

Without Reserve: Home Foreclosure Discounts^{*}

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Abstract

In this paper I provide estimates of home foreclosure discounts for Cape Town, South Africa, a unique setting where until 2019, foreclosure auctions lacked reserve prices. Leveraging novel and comprehensive data on property transactions and foreclosure notices, I estimate sizable foreclosure discounts when properties are sold at auction of 17.3% using a hedonic model and 43.9% under a repeat-sales framework. These estimates are robust to controlling for transaction costs incurred at auctions, such as commission fees, property tax arrears and eviction costs, which when unaccounted for lead to a significant overestimate of foreclosure discounts. I show that the buyers of foreclosed property are more likely to be companies, who buy and flip multiple properties. Studying the returns these buyers make when selling in a hedonic model with year-suburb and buyer fixed effects, I find that sellers of foreclosed property bought at an auction make a 25.6 percentage points higher return than when the same seller sells a non-foreclosed property in the same suburb in the same year. These large discounts and returns may be especially punitive to foreclosed homeowners in settings like South Africa where mortgages represent recourse loans and are typically highly levered, given auction prices may not be sufficient to cover the outstanding mortgage principal, leaving a foreclosed homeowner without a home and still liable for a mortgage on a home they no longer own. This has important implications for the design of consumer protection legislation as it emphasizes the role of legislative safeguards, such as reserve prices, in providing protection to financially distressed consumers. *JEL Codes: R30, G21, G51, K35*

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1 Introduction

The widespread prevalence of home foreclosures was a defining characteristic of the Global Financial Crisis. In the United States, where at the peak of the crisis the mortgage default rate rose to above 10%, the wave of foreclosures had major macroeconomic effects.¹ A key mechanism behind this is the fact that foreclosures typically sell at a ‘foreclosure discount’ — a lower price relative to an otherwise identical non-foreclosed property (Campbell et al. 2011, Harding et al. 2012, Zhou et al. 2015).² A key question then relates to what drives this foreclosure discount. In the United States, where most of the literature has focused, the financial institutions who hold the mortgage of the foreclosed property are typically tasked with selling the property, given foreclosed properties often go unsold at foreclosure auctions, the standard mechanism for selling foreclosed homes. This results in the lender taking ownership of the property and being tasked with selling it, also known as a Real Estate Owned (REO) sale. Given this, the literature has often interpreted the existence of foreclosure discounts as evidence of a firesale (Shleifer & Vishny 1992, 2011) given the lenders that sell these property “have an incentive to sell them quickly” (Campbell et al. 2011).

Outside of the United States, however, there are many settings where foreclosure auctions are more successful and where REO sales are less common.³ In these settings, the auction mechanism itself can contribute to the foreclosure discount observed because properties sold at auction typically sell for lower prices given auctions result in a poorer match between buyers and sellers compared to the non-auction market (Mayer 1995), a result consistent with housing search theory (Wheaton 1990, Han & Strange 2015, Piazzesi et al. 2020). Given this tendency for auctions to depress prices, many countries include legislative safeguards to ensure auction prices remain competitive, thereby limiting the extent of foreclosure discounts. The most common safeguard used is reserve prices, which are typically set at the value of the outstanding mortgage, any liens, unpaid taxes and any auction related costs. There may even be additional safeguards. For example, in Sweden, an auctioneer cannot accept an offer if they believe a considerably higher price can be achieved at a later date (Donner 2017). Given the widespread prominence of reserve prices in home foreclosure auctions, we still do not have any evidence of the extent of foreclosure discounts in settings without reserve prices. This is important given that these discounts may be significantly larger in these settings, which could amplify the neg-

¹Mian et al. (2015) show that foreclosures can account for 33% of the decline in house prices, 20% of the decline in residential investment and 20% of the decline in vehicle sales between 2007 and 2009.

²When they occur in large enough numbers, foreclosure also create negative price externalities, driving down prices of neighboring non-foreclosed properties (Gupta 2019, Anenberg & Kung 2014, Guren & McQuade 2020).

³Notable examples being Sweden (Donner 2017), China (Qu & Huang 2024, Qian 2024), Italy (Amoruso et al. 2020), Germany (Just et al. 2020), and Korea (Park & Bang 2014).

ative effects of foreclosures on homeowners, the housing market, and the economy (Guren & McQuade 2020, Gupta 2019, Anenberg & Kung 2014, Mian et al. 2015).

In this paper, I provide novel estimates of foreclosure discounts for Cape Town, South Africa, a setting where until 2019, there were no reserve prices in home foreclosure auctions.⁴ In this setting, the extent of foreclosure discounts are unbounded and there has been considerable anecdotal evidence of large foreclosure discounts, resulting in a R60 billion, or about \$4.2 billion USD in 2018, class action lawsuit against the major financial institutions in South Africa for selling homes at a fraction of their market value.⁵

Leveraging the unique institutional features of the South African setting — where auctions are scheduled but sales may take place (i) before the auction if the homeowner finds a buyer and (ii) after the auction date in if the homeowner can make a substantial payment to clear the mortgage arrears and have the bank suspend the auction — and the rich and novel data I collect — which includes the universe of property transactions for Cape Town, a major city in South Africa, complete with information on property characteristics combined with data on which properties get auction and when — I am able to provide a complete characterization of foreclosure discounts for properties that sell at an auction as well as properties flagged for auction but that sell outside the auction.

In a standard hedonic specification with extensive property-level controls in addition to month and suburb-year fixed effects, I find evidence of sizable foreclosure discounts: properties put up for foreclosure sell for 27.8% lower prices than otherwise identical non-foreclosed properties. Despite robust hedonic controls and fixed effects, foreclosed properties may differ from non-foreclosed property in fundamental, and difficult to observe ways, resulting in omitted variable bias and an upward bias in these estimates (Clauret & Daneshvary 2009). To reduce these concerns, I re-estimate the hedonic specification including a property fixed effect to follow a repeat-sales approach. This approach allows me to compare the difference in transaction prices attained when the *same* property is sold in a foreclosure sale relative to when it is sold in a conventional sale. The discount remains robust: properties put up for foreclosure sell for 68.9% lower prices than when the *same* property is sold in a non-foreclosed sale. Importantly, this result is robust to the inclusion of a year fixed effect, which effectively compares foreclosed and non-foreclosed sales of *same* property in the *same* year.

⁴Until 2019, there was no legal requirement for home foreclosure auctions to include a reserve price in South Africa, and as a result, the norm in these auctions is for the auction to commence without a reserve price. In September 2018, reserve prices were mandated in foreclosure auctions in Cape Town. Given the data I use in this paper ends in 2018, this amendment will not affect the findings in the paper

⁵See for example: “SA banks sued for R60bn in home repossession case” - *Fin24*, 16 August 2017 and “Banks face lawsuit over unjust sale of homes” - *IOL*, 25 January 2021

Next, I study the impact of the sale mechanism by separating foreclosed transactions into those that sell before, at, or after the auction. I find that price discounts are largest when properties sell at auction — the foreclosure discount increases to 55.3% when properties are sold to private buyers and 74.3% when the property is bought by the bank holding the mortgage (in an REO purchase). While the foreclosure auction discount increases to 68.9% for private buyers in the repeat sales framework, the discount when a property is sold by the bank drops to 49.9%. A significantly lower discount on bank bought auction properties when using a property fixed effect is consistent with the notion that when banks resell these properties as REO sales they are likely to accept a much lower offer than a private buyer given the bank is only interested in recovering the outstanding mortgage principle and any arrears. Turning to foreclosed properties that sell outside the auction, I find that properties flagged for foreclosure that sell *before* the auction, sell for a discount of 8.0%, while properties flagged for foreclosure that sell *after* the auction (in the event of arrears being cleared and the auction being suspended), sell for a discount of 12.3%. This is an important result given it suggests that even if an auction is avoided, homeowners of foreclosed property will still sell at a discount, consistent with what one would expect in a firesale (Shleifer & Vishny 2011), albeit one 4-6 times smaller than the discount that would be attained an auction.

Buyers of foreclosed property at auctions, however also incur significant costs, most notably auction fees, outstanding property taxes and eviction costs, which as highlighted in Clauretje & Daneshvary (2009) must also be accounted for to prevent an upward bias in these estimates. I implement a robustness exercise to account for these factors by adding auction fees as well as plausible estimates for property taxes and eviction costs to the transaction price at the auction and re-estimate my hedonic specification. The auction discounts more than halves, but remains sizable at 17.3% (43.9% in the repeat sales estimation) for private buyers and 30.7% (30.2% in the repeat sales estimation) when bought by the lender, clear evidence that the additional costs associated with foreclosures are sizable. While this certainly places the auction discounts much closer in magnitude to the discounts pre-and-post auction, these discounts remain substantial, suggesting that even after accounting for costs, buyers can simply purchase these properties at a large discount and re-sell them to make significant excess returns - a result consistent with estimating larger price premium using a property fixed effect.

Finally, I focus on the buyers of foreclosed property and find that these buyers are more likely to be companies, who are repeat buyers, and who are more likely to flip these properties. In fact, 27.5% of foreclosed property bought at auction are resold within 6 months, rising to 51.6% after 18 months. I then study the returns made by these buyers when reselling foreclosed property. In my preferred specification, with controls for holding periods and suburb-year and buyer

fixed effects, I find that sellers of foreclosed property bought at an auction make a 25.6 percentage points higher return than when the *same* seller sells a non-foreclosed property in the *same* suburb in the *same* year. Interestingly, this excess return is similar in magnitude to the excess returns made by sellers of foreclosed property bought outside of the auction.

This paper contributes primarily to a voluminous literature estimating foreclosure discounts (Campbell et al. 2011, Chinloy et al. 2017, Zhou et al. 2015, Donner 2017, Clauretje & Daneshvary 2009, Harding et al. 2012). Most of the established literature has focused exclusively on the United States, however as noted earlier, in this setting, most foreclosure auctions are unsuccessful, and as a result foreclosures are typically resold as REO sales by banks.⁶ There is however very limited empirical evidence of foreclosure discounts in settings where auctions represent the main sale mechanism for foreclosures. One notable exception is Donner (2017) who finds evidence of foreclosure discounts in Sweden. My major contribution to this literature is to provide novel estimates of foreclosure discounts in a setting that does not include legislative safeguards such as reserve prices at auctions. This lack of protection leads to estimates of foreclosure discounts larger than those in the papers cited, which highlights the importance of safeguards like reserve prices to limit the extent of foreclosure discounts.

Secondly, this paper also contributes to the literature on firesales — a forced sale of an illiquid asset that occurs at a dislocated price by a seller who cannot pay their creditors without selling assets (Shleifer & Vishny 1992, 2011). In particular, this paper contributes to a small but growing literature exploring the effects of firesales in the housing market due to financial distress, death, or divorce. For example, Campbell et al. (2011) find evidence of price discounts for properties that sell close in time to the death or bankruptcy of a seller while Andersen & Nielsen (2017) find evidence of price discounts in Denmark following the sudden death of a home owner. In this paper, I present evidence that foreclosed homeowners sell their property for a discount in the conventional market before the auction and that these discounts are in fact smaller than the discounts that arise at the foreclosure auction itself. In studying the evolution of discounts at different time horizons after the auction, my work is similar in spirit to Andersen & Nielsen (2017) who estimate death-related home discounts at different time horizons.

Furthermore, to the best of my knowledge, I am the first to explore foreclosure discounts in an developing country setting. A growing literature exists documenting the negative consequences of foreclosure for homeowners, including credit rationing and financial losses (Guren & McQuade 2020), decreases in durable consumption that lasts for several years (Humphries et al. 2019) and financial distress (Diamond et al. 2020). In high inequality settings, like many de-

⁶As such, while many studies in the United States refer to foreclosure discounts, they are typically referring to the discount associated with REO properties being resold by the lender, and not the discount foreclosed properties sell for at a foreclosure auction.

veloping countries, these negative consequences can potentially worsen inequality while also potentially reducing home ownership rates, typically a key policy goal in these settings.

The rest of the paper proceeds as follows. In Section 2, I explain the institutional setting of the home foreclosure market South Africa and introduce the novel data I employ in this paper. In Section 3, I report the foreclosure discounts I estimate and the excess returns made by buyers of foreclosed property. Section 4 discusses the implications of these findings. Section 5 concludes.

2 Institutional setting and data

The home foreclosure process in South Africa is executed with judicial supervision and the local sheriff's office is responsible for auctioning the property. In that sense, the foreclosure process is very similar to the foreclosure process in judicial foreclosure states in the United States.⁷ When homeowners are unable to meet their mortgage obligations (when they are typically more than 90 days in arrears) the lender will initiate a process to repossess the property with the intention of selling the property through a foreclosure auction to cover the outstanding obligations (Davids & Kemp 2017).⁸ Once a foreclosure judgment is passed in court, an auction date is set, with the auction typically taking place at the local sheriff's office.

All foreclosure auctions are advertised every Friday in the Government Gazette and are free to attend. Importantly, until end-2018, there was no legal requirement for home foreclosure auctions to include a reserve price in South Africa, and as a result, the norm in these auctions is for the auction to commence without a reserve price. The lender is allowed to bid and the highest bidder wins. As is standard abroad, the property is sold 'as-is' and the buyer is therefore responsible numerous costs including any outstanding property taxes on the property and any costs involved in the event of an eviction.⁹ The buyer must also pay the auctioneer's commission, which is capped a maximum of R40,000 plus VAT and must also make a deposit of 10% of the purchase price immediately at the auction either in the form of cash or through a bank guaranteed cheque.¹⁰ Once a property has been sold at foreclosure auction, the proceeds from the

⁷In the US, 18 states implement foreclosures with judicial supervision. It is generally acknowledged that the judicial foreclosure process provides for more protection for homeowners - Mian et al. (2015) find that states who implement non-judicial foreclosures were twice as likely to foreclosure during the financial crisis between 2007-2009

⁸In South Africa, mortgages represent a recourse loan which rules out any incentives for strategic default.

⁹Given foreclosed homeowners are under financial distress at the time of the auction, owners of foreclosed properties are typically likely to be in arrears with their property taxes.

¹⁰The auctioneers commission is structured as: 6% on the first R100,000 of the sale, 3.5% on R100,001 to R400,000, and thereafter, 1.5% on the balance of the sale capped at minimum of R3,000 plus Value Added Tax (15%) and

sale are subtracted from the mortgage account. In South Africa, mortgages represent a recourse loan, and as a result the homeowner is liable for any outstanding amount on the mortgage account that remains after the sale of a property. It is important to note that despite an auction date being set, an auction sale is not necessarily guaranteed. The homeowner can sell a property before the auction and in the event a homeowner can settle all or a significant portion of the mortgage arrears, the lender can choose to suspend the foreclosure auction.¹¹ In the event of a foreclosure being suspended, should the homeowner fall into arrears once more, the lender will apply to have a new foreclosure notice issued, with a new auction date.

Given the lack of reserve prices, all auctions are in effect guaranteed to be successful as long as a single buyer bids. In some cases where the bids made by private bidders are too low relative to the outstanding principal and arrears on the mortgage, the bank itself will make a bid and acquire the property to re-sell it. These REO type foreclosures are however small - in the sample period of 2011 to 2018 in this paper, only 3.3% of all auctioned foreclosures are bought by the bank. This low prominence of REO foreclosures represent the major institutional difference between South Africa and the United States, where REO foreclosures are the dominant type of foreclosure — for example, in Massachusetts, Campbell et al. (2011) report that between 1987 and 2009, unsuccessful auctions and REO ownership accounted for 82% of all foreclosure auction outcomes. South Africa is not unique in this regard, with several other settings also featuring a dominance of private/non-REO sales at foreclosure auctions, such as Sweden and Korea. What makes the South African setting unique however, is the lack of legislative protections such as reserve prices for homeowners in these auctions. In Sweden, Donner (2017) explains that auctioneers at foreclosure auctions cannot accept a bid that does not cover the costs of the sale and the cost of all debt that is more senior to the debt being triggered. Moreover, an auctioneer can also not accept a bid if they believe it to be likely that a considerably higher price can be achieved at a later date. In Korea, foreclosed properties are auctioned with a reserve price equal to the appraised value of the property (Park & Bang 2014). If an auction is unsuccessful, another auction is scheduled and the reserve price is reduced to 80% of the appraised value. This process continues, with the reserve price being incrementally lowered, until a property attracts a bid that is above the reserve price.

These legislative protections effectively put a bound on the magnitude of foreclosure discounts. No such protections existed in South Africa until 2019, and as a result, the extent of foreclosure discounts are unbounded. As a result, there has been increasing attention on the evidence of

a maximum of R40,000 plus VAT.

¹¹In such cases, lenders will, however, typically, require a bank guarantee from the homeowner for the purchase price of the property.

the large discounts that homes sell for at foreclosure auctions.¹²

2.1 Data and summary statistics

Despite the increasing attention on the home foreclosure market in South Africa, there is no research documenting the extent of foreclosures or foreclosure discounts. In this paper, I provide novel evidence on the extent of foreclosures in Cape Town, a major City in South Africa using publicly available data on foreclosures in South Africa. Every Friday the South African government releases a special Government Gazette which includes a notice for each home foreclosure auction happening in the upcoming two weeks. The Gazette is released as a pdf document and contains a wealth of information on each foreclosure auction including: the case number; the name of the defendant; the name of the plaintiff; the address of the property to be auctioned; the title deed number associated with the property; the date and time of the auction; any auction conditions; and the address of the auction itself.¹³ The text is largely unstructured, as can be seen in Figure 1. In order to process this information, I parse the pdf documents to text and use a range of text processing techniques to isolate the key information from each advert.

[Insert Figure 1 about here]

I download and process all foreclosure notices issued for Cape Town between 2011 and 2018 and append it to rich property transaction data on the universe of all residential property transactions covering the period January 2011 to December 2018 using the title deed number, which is a common identifier in both datasets. This data includes information on the transaction price and date of sale of every property and rich property characteristic information for each property where I observe the following variables: zoning, plot size, dwelling size, number of bedrooms, number of bathrooms, year of construction, any renovations and the property's valuation (for the purposes of property taxes). Importantly, the data are recorded as of 2015 and are therefore time-invariant.

In the merging process, a match indicates that a property that was issued with a foreclosure notice was sold. In cases where multiple auction notices are issued, I only retain the most recent notice. In this joined foreclosure-transaction dataset, I use the date of sale, as recorded in the property transaction data, and the date of the auction, as reported in the auction notice, to

¹²See for example: "SA banks sued for R60bn in home repossession case" - *Fin24*, 16 August 2017 and "Banks face lawsuit over unjust sale of homes" - *IOL*, 25 January 2021

¹³While some studies such as Campbell et al. (2011) identify foreclosures through transaction data provided by a third party, the approach in this paper using court data, is similar in spirit to Aron & Muellbauer (2011).

determine when a property sells relative to the foreclosure auction and to create four different types of properties:

- *Auction sales* represent cases where the date of sale corresponds to the date of the auction. These transactions that occurred at the auction itself and are subject to the rules of the auction.¹⁴
- *Pre-auction distressed sales* represent transactions that occur before the auction date. These transactions represent cases where the seller was able to negotiate a sale of the property with a private buyer before the date of the auction. While these sales occur in the conventional market, the seller remains a distressed seller.
- *Post-auction distressed sales* represent transactions that occur after an auction date. These transactions represent cases where the seller was able to delay the auction itself through a payment to the bank to clear some of their arrears. While these sales occur in the conventional market, I still classify the seller as distressed.
- *Recoveries* represent cases where a foreclosure notice is issued but a property never sells. In such cases, the homeowner has been able to avoid the foreclosure and retain their home by settling the arrears on the mortgage.

In Table 1 I present summary statistics for foreclosed properties and non-foreclosed properties. These are 2,082 foreclosed properties that sell between 2011 and 2018, amounting to just over 1% of all transactions in Cape Town. On average, foreclosed properties sell for less than half the price of non-foreclosed property and are smaller. In Table 2 I report where and how the 2,082 foreclosed properties are sold. The most common type of sale is to a private buyer at a foreclosure auction, accounting for 34.5% of all foreclosure related sales. This is also the group of properties associated with the lowest average transaction prices. 28% of foreclosures sell before the auction date and these transactions are associated with average transaction prices that are nearly double those attained at auction. 34.2% of properties are sold after the auction and once again prices attained are higher for these transactions compared to prices attained at auction. Interestingly, transaction prices increase the greater the time between the transaction date and the scheduled foreclosure auction date - properties that sell more than a year after the foreclosure auction was due to take place are associated with transaction prices that are roughly twice as large as properties that sell in the month after the scheduled foreclosure auction date. Finally, only 3.3% properties are purchased by the lender at auction, highlighting how uncommon REO purchases and sales are in the South African context.

¹⁴The underlying assumption here being that a property up for foreclosure that sells on the same date as the foreclosure auction is sold at the auction itself and not before the auction, but on the same day.

[Insert Table 1 about here]

[Insert Table 2 about here]

3 Empirical model and results

In this paper I am interested in understanding the extent to which foreclosed property transact at a discount relative to comparable non-foreclosed property. In order to quantify these foreclosure discounts, I implement a standard hedonic regression, in the vein of Campbell et al. (2011) and Andersen & Nielsen (2017), where the dependent variable is the log transaction price, $y_{i,s,t}$ of property i in suburb s that sells in time t :

$$y_{i,s,t} = \alpha + \beta F_{i,t} + \gamma' X_i + \delta_{s,t} + \varepsilon_{i,s,t} \quad (1)$$

where $F_{i,t}$ captures if a transaction was associated with a foreclosure notice. In later specifications, $F_{i,t}$ takes the form of a vector of sale outcomes all related to a foreclosure notice. I also include: X_i , a vector of property level controls, which include property size, type, bedrooms, bathrooms, age, a dummy variable if any renovations have taken place, the properties value as assessed by the local municipality for the purposes of property taxes, and; a suburb-year fixed effect, $\delta_{s,t}$.¹⁵ The use of property's assessed value controls for any unobserved heterogeneity in property value over and above controls for property characteristics and location-time fixed effects, given property tax authorities have more detailed information on each property.

The results from this specification are reported in Table 3. Properties that receive a foreclosure notice sell for a discount of 63.3% compared to other comparable properties that sell without a foreclosure notice being issued. In column (2), I amend the specification to include a suburb fixed effect and find that the foreclosure discount more than halves, evidence that foreclosures are spatially located in areas with lower than average property prices. While the discount decreases slightly once controlling for property characteristics, the estimates are largely unchanged when including the property valuation and a suburb-year fixed effect, suggesting that unobserved heterogeneity in property value does not affect the estimates once location and property characteristics are controlled for. My preferred estimate, in column (5), finds that foreclosed properties that receive a foreclosure notice sell for a discount of 27.8% compared to other comparable properties that sell without a foreclosure notice being issued.

¹⁵In this paper, suburbs refer to *sub-places* as defined in the 2011 South African National Census. There are 921 sub-places in Cape Town.

[Insert Table 3 about here]

Despite these robust hedonic controls and fixed effects, foreclosed properties may differ from non-foreclosed property in fundamental and difficult to observe ways, resulting in omitted variable bias and an upward bias in β . To address this, I re-estimate the hedonic specification including a property fixed effect, which limits my sample of analysis to properties that have transacted multiple times in my sample period. The benefit of this approach is that it allows me to compare the difference in transaction prices attained when the *same* property is sold in a foreclosure sale relative to when it is sold in a conventional sale, removing concerns that unobserved differences in property characteristics drive my results. I report these results in columns (1) and (2) of Table 4. In column (1), I find that properties put up for foreclosure sell for 70.4% lower prices than when the *same* property is sold in a non-foreclosed sale. These discounts are substantially larger than the discounts estimated in the hedonic specification (although the reference property is different), suggesting that foreclosed property sells for a much larger discount relative to its own non-foreclosed transaction value, as opposed to an otherwise observable non-foreclosed property in the same suburb.

Despite this, a property sold while foreclosed may be in a significantly worse condition than the same property when it is resold, especially if the foreclosed homeowners neglected the property. In such a scenario, the buyers of these foreclosed property may need invest in repairs or improvements to the property before reselling it. In order to provide evidence that this cannot fully explain my results, I re-estimate the model including a year fixed effect, thereby effectively comparing foreclosed and non-foreclosed sales of *same* property in the *same* year. Under the assumption that the eviction of a foreclosed tenant and any property repairs and improvements may take time, this approach would reduce concerns that the neglect and condition of a property (which I cannot observe in the data) when it is foreclosed relative to when it is not foreclosed drives my results. In Column (2), I show that while the inclusion of a year fixed effect reduces the discount by 14 percentage points, the discounts still remain sizable at 56.1%.

[Insert Table 4 about here]

3.1 Estimating foreclosure discounts at auctions

Despite these findings, it is unclear what the foreclosure discount is measuring, given the fact that some foreclosures sell at auction, while others may not. As a result, the foreclosure discounts I measure jointly capture discounts that can be attributed to financial distress of the seller and discounts attributed to the auction mechanism itself. I therefore re-estimate my

main specification, this time splitting the foreclosure variable, $F_{i,t}$ into various groups relative to when the property sells and also who buys it at the auction. I report these results in Table 5 and panel (a) of Figure 2.

[Insert Table 5 about here]

[Insert Figure 2 about here]

I find that foreclosure discounts are the highest when a property is sold at auction, especially when sold to the lender. In my preferred specification in column (6), I find that while properties sold to a private buyer at auction sell for a discount of 55.3%, while properties that are bought by the lender at auction sell for a discount of 74.3%. The fact that the foreclosure discount is largest when a property is bought at an auction by the lender is intuitive when you consider the fact that the lender purchasing a property is typically the last resort and only occurs in cases where the property has struggled to generate sufficient interest at the auction itself. The discounts are considerably smaller when a property scheduled for foreclosure sells outside of the foreclosure auction. When a property is sold before the auction the discount drops to 8.0% and when a property is sold after the auction (in the event the homeowner can delay the auction) the discount is estimated at 12.3%. Exploiting the richness of my data, I then split post-auction sales by how much times passes after the auction before the property sells and report these results in Table 6 and panel (b) of Figure 2. I find that these post-auction discounts decrease over time. In fact, properties that sell more than a year after the auction date sell for identical prices to otherwise observable non-foreclosed property. One interpretation of this pattern of discounts is that the longer it takes a property to sell, the longer time the property stays on the market and the more likely it is that the seller achieves the market price they are seeking.

[Insert Table 6 about here]

In a similar vein to earlier, I also re-estimate this model utilizing a property fixed effect and report those estimates in Table 4. In column (4), where I include a year fixed effect, I find that properties sold to private buyers and lenders at auction sell for a discounts of 68.9% and 49.9% relative to what that *same* property would sell when it is resold in the *same* year, respectively. Interestingly, the auction discount for lenders is smaller than the discount for private buyers when including a property fixed effect. One explanation for this would be related to the price at which these properties are resold. Given the lender's incentives when reselling these properties as REO sales is to simply recovering the outstanding mortgage principle and any arrears, they may be less likely to accept a lower offer than a private seller would, which would result in a

smaller discount for lender re-sold auction property in a repeat-sales when using a property fixed effect, relative to a hedonic specification without a property fixed effect.

Together, these results indicate substantial differences between foreclosure discounts at and outside foreclosure auctions, with discounts being considerably lower when a homeowner is able to sell their property before an auction, or after the auction. Nonetheless, these out of auction discounts remain large, between 8.0% and 12.3% and given these homeowners remain financially distressed (despite avoiding a foreclosure auction) these discounts appear consistent with firesale motives. The fact that auction discounts are more than four times larger is clear evidence that foreclosure auctions are poor places to sell property, and that should homeowners have been able to sell their property on the conventional market, they would attain considerably better outcomes.

3.2 Accounting for transaction costs

As discussed earlier, the buyers of properties at an auction are subject to additional costs that would not be incurred were the sale to happen outside of an auction, such as the auction commission, any arrears of unpaid property taxes and in some cases the costs of eviction when a foreclosed homeowner refuses to vacate their property. In anticipation of these costs, buyers may reduce the price they are willing to bid and this could therefore confound the foreclosure discount I estimate. In this section, I incorporate the costs into the transaction prices attained at the auction and then re-estimate the auction discounts. While I can directly observe some costs, other costs need to be proxied; I detail what these costs are and how they are calculated below.

The first cost a buyer of an auction property is liable for is the auctioneers commission which is capped a maximum of R40,000 plus VAT and calculated as follows: 6% on the first R100,000 of the sale, 3.5% on R100,001 to R400 000, and thereafter, 1.5% on the balance of the sale capped at minimum of R3,000 plus Value Added Tax (15%) and a maximum of R40,000 plus VAT. Given I directly observe the transaction price at the auction, I am able to calculate the auctioneer's commission for each transaction at auction.

The second cost incurred by buyers at an auction is any current arrears on unpaid property taxes, given the property is sold 'as-is'. Given foreclosed homeowners are in financial distress, they are also likely to be in arrears with their property taxes. While I do not observe the property tax outstanding on each property, I can construct reasonable values thereof. As in many other countries, property taxes in South Africa are calculated on a property's assessed valuation, which gets multiplied by a "rate-in-the-rand" amount to calculate yearly property taxes

due.¹⁶ Using the property valuation I observe for 2015 and the prevailing rate-in-the-rand, I calculate the monthly property taxes due for each property, multiply that by 24 to get two years worth of unpaid property taxes, under the assumption that a homeowner is two years in arrears, and add that to the transaction price.

The final cost facing auction buyers relates to any eviction costs. The legal eviction process is costly and time-consuming, in many cases taking up to and over one year to complete. Given I cannot observe which properties are subject to evictions, nor do I know the costs associated with them, I approximate these costs in the following way. I start by finding publicly available eviction costs from a legal firm in South Africa.¹⁷ Evictions can either be uncontested or contested and eviction costs are estimated at between R5,000 and R25,000 for an uncontested eviction and up to R100,000 for a contested eviction. I then randomly assign 90% of foreclosures which sell at the foreclosure auction as requiring eviction, which is consistent with anecdotal evidence which suggests that 90% of foreclosed homes bought at an auction are occupied.¹⁸ I then consider a scenario where all of these randomly assigned transactions involve uncontested evictions and another scenario where all of the transactions involve contested evictions. In the case of each, I take the midpoint of the cost estimates from earlier and add that to the transaction price including the auctioneer's commission and two years of tax arrears.

I report these results in Table 7 and visually in Figure 3. As can be seen between columns (1) - (3), adding both the auction commission and two years of tax arrears only reduces the auction discount for private buyers from 55.3% to 44.9%. When adding uncontested eviction costs the discount reduces to 31.7% and then reduces even further to 17.3% after adding contested eviction costs, more than half the estimated foreclosure discount without accounting for any costs. I show these results of exercise visually in Figure 3. As can be seen visually, including transaction costs bring the auction discounts closer to the non-auction foreclosure discounts with the 95% confidence interval on the before auction and auction discounts overlapping. Turning to the specification including property fixed effects in Table 8, there is a similar pattern with the discount decreasing from 81.9% without any cost adjustments in column (1) to 43.9% in column (5) when accounting for all costs. Together this puts my preferred estimate of the foreclosure discount when accounting for costs between 17.3% and 43.9%. This highlights the importance of accounting for these transactions costs which can considerably reduce the estimated foreclosure discount. Despite this adjustment, these discounts remain considerably larger than estimates in the literature, highlighting the role the lack of reserve prices likely play

¹⁶For example, in 2018, the rate-in-the-rand in Cape Town was R0.007154. In Cape Town, properties typically get re-valued every three to four years.

¹⁷I use auction costs as reported by Le Roux Attorneys, available here.

¹⁸See, for example, "How to buy a distressed property in SA - while avoiding the many, many pitfalls" - *Business Insider South Africa*, 19 December 2020.

in suppressing auction prices.

[Insert Table 7 about here]

[Insert Table 8 about here]

[Insert Figure 3 about here]

3.3 Returns for buyers of foreclosed property

The results so far indicate sizable foreclosure discounts that are robust even after accounting for auction costs. One implication of the presence of these discounts is that buyers may be able to purchase these properties at a large discount and resell them immediately to make large returns. These large returns would indicate that the foreclosure market may not be perfectly efficient such that these large returns are priced away in equilibrium. These returns could however also represent a compensation for the liquidity of these buyers and their risk-taking, given foreclosed property typically involves costly and time-consuming evictions.

To explore this re-sale market, I first present evidence that buyers of foreclosed property and their likely motives differ from those of buyers of non-foreclosed property. In Table 9 I show summary statistics for buyers and resale behavior across three categories: non-foreclosed property, non-auctioned forecloses and auctioned foreclosures. Close to 27% of all auctioned foreclosures are resold within 6 months of the auction, compared to only 10.9% for non-auctioned foreclosures and less than 1% of non-foreclosed property. This rises to over 50% after 18 months for auctioned foreclosures and only 22% for non-auctioned foreclosures and 4.7% for non-foreclosures. This presents strong evidence that buyers of auctioned foreclosures (and to some extent also non-auctioned foreclosures) flip the properties they buy. The shares of properties sold to non-natural persons is also substantially higher for auctioned foreclosures at 27%, relative to 18.9% for non-auctioned foreclosures and 8.2% for non-foreclosures. Lastly, the share of repeat buyers, defined as buyers who have purchased more than two properties, is also higher for auctioned foreclosures at 24.7%, compared to only 7% for non-auctioned foreclosures and 8.46% for non-foreclosures. All together, this indicates that the buyers of foreclosed property at auctions are more likely to be non-natural persons like companies, who buy and flip multiple properties.

[Insert Table 9 about here]

The large auction discounts estimated combined with the extent of flipping in the data suggests that large returns could be made for buyers of foreclosed property. In order to study this, I estimate the following specification on the subset of properties that sell more than once in my sample, where the dependent variable is the annualized return made by the seller upon resale, $r_{i,s,t}$ of property i in suburb s that sells in time t :

$$r_{i,s,t} = \alpha + \beta F_{i,t} + \gamma X_i + \delta_{s,t} + \phi_b + \varepsilon_{i,s,t} \quad (2)$$

where as before $F_{i,t}$ takes the form of a vector of sale outcomes all related to a foreclosure notice. I also include: X_i , which now captures the holding period of the seller, which I first include as a continuous variable, and thereafter as a categorical one; where as before $\delta_{s,t}$ represents a suburb-year fixed effect, and; ϕ_b which is a fixed effect for the buyer. The advantage of the latter fixed effect being that in the fully specified model, β captures the difference in returns made by the *same* buyer when reselling a foreclosed property relative to a non-foreclosed property, keeping holding period constant. This removes concerns that the buyer specific effects, such as experience or social networks, are driving the differences in returns which may be important given that companies and repeat buyers are disproportionately represented in the group of buyers for foreclosed property. Finally, given I am estimating returns made on a property, property characteristics (which are constant across both purchase and sale) do not drive my results.

I report these results in Table 10. In column (1), where I employ a year, month of the year and suburb fixed effect, I find that private buyers of auctioned foreclosures make a 71.7 percentage point higher annualized return than buyers of non-foreclosures. Lenders also make sizable returns, but the estimated effect of 30.8 percentage points is less than half that of private buyers, once again consistent with the notion that the lender's incentives when reselling these properties as REO sales is to simply recover the outstanding mortgage principle and any arrears and as a result, they may be less likely to accept a lower offer than a private seller would.

In column (2) I add the holding period, measured in years, and I find a negative coefficient suggesting that holding periods are negatively correlated to returns. After doing this, the estimated excess return also decreases, but still remains sizable. In column (3), I include the holding period as a set of categorical variables, where the reference group is properties sold with holding period of more than 4 years. While the negative correlation is once again present, there is a significant jump in the adjusted R-squared suggesting that the effect of holding period on returns is highly non-linear. Furthermore, estimated excess returns at auction for private buyers reduces significantly to 48.3 percentage points, while the discount for the lender becomes statis-

tically insignificant. This suggests that lenders are reselling the REO property relatively quickly, such that controlling for the holding period makes the returns they make indistinguishably different from returns on non-foreclosed property.

The sizable excess return for private buyer could however be explained by buyer specific factors such as skill, experience or social networks. To address this, in column (4) I now add a buyer fixed effect, which as discussed earlier allows me to compare returns made across different types of property keeping the buyer, suburb and holding period constant. I now estimate that buyers who resell foreclosed property purchased at an auction make a 32.2 percentage points higher return than when reselling other property in same suburb, keeping holding period constant. While these returns seem large, they are in fact consistent with the large discounts estimated earlier and in line with the excess returns estimated for buyers of non-auction foreclosed property where these excess returns are estimated between 23.3-27.9 percentage points. In column (5) I also add a year by suburb fixed effect, which allows me to compare returns made across different types of properties by the *same* buyer that are sold in the *same* suburb in the *same* year and I still find the excess return for private buyers to be robust at 25.6 percentage points.

[Insert Table 10 about here]

4 Discussion and implications

The foreclosure discounts I estimate in this paper are large and robust across a number of different specifications. Given the key institutional difference in the foreclosure market in South Africa relative to elsewhere is the lack of reserve prices, this is indicative of the role that reserve prices can play in limiting the extent of foreclosure discounts. These discounts have gained increasing public attention and outcry.¹⁹ One egregious example of such abusive practices was documented in *Nxazonke v Absa Bank*.²⁰ In this case, the homeowner was liable for R28,000 (\$1,944 USD) in outstanding debt and had their property repossessed and sold at a foreclosure auction for R10 (\$0.69) when the property's valuation was R81,000 (\$5,625 USD) leaving the homeowner homeless and liable for the shortfall. In this case, the court declared that the sale represented an abuse of process. The sale of homes for a fraction of their market value by banks represents a classic principal agent problem, given the banks incentive is simply recover the outstanding amount owed on the mortgage, which is typically a fraction of the value of the

¹⁹See for example: "SA banks sued for R60bn in home repossession case" - *Fin24*, 16 August 2017 and "Banks face lawsuit over unjust sale of homes" - *IOL*, 25 January 2021

²⁰Judgement is available here.

home. These large discounts are especially concerning in a context like South Africa's where mortgages represent recourse loans and are highly levered.²¹ In such a setting, where a homeowner's has a highly levered mortgage and the price attained at auction is significantly below market value and the outstanding arrears on the mortgage, the home foreclosure process is especially punitive, given a homeowner loses their home and is still liable to pay for a mortgage on a property they no longer own.

Given concerns that the lack of a reserve price was contributing to the foreclosure discounts, the Uniform Court Rules were amended in order to allow the court to set a reserve price for foreclosure auctions effective 22 December 2017.²² The amendment, however, left the decision to implement a reserve price at the discretion of the court, and in practice, reserve prices were rarely implemented given the complexities involved with determining the reserve price.²³ However, in late 2018, the Gauteng High Court mandated the setting of a reserve prices in all auctions.²⁴ A natural question then relates to the impact of these reserve prices on auction outcomes, which are beyond the scope of this paper given data availability, but which I leave to future work.

After these results, an open question is why do these foreclosure discounts and excess returns persist? As argued by Clauretje & Daneshvary (2009), while the housing market is not perfectly efficient, it is unlikely to be so inefficient such that excess returns can be generated so easily and consistently, given competition among buyers would eliminate that discount. While I cannot conclusively answer this question, I suggest two potential reasons for the persistence of these discounts and returns that merit further investigation.

The first potential explanation relates to limited competition at foreclosure auctions that are related to participation costs. As Allen & Gale (1994) highlight, firesale discounts can occur if there are sufficiently large participation costs to prospective buyers, thereby limiting the extent of competition. I find two pieces of suggestive evidence that competition at auctions may indeed be limited. Firstly, participating in auctions requires liquidity - successful bidders are required to pay a deposit of 10% of the purchase price immediately either in cash or through a bank guaranteed cheque.²⁵ This deposit may therefore serve to exclude potential buyers with little liquidity, thereby reducing competition. This is likely reflected in the high share of companies (who likely have greater liquidity than individuals) who purchase foreclosed property an

²¹In Davids (2020), I find that the modal mortgage in Cape Town has an LTV of 1.

²²The amendment is available here.

²³See for example: "Judgment ends era of the R10 repossessed home in SA" - *The Sunday Times*, 13 September 2018.

²⁴"Judgment ends era of the R10 repossessed home in SA" - *The Sunday Times*, 13 September 2018.

²⁵These participation costs are not unusual. In Massachusetts for example, the deposit to participate in an auction is \$5,000 (Campbell et al. 2011)

auction. Secondly, in the previous section I find that the share of repeat buyers is significantly higher for foreclosed auctioned property that sells at an auction. While this does not speak to who participates, the high share of repeat buyers is potentially indicative of limited competition. Secondly, buying foreclosed property, especially at an auction involves many risks and transactions that buying non-auctioned property does not, over and above the explicit financial costs we have already controlled for. For example, in many cases buyers are unable to view the property adding a factor of risk in terms of the condition of the property. Furthermore, the process to evict, then clean, repair and potentially renovate a property is time consuming. As such, the existence of large discounts and excess returns could instead then reflect the risk premia and non-monetary transaction costs associated with foreclosed property. Combined with a market of risk-averse buyers, this could also serve embed the foreclosure discounts I estimate. These explanations are however merely indicative and future work should explore this more thoroughly.

5 Conclusion

This paper provides novel estimates of foreclosure discounts in a setting where foreclosure auctions happen without reserve prices. I find evidence of sizable foreclosure discounts, which are robust across different specifications and even after transaction costs have been accounted for. I furthermore also show that the buyers of these foreclosed properties are able to flip these properties for sizable returns, even relative to the returns they make on other non-foreclosed properties they sell in the same suburb in the same year. These large discounts and returns are indicative that the home foreclosure market is not perfectly efficient, consistent with evidence I present suggestive of low competition at auction, and/or a sizable risk premium existing on flipping foreclosures relative to non-foreclosures that must be compensated for.

The foreclosure discounts I estimate are also substantially larger than other estimates in the literature from countries where reserve prices are used, indicative of the important role reserve prices play in limiting the extent of these discounts for homeowners. Limiting the extent of these discounts is particularly important given the negative consequences of foreclosures for homeowners and the economy as a whole. These negative effects may be especially amplified in high inequality settings like South Africa and contribute to widening inequality and lower home ownership rates. To that extent, the introduction of reserve prices in auctions in South Africa is a promising development, however more work is needed to better understand the role that this has had on foreclosure discounts, the incentives for banks to foreclose and the risk premium associated with mortgage lending.

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Figure 1: Sale in execution notice

AUCTION

(1) Case No: 17201/2016

IN THE HIGH COURT OF SOUTH AFRICA
(Western Cape Division, Cape Town)

In the matter between: (2) [REDACTED] AND (3) [REDACTED] AND
[REDACTED]

(4) NOTICE OF SALE IN EXECUTION (5)

(6) 17 January 2019, 10:00, Sheriff's Offices situated at: [REDACTED]

In pursuance of a judgment granted in the High Court of South Africa and a Writ of Execution dated 21 April 2017 the property listed hereunder will be sold in Execution on Thursday, 17 January 2019 at 10:00 at the sheriff's offices situated at [REDACTED] to the highest bidder:

Description: [REDACTED] - situated at: (7) [REDACTED]

Zoned: Residential

Improvements: The following information is given but nothing in this regard is guaranteed

A dwelling with brick walls and a tiled roof consisting of 1 Lounge 1 Dining Room 1 Kitchen 1 Scullery 3 Bedrooms 2 Bathrooms 1 Shower 2 WC's 2 Garages held by the Defendant in his name under Deed of Transfer No. (8) [REDACTED]

The full and complete Conditions of Sale will be read immediately before the Sale and will be available 24 hours before the sale at the sheriff's offices situated at (9) [REDACTED]

Payment: 10% of the purchase price shall be paid on the day of the sale and the balance together with interest and sheriff's fees and commission with registration

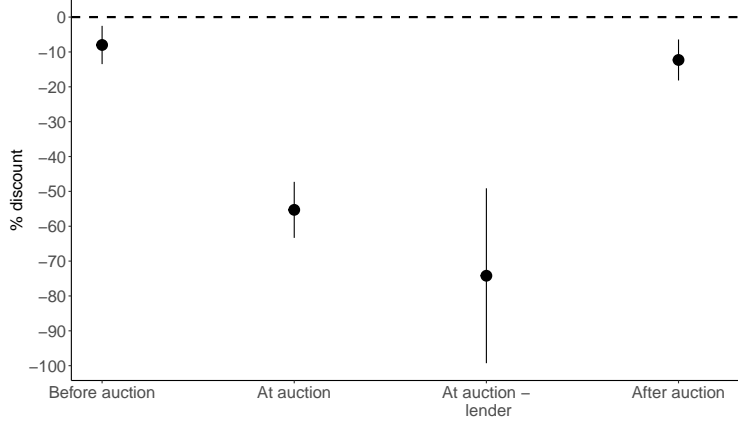
Dated at Goodwood 3 February 2016.

Attorneys for Plaintiff(s): [REDACTED]

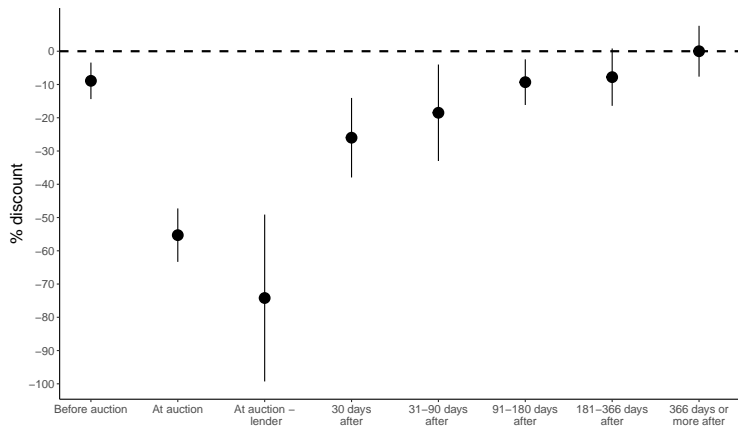
Ref: F01730.

This figure illustrates a sale in execution notice with the relevant information notated. (1) The case number (2) The name of the plaintiff (3) The name of the defendant (4) The date of the auction (5) The location of the auction (6) The date that the Plaintiff brought the case before the court (7) The address of the property (8) The title deed associated with the property (9) The special payment conditions which apply to the auction. I have redacted all personal information from the advert.

Figure 2: Estimated foreclosure discounts across time



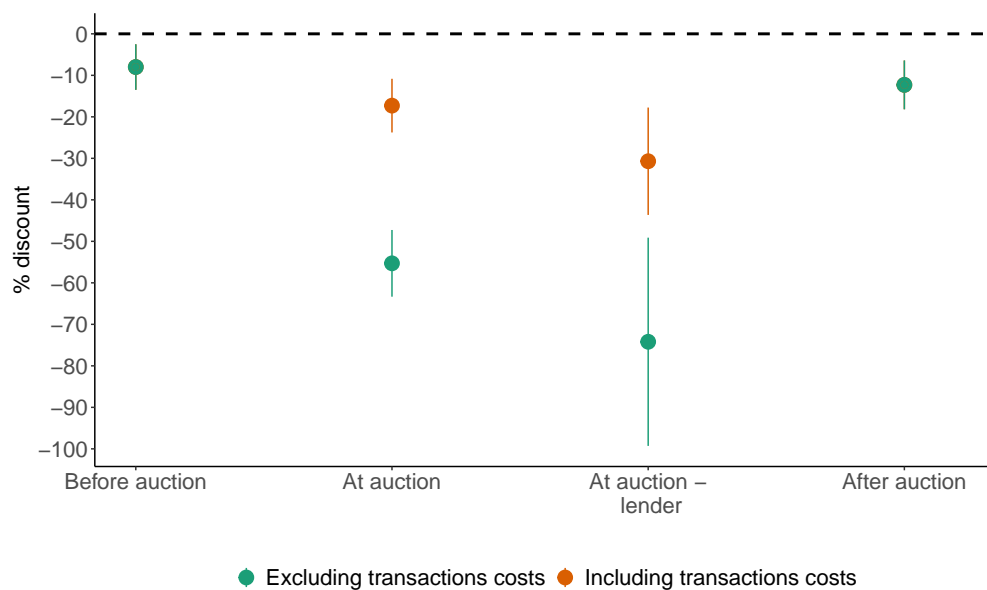
(a) Before, at, and after the auction



(b) Detailed after auction groups

This figure reports the estimates of foreclosure discounts from the main hedonic specification in equation (1). Panel (a) splits the foreclosure discount into four groups: sales before the the auction, sales at the auction bought by a private buyer, sales at the auction bought by the lender, and sales that occurred after the auction date. Panel (b) splits the latter category up based on the time between the auction date and the eventual sale date. The vertical bars indicates the 95% confidence interval.

Figure 3: Accounting for transaction costs



This figure reports estimates of foreclosure discounts from the main hedonic specification in equation (1) with and without transaction costs. The vertical bars indicates the 95% confidence interval.

Table 1: Summary statistics

	Full sample	Non-foreclosed transactions	Foreclosed transactions
Transaction price	1,678,752 (5,367,723)	1,689,779 (5,397,478)	753,839 (1,038,472)
Land size	443 (583)	443 584	408 430
Property size	121 (87)	122 (87)	111 (83)
Bedrooms	2.70 (0.99)	2.70 (0.99)	2.77 (0.92)
Bathrooms	1.86 (1.05)	1.86 (1.05)	1.72 (0.99)
Share of sectional title transactions	15.44%	15.45%	14.41%
Observations	176,723	174,641	2,082
Share of total transactions	100%	98.82%	1.18%
Share of total transaction value	100%	99.47%	0.53%

This table reports summary statistics across foreclosed and non-foreclosed property between 2011 and 2018. I report mean values and standard deviations in parenthesis.

Table 2: Summary statistics: foreclosure outcomes

Transaction type	N	Share	Mean price
Before auction	583	28.0%	R887,231
At auction	718	34.5%	R458,596
At auction - lender	69	3.3%	R457,422
30 days after auction	177	8.5%	R618,997
31 - 90 days after auction	123	5.9%	R873,163
91 - 180 days after auction	92	4.4%	R970,120
181 - 360 days after auction	104	5.0%	R1,183,401
361 days or more after auction	216	10.4%	R1,213,501
	2,082	100%	R753,839

This table provides a breakdown of all foreclosure related transactions with respect to when they transact relative to the auction date. I include the number of transactions, the share of all foreclosed transactions and mean prices.

Table 3: Estimated foreclosure discounts

	Log transaction price				
	(1)	(2)	(3)	(4)	(5)
Foreclosed	-0.633*** (0.059)	-0.251*** (0.027)	-0.273*** (0.023)	-0.268*** (0.023)	-0.278*** (0.024)
Year FE	Yes	Yes	Yes	Yes	No
Month FE	Yes	Yes	Yes	Yes	Yes
Suburb FE	No	Yes	Yes	Yes	No
Property Features	No	No	Yes	Yes	Yes
Property Valuation	No	No	No	Yes	Yes
Year x Suburb FE	No	No	No	No	Yes
Observations	176,316	176,316	176,316	176,316	176,316
Adjusted R-squared	0.053	0.750	0.811	0.835	0.852

This table reports the results from the main hedonic specification in equation (1). Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 4: Foreclosure discounts estimated with a property fixed effect

	Log transaction price			
	(1)	(2)	(3)	(4)
Foreclosed	-0.704*** (0.033)	-0.561*** (0.034)		
Sold before auction			-0.498*** (0.039)	-0.363*** (0.041)
Sold at auction			-0.819*** (0.042)	-0.689*** (0.044)
Sold at auction: lender			-0.712*** (0.118)	-0.499*** (0.112)
Sold after auction			-0.639*** (0.064)	-0.499*** (0.064)
Property Fixed Effect	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes
Observations	55,227	55,227	55,227	55,227
Adjusted R-squared	0.740	0.826	0.741	0.827

This table reports the results from the main hedonic specification in equation (1) estimated with the inclusion of a property fixed effect. For properties that sold at the auction, I distinguish between properties bought by the lender and properties bought by other parties. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 5: Foreclosure discounts across time

	Log transaction price				
	(1)	(2)	(3)	(4)	(5)
Sold before the auction	-0.292*** (0.065)	-0.022 (0.027)	-0.076*** (0.025)	-0.075*** (0.025)	-0.080*** (0.028)
Sold at the auction	-1.155*** (0.084)	-0.541*** (0.044)	-0.550*** (0.040)	-0.541*** (0.039)	-0.553*** (0.041)
Sold at the auction: lender	-1.227*** (0.252)	-0.645*** (0.152)	-0.643*** (0.136)	-0.668*** (0.141)	-0.743*** (0.128)
Sold after auction	-0.377*** (0.066)	-0.112*** (0.036)	-0.120*** (0.031)	-0.117*** (0.030)	-0.123*** (0.030)
Year FE	Yes	Yes	Yes	Yes	No
Month FE	Yes	Yes	Yes	Yes	Yes
SP FE	No	Yes	Yes	Yes	No
Property Features	No	No	Yes	Yes	Yes
Property Valuation	No	No	No	Yes	Yes
Year x Suburb FE	No	No	No	No	Yes
Observations	176,316	176,316	176,316	176,316	176,316
Adjusted R-squared	0.054	0.751	0.812	0.835	0.852

This table reports the results from the main hedonic specification in equation (1) with detailed groups for when the property sold relative to the foreclosure auction. For properties that sold at the auction, I distinguish between properties bought by the lender and properties bought by other parties. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 6: Estimated foreclosure discounts across time - detailed

	Log transaction price				
	(1)	(2)	(3)	(4)	(5)
Sold before auction	-0.292*** (0.065)	-0.022 (0.027)	-0.076*** (0.025)	-0.075*** (0.025)	-0.080*** (0.028)
Sold at auction	-1.155*** (0.084)	-0.541*** (0.044)	-0.550*** (0.040)	-0.541*** (0.039)	-0.553*** (0.041)
Sold at auction to lender	-1.227*** (0.252)	-0.645*** (0.152)	-0.644*** (0.136)	-0.669*** (0.141)	-0.743*** (0.128)
Sold 30 days after auction	-0.621*** (0.106)	-0.310*** (0.067)	-0.233*** (0.059)	-0.211*** (0.058)	-0.260*** (0.061)
Sold 31 - 90 days after auction	-0.457*** (0.128)	-0.212** (0.087)	-0.181** (0.081)	-0.184** (0.078)	-0.185** (0.074)
Sold 91 - 180 days after auction	-0.001 (0.097)	-0.092 (0.095)	-0.117** (0.053)	-0.079** (0.036)	-0.093*** (0.035)
Sold 181 - 360 days after auction	-0.111 (0.109)	0.014 (0.054)	-0.085* (0.049)	-0.095** (0.044)	-0.079* (0.044)
Sold 361 days or more after auction	-0.259*** (0.075)	0.044 (0.049)	-0.009 (0.039)	-0.014 (0.038)	0.003 (0.039)
Year FE	Yes	Yes	Yes	Yes	No
Month FE	Yes	Yes	Yes	Yes	Yes
Suburb FE	No	Yes	Yes	Yes	No
Property Features	No	No	Yes	Yes	Yes
Property Valuation	No	No	No	Yes	Yes
Year x Suburb FE	No	No	No	No	Yes
Observations	176,316	176,316	176,316	176,316	176,316
Adjusted R-squared	0.054	0.751	0.812	0.835	0.852

This table reports the results from the main hedonic specification in equation 1 with detailed groups for when the property sold relative to the foreclosure auction. For properties that sold at the auction, I distinguish between properties bought by the lender and properties bought by other parties. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 7: Foreclosure discounts accounting for transaction costs

	(1)	(2)	(3)	(4)	(5)
	Base specification	Including commission	Including commission and two years of tax arrears	Including commission, two years of tax arrears and uncontested eviction costs	Including commission, two years of tax arrears and contested eviction costs
Sold at auction	-0.553*** (0.041)	-0.467*** (0.037)	-0.449*** (0.035)	-0.317*** (0.030)	-0.173*** (0.030)
Sold at auction: lender	-0.743*** (0.128)	-0.662*** (0.113)	-0.640*** (0.112)	-0.480*** (0.077)	-0.307*** (0.066)
Property Features	Yes	Yes	Yes	Yes	Yes
Property Valuation	Yes	Yes	Yes	Yes	Yes
Year x Suburb FE	Yes	Yes	Yes	Yes	Yes
Observations	176,316	176,316	176,316	176,316	176,316
Adjusted R-squared	0.852	0.852	0.853	0.853	0.853

This table reports the results from the main hedonic specification in equation 1 where I add various costs to the transaction price which are incurred when purchasing a foreclosed property at an auction. Column (1) represents my base specification and in column (2) I add the auctioneer's commission to the transaction price for auctioned properties. In columns (3), I also include two years' worth of property tax arrears to the transaction price. The details for how these amounts are calculated can be found in-text. In columns (4) and (5) I add the costs of uncontested and contested evictions randomly to 90% of all transactions, respectively. The details for how these amounts are calculated can be found in-text. For brevity, I only report the coefficients on properties sold at auction and do not report the coefficients from other non-auction foreclosed transactions given these coefficients are unchanged from Table 5. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 8: Foreclosure discounts accounting for transaction costs - including a property fixed effect

	(1)	(2)	(3)	(4)	(5)
	Base specification	Including commission	Including commission and two years of tax arrears	Including commission, two years of tax arrears and uncontested eviction costs	Including commission, two years of tax arrears and contested eviction costs
Sold at auction	-0.819*** (0.042)	-0.734*** (0.036)	-0.716*** (0.036)	-0.584*** (0.026)	-0.439*** (0.021)
Sold at auction: lender	-0.712*** (0.118)	-0.629*** (0.100)	-0.607*** (0.098)	-0.460*** (0.058)	-0.302*** (0.050)
Property Features	Yes	Yes	Yes	Yes	Yes
Property Valuation	Yes	Yes	Yes	Yes	Yes
Year x Suburb FE	Yes	Yes	Yes	Yes	Yes
Observations	55,227	55,227	55,227	55,227	55,227
Adjusted R-squared	0.741	0.741	0.741	0.741	0.740

This table repeats the estimation in Table 7, with the addition of a property level fixed effect. For brevity, I only report the coefficients on properties sold at auction and do not report the coefficients from other non-auction foreclosed transactions given these coefficients are unchanged from Table 4. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

Table 9: Who buys foreclosed property and when are they sold?

	Non-foreclosures	Non-auction foreclosures	Auctioned foreclosures
% sold in 6 months	0.97%	10.89%	26.69%
% sold in 12 months	2.65%	18.60%	44.33%
% sold in 18 months	4.66%	22.42%	51.55%
% sold to non-natural persons	8.22%	18.82%	27.00%
% of buyers who purchase 2+ properties	8.46%	7.00%	24.60%

This table reports a number of summary statistics across non-foreclosed property, non-auctioned property, and auctioned foreclosed property, which reflect who the buyers of these properties are and when these properties are re-sold.

Table 10: Returns for buyers of foreclosed property

	Annualized Return				
	(1)	(2)	(3)	(4)	(5)
Before auction	0.471*** (0.075)	0.428*** (0.074)	0.292*** (0.077)	0.279*** (0.102)	0.135 (0.091)
At auction	0.717*** (0.049)	0.621*** (0.051)	0.482*** (0.065)	0.322*** (0.066)	0.256*** (0.072)
At auction: lender	0.308*** (0.097)	0.197* (0.100)	0.042 (0.115)	0.194 (0.127)	0.112 (0.128)
After auction	0.506*** (0.077)	0.440*** (0.080)	0.331*** (0.080)	0.233*** (0.087)	0.272*** (0.103)
Holding period		-0.071*** (0.012)			
<i>Holding period dummy variables</i>					
Less than 3 months			1.000*** (0.126)	0.881*** (0.127)	0.727*** (0.137)
Between 3 and 6 months			0.589*** (0.130)	0.475** (0.204)	0.413* (0.221)
Between 6 months and a year			0.330*** (0.076)	0.252** (0.114)	0.233* (0.126)
Between 1 and 2 years			0.093*** (0.026)	0.090*** (0.029)	0.090*** (0.030)
Between 2 and 4 years			0.042*** (0.010)	0.065*** (0.018)	0.065*** (0.020)
Year FE	Yes	Yes	Yes	Yes	No
Month FE	Yes	Yes	Yes	Yes	Yes
Suburb FE	Yes	Yes	Yes	Yes	No
Buyer FE	No	No	No	Yes	Yes
Year x SP FE	No	No	No	No	Yes
Observations	31,764	31,764	31,764	18,989	17,766
Adjusted R-squared	0.231	0.263	0.313	0.566	0.587

This table reports the estimates from the specification in equation (2) estimating the differences in returns made across foreclosed and non-foreclosed property. Standard errors are clustered at the suburb level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.