information is available using a proprietary dataset on mortgage performance from CoreLogic. The CoreLogic LoanPerformance data include mortgage characteristics and foreclosure status for nearly the full population of subprime, alt-a, and jumbo mortgages nationwide. By matching the CoreLogic data with our dataset, we are able to observe the identity of the mortgage servicer during the foreclosure process, as well as other meaningful loan-level characteristics, such as whether the borrower had filed for bankruptcy.<sup>38</sup> The match successfully provides this rich

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<sup>38</sup>The match between the CoreLogic and Warren data sets was initially created by Kristopher Gerardi of the Federal Reserve Bank of Atlanta. It is based on the mortgage origination date and mortgage amount, originating lender, and zip code of the

mortgage-level information for 818 loans in our dataset.

Using this matched dataset, we reestimate our main OLS specifications for the initial scheduling duration with borrower characteristics, a specification in which we include servicer fixed effects, and a specification in which we include servicer fixed effects and control for whether the borrower filed for bankruptcy (see Table 6). First note that when we estimate our main specification on the subset of data, our findings are not significant, and the point estimate of the impact of integration is much closer to zero than in the full data set. But after including the servicer and borrower bankruptcy controls, the estimates move much closer to our original findings, though we still lack sufficient power for statistical significance. We interpret these results to suggest that including the servicer fixed effects in our full sample would further clarify and distinguish the impact of different organizational forms rather than mute it, but, of course, more complete data are required to thoroughly test this conjecture.

In our main specifications we control for the year the auction occurs. However, by examining Figure A-1 in the Appendix, we can see that the overall duration (which is composed primarily of delay between the complaint and the originally scheduled auction), grows rapidly within some years. For example, the average duration of approximately 150 days in January 2008 grows by about 100 days by the end of the year. We examine the sensitivity of our results to our specification of time, using more granular quarterly and monthly cohorts. We find that the estimates from these alternative specifications are consistent with our main findings. See Table A-3 in the Appendix for details.

The seven law firms that we include in our sample process over 88 percent of the foreclosures in Suffolk County, and we focus on them to try to capture those firms that specialize in foreclosure processing and are sufficiently large to make integration possible. The other firms that processed foreclosures in our dataset can roughly be categorized as one of two types. One type has a market share between 1 and 2.5 percent, or in other words, processed about 40 to 90 foreclosures in our data set. The other type of law firm processes only a few (most commonly exactly one) foreclosures in our dataset. These foreclosures are often atypical and are usually of mortgages not originated by large lenders, but rather granted by

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property securing the mortgage.

Dependent variable: Duration from complaint to first scheduled auction				
	Full Sample	CoreLogic Matched Sample		
	(1)	(2)	(3)	(4)
Integrated	23.957*** (5.023)	10.003 (12.136)	18.141 (15.834)	15.481 (15.688)
2007 Auction	10.120 (7.652)	13.402 (14.428)	15.885 (15.259)	6.241 (14.321)
2008 Auction	81.578*** (7.871)	87.344*** (15.934)	91.912*** (17.256)	83.119*** (16.360)
2009 Auction	133.917*** (9.746)	167.645*** (24.398)	169.704*** (26.157)	166.047*** (25.707)
2010 Auction	132.545*** (10.132)	152.199*** (25.242)	157.354*** (25.372)	149.253*** (24.892)
Subprime	17.042*** (5.176)	-	-	-
Single family home	35.324*** (6.698)	24.259 (15.042)	24.447 (15.190)	18.035 (14.889)
2 family home	30.551*** (6.583)	18.297 (12.283)	22.843* (12.981)	19.839 (12.565)
3 family home	32.439*** (6.835)	45.783*** (14.766)	49.060*** (15.199)	45.036*** (15.227)
Refinanced	-11.383* (6.282)	-8.737 (17.623)	-11.211 (17.316)	-12.412 (17.288)
Purchased 2000-04	5.914 (7.656)	-7.344 (20.355)	-9.772 (21.394)	-6.910 (20.913)
Purchased 2005-06	-14.612* (7.881)	-17.621 (21.517)	-19.329 (22.093)	-13.704 (21.938)
Purchased post-2006	-22.625** (11.080)	-36.339 (28.083)	-41.823 (28.305)	-33.606 (28.391)
Filed bankruptcy	-	-	-	77.083*** (13.355)
Constant	182.535*** (11.535)	196.215*** (27.831)	215.481*** (61.504)	214.373*** (62.213)
Zipcode	Included	Included	Included	Included
Servicer	Not Included	Not Included	Included	Included
Observations	3401	818	818	818
R-Squared	0.144	0.192	0.211	0.249

Table 6: OLS regressions with White's heteroskedasticity-consistent standard errors displayed in parentheses. (2) - (4) use the matched CoreLogic sample to measure the impact of servicer identification. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

an individual or small investment trust.

We broaden the sample of law firms in our dataset to ensure our results are robust to sample selection. We include the two firms with the next largest market shares and examine the results of two-stage least squares estimation (see Column 2, Table A-4 in the Appendix).<sup>39</sup> The estimated impact of the law firm using an in-house auctioneer is consistent with our main results, with a point estimate of approximately seven additional weeks from the filing of the complaint to the first scheduled auction.

Last, we briefly investigate the scheduling duration for small and medium firms as well. In general, the overall processing time is shortest for the seven large firms, longer for the group of firms with medium market share, and longest for the group with the smallest market share. The average duration from the complaint to the original auction date is about 200 days for the seven large firms, 225 days for the medium firms, and 250 days for the smallest firms. By estimating our model with the broader dataset and additional controls for small and medium firms, we see that this relationship between firm size and processing time is robust, as is our main finding on the relationship between integration and foreclosure duration (see Column 1, Table A-4 in the Appendix).<sup>40</sup>

## 7 Conclusion

We use a unique dataset 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. We hypothesize that in the initial scheduling process, independent auction companies have a market incentive to agree to the time frame

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<sup>39</sup>The two firms in this group that processed the highest volume of foreclosures, processed very few after 2008, which was an additional reason we only considered firms with above 4 percent of the market. Other than those two firms, the firm with the next largest market share has only about 1.25 percent of the market.

<sup>40</sup>The average postponement duration does not vary significantly between small, medium and large firms. Results available from the authors upon request.

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. While firms may still be optimizing when deciding to use an in-house auctioneer or to enter into a long-term arrangement, at least in terms of processing speed, there are costs to integrating.

## A Additional Tables and Figures

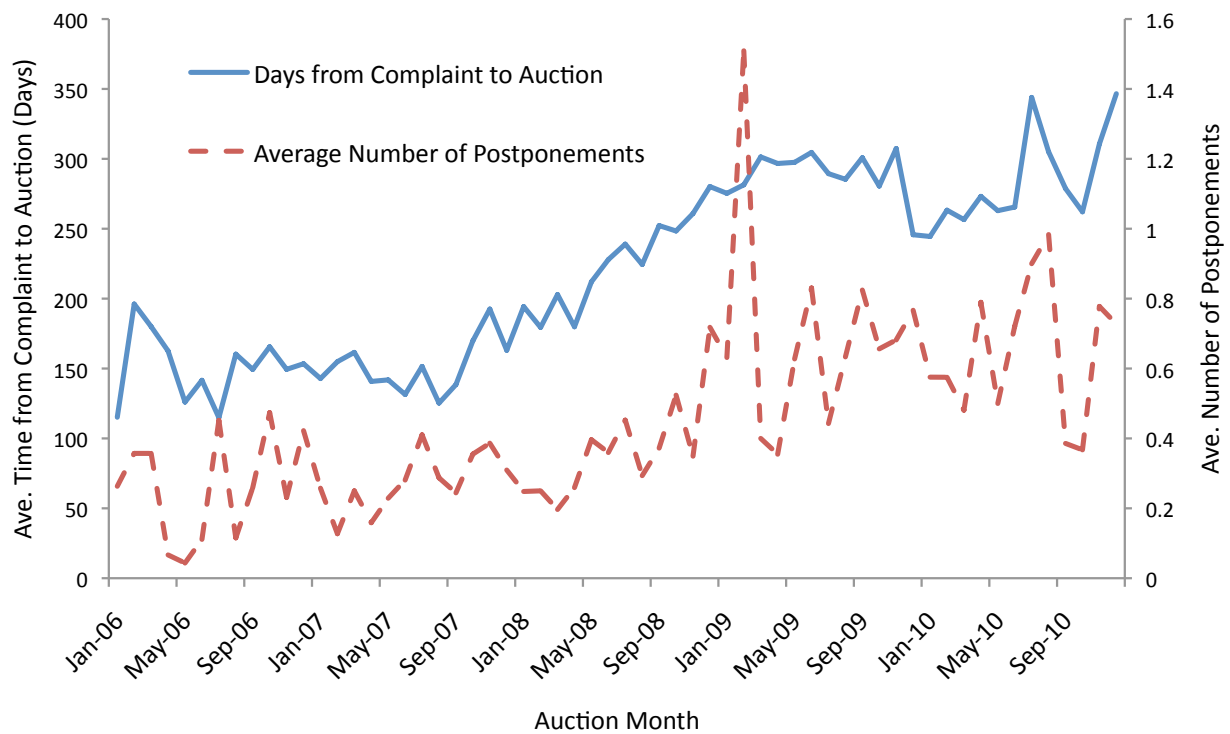


Figure A-1: Processing Time from Foreclosure Complaint to Completed Auction and Number of Postponements

Dependent variable:	Law firm and auction company are integrated			
	Full Sample		Industry Leader Only	
	(1)	(2)	(3)	(4)
FHLMC	-0.704*** (0.016)	-0.722*** (0.018)	-0.922*** (0.016)	-0.916*** (0.017)
2007 Auction	0.031 (0.033)	0.032 (0.033)	-0.018 (0.018)	-0.012 (0.018)
2008 Auction	-0.004 (0.033)	-0.002 (0.033)	-0.000 (0.017)	0.008 (0.016)
2009 Auction	-0.026 (0.037)	-0.037 (0.037)	-0.027 (0.021)	-0.013 (0.022)
2010 Auction	-0.073** (0.035)	-0.085** (0.036)	-0.018 (0.019)	0.001 (0.018)
Subprime	-	-0.062*** (0.016)	-	0.036*** (0.011)
Single family home	-	0.013 (0.022)	-	0.038** (0.015)
2 family home	-	0.013 (0.021)	-	0.025 (0.016)
3 family home	-	-0.003 (0.022)	-	0.023 (0.016)
Refinanced	-	0.012 (0.020)	-	-0.024 (0.015)
Purchased 2000-04	-	-0.021 (0.022)	-	0.001 (0.015)
Purchased 2005-06	-	-0.019 (0.024)	-	0.008 (0.017)
Purchased post-2006	-	-0.065* (0.037)	-	0.012 (0.024)
Constant	0.763*** (0.029)	0.987*** (0.040)	0.967*** (0.015)	0.947*** (0.036)
Zipcode	Not Included	Included	Not Included	Included
Observations	3401	3401	1745	1745
R-squared	0.1457	0.158	0.597	0.613
F-statistic	580.67	201.47	686.92	301.99

Table A-1: (1) and (2) are first stage IV regressions with standard errors clustered on the law firm–auction company–quarter displayed in parentheses. (3) and (4) are first stage IV regressions estimated using foreclosures processed by the industry leader with White’s standard errors reported in parentheses. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

Dependent variable:	Average postponement duration			
	Full Sample		Industry Leader Only	
	(1)	(2)	(3)	(4)
Integrated	-0.029 (3.162)	-2.179 (3.550)	-0.197 (1.942)	0.227 (2.267)
2007 Auction	-4.976 (3.705)	-6.249* (3.515)	-4.759 (4.110)	-6.284 (3.927)
2008 Auction	1.195 (3.895)	0.356 (3.739)	2.001 (4.154)	0.190 (3.953)
2009 Auction	-0.464 (3.854)	-0.099 (3.739)	0.348 (4.154)	-1.285 (3.953)
2010 Auction	0.808 (3.690)	0.725 (3.593)	2.042 (4.121)	0.842 (3.903)
Subprime	-	1.435 (1.473)	-	-1.328 (1.417)
Single family home	-	1.528 (1.419)	-	0.596 (1.864)
2 family home	-	3.248** (1.516)	-	4.366*** (1.680)
3 family home	-	6.257*** (1.818)	-	3.410 (2.080)
Refinanced	-	-2.141 (1.663)	-	0.492 (1.615)
Purchased 2000-04	-	-0.496 (1.609)	-	-1.119 (1.801)
Purchased 2005-06	-	0.284 (1.602)	-	1.764 (1.922)
Purchased post-2006	-	-3.409 (2.777)	-	-1.195 (2.704)
Constant	33.270*** (4.108)	39.863*** (6.455)	30.545*** (4.336)	20.894*** (4.231)
Zipcode	Not Included	Included	Not Included	Included
Observations	899	899	519	519
R-squared	0.015	0.055	0.031	0.113

Table A-2: (1) and (2) are IV estimates with standard errors clustered on the law firm–auction company–quarter displayed in parentheses. (3) and (4) are IV estimates for foreclosures processed by industry leader with White’s standard errors reported in parentheses. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

Dependent variable:	Duration from complaint to first scheduled auction	
	(1)	(2)
Integrated	51.952*** (9.710)	53.482*** (10.465)
Subprime	18.100*** (5.612)	17.804*** (5.706)
Single family home	35.505*** (6.816)	35.511*** (6.872)
2 family home	28.984*** (6.373)	28.832*** (6.435)
3 family home	31.838*** (7.685)	31.283*** (7.700)
Refinanced	-11.365* (6.239)	-12.129* (6.338)
Purchased 2000-04	5.718 (7.941)	7.582 (8.146)
Purchased 2005-06	-15.198 (9.635)	-14.127 (9.626)
Purchased post-2006	-19.162 (11.732)	-18.914 (11.815)
Constant	176.336*** (25.240)	133.251*** (28.259)
Zipcode	Not Included	Included
Observations	3401	3401
R-squared	0.152	0.163

Table A-3: Alternative time cohort IV estimates with standard errors clustered on law firm–auction company–quarter displayed in parentheses. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.



Dependent variable:	Duration from complaint to first scheduled auction	
	(1)	(2)
Integrated	50.340*** (14.026)	48.694*** (14.392)
Medium law firm	67.670*** (15.146)	-
Small law firm	82.837*** (18.183)	-
2007 Auction	10.577 (11.196)	7.996 (12.366)
2008 Auction	85.237*** (12.034)	79.499*** (13.488)
2009 Auction	144.235*** (12.189)	133.434*** (13.397)
2010 Auction	141.779*** (14.288)	133.156*** (15.549)
Subprime	15.118** (5.254)	16.253** (5.362)
Single family home	34.345*** (7.063)	29.755*** (7.104)
2 family home	29.690*** (6.134)	28.406*** (6.392)
3 family home	33.548*** (7.359)	29.905*** (7.530)
Refinanced	-9.054 (5.935)	-10.735* (5.898)
Purchased 2000-04	5.690 (7.582)	5.125 (7.748)
Purchased 2005-06	-15.141* (9.089)	-15.133 (9.304)
Purchased post-2006	-24.538** (11.352)	-23.762** (11.651)
Constant	156.224*** (19.176)	160.443*** (20.300)
Zipcode	Included	Included
Observations	3841	3581
R-Squared	0.151	0.135

Table A-4: IV estimates to test for robustness in sample selection with standard errors clustered on law firm–auction company–quarter cohorts displayed in parentheses. In (1), we include all foreclosures in our matched data set, controlling for whether a large, medium, or small firm processed the foreclosure. In (2), we include all transactions conducted by the nine largest firms. Omitted property type is condominium and auction year is 2006. \*\*\*, \*\*, and \* indicate significance at the 1 percent, 5 percent, and 10 percent levels respectively.

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