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Working Paper 22-01

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Abstract

This paper examines factors affecting the use of appraisal waivers for mortgages guaranteed by Fannie Mae and Freddie Mac and the effect of appraisal waivers on prepayment speeds. We find that the alignment of Freddie Mac's eligibility criteria with those of Fannie Mae around the start of the COVID-19 pandemic was associated with an increase in the use of appraisal waivers. Conditional on satisfying the basic eligibility criteria, appraisal waivers are more common for refinance loans, loans serviced by nonbanks, and less risky borrowers. We also find that appraisal waivers were associated with higher conditional prepayment rates during 2020, but to a lesser extent in 2021 as refinancing activity slowed down. Much of this association can be explained by correlations between appraisal waivers and other observable determinants of prepayment speeds.

Keywords: appraisal waiver · prepayment · nonbanks

JEL Classification: G21 · G23

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1 Introduction

In the context of mortgages, an appraisal waiver is an offer by Fannie Mae or Freddie Mac, which shall be referred to more briefly as "the Enterprises", to a lender and borrower to forgo the requirement of an appraisal, which refers to when the value of the property being purchased using the mortgage is assessed through an inspection.[1] The Enterprise instead assesses the value of the house using an automated process.[2] Appraisal waivers are becoming more common, as Figure 1 shows that the share of Enterprise loans underwritten using an appraisal waiver increased from less than 10% in early 2019 to over 30% by mid-2021.[3] One factor that may have contributed to the growing use of appraisal waivers in 2020 is the COVID-19 pandemic. For example, in order to reduce contact between parties in the mortgage transaction process during the early stages of the pandemic, Freddie Mac encouraged the exercise of appraisal waivers for mortgages that were eligible as well as expanded its eligibility criteria to more closely align with that of Fannie Mae (Freddie Mac (2020)).

The increased use of appraisal waivers associated with the pandemic has a number of potential implications for the mortgage market. On the one hand, they could increase the efficiency of mortgage transactions by reducing the time and costs associated with the appraisal process.[4] On the other hand, these efficiency gains could also be associated with higher prepayment speeds, as Figure 2 shows that loans originated with an appraisal waiver exhibited a higher conditional prepayment rate (CPR) throughout 2020.[5] Prepayment speeds

[1]Note that this paper refers to Fannie Mae and Freddie Mac as "the Enterprises" since they are government-sponsored enterprises. The Enterprises guarantee mortgage-backed securities to support the secondary mortgage market. Mortgages must meet certain requirements to be included in a mortgage-backed security guaranteed by the Enterprises. Typically, one such requirement is an appraisal, which is an assessment of the value of the property that serves as collateral for the mortgage.

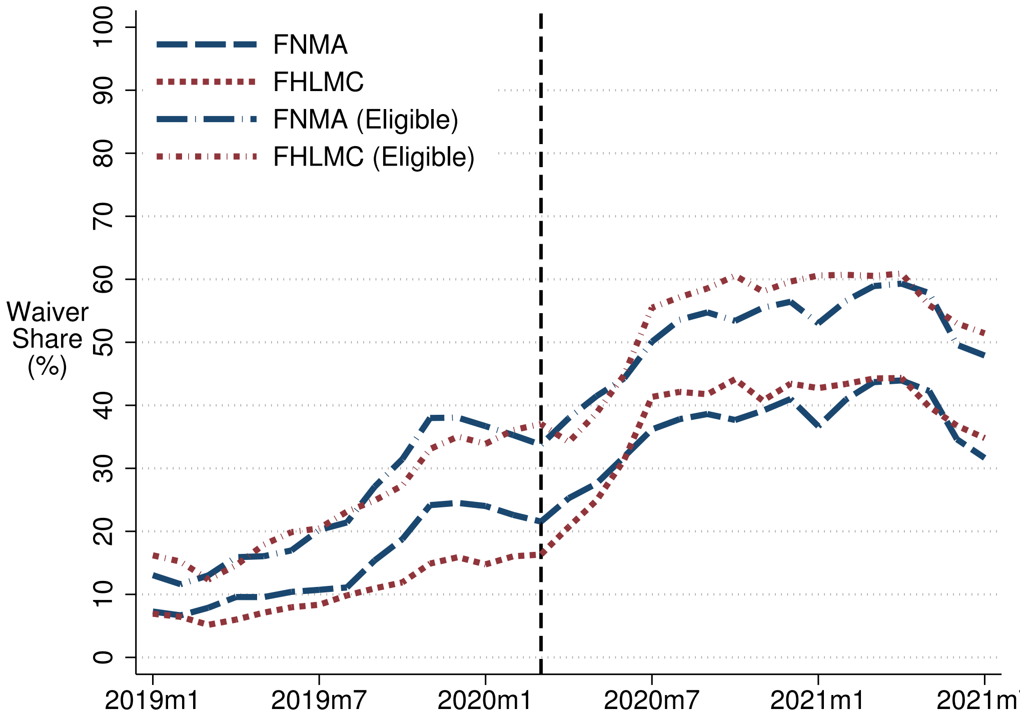
[2]For Fannie Mae, Desktop Underwriter determines appraisal waiver eligibility based in part on an assessment of the quality of prior appraisals recorded in its Collateral Underwriter data (Fannie Mae (2020)). For Freddie Mac, Automated Collateral Valuation determines appraisal waiver eligibility for loans submitted through Loan Product Advisor using historical data, public records, and models (Freddie Mac (n.d.)).

[3]Note that Fannie Mae introduced its current appraisal waiver program in December 2016 (Fannie Mae (2016)), and Freddie Mac followed in 2017 (Freddie Mac (2017*b*)).

[4]Appraisal waivers are estimated to reduce loan closing times by about seven to ten days and appraisal costs by $300 to $700 (Federal Housing Finance Agency Office of Inspector General (2018)). Lenders also enjoy relief from representations and warranties on the value, condition, and marketability of the property (Fannie Mae (2022), Freddie Mac (n.d.)), which reduces the risk of being required by the guaranteeing Enterprise to repurchase the loan.

[5]The conditional prepayment rate is the percentage of of a loan's principal that is estimated to be prepaid, or paid prior to being due.

Figure 1: Appraisal Waiver Share

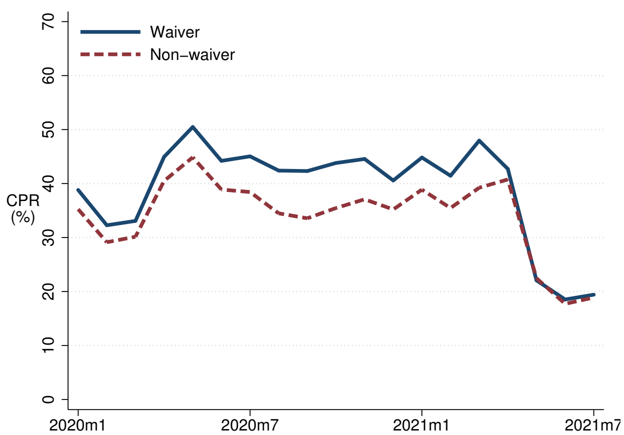


Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac. It also shows the share for a subsample of loans that were approximately eligible for a waiver. Approximate eligibility is determined by the loan-to-value limits in Table 1 and omitting loans for manufactured housing and co-ops. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

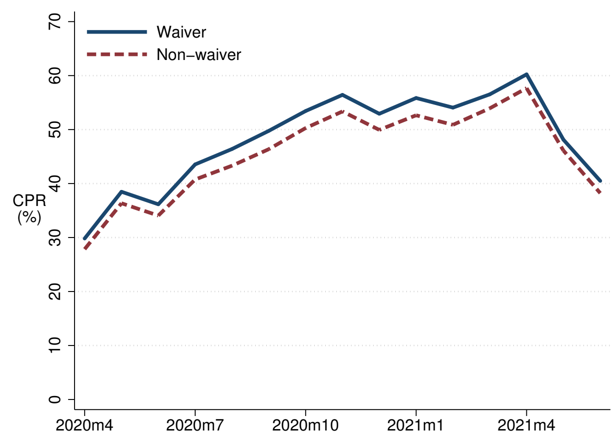
are important for several reasons. First, they affect the value of mortgage-backed securities (MBS). Second, market participants have indicated that the alignment of prepayment speeds across cohorts of the Enterprises' uniform MBS (UMBS) is crucial to maintaining their fungibility in the to-be-announced (TBA) market, which is a key goal of the UMBS Rule (Federal Housing Finance Agency (2019)).[6,7] Third, if the relationship between prepayments and appraisal waivers is persistent and causal, then failing to price the use of an appraisal waiver creates a cross-subsidy in favor of borrowers who use an appraisal waiver.[8]

Figure 2: Prepayment Speeds by the Use of Appraisal Waivers

(a) Varying Cohorts



(b) Fixed Cohort



Notes: Figure 2a shows the average CPR for loans with an appraisal waiver or without an appraisal waiver. The date corresponds to the month when a loan's respective MBS pool age is 12 months. Figure 2b shows the average CPR for loans with an appraisal waiver or without an appraisal waiver within the set of purchase mortgages in the Freddie Mac 2019 3.0 coupon cohort with loan size between \$200,000 and \$400,00, FICO greater than 720, LTV less than 80. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

This paper first examines a number of factors that have affected the use of appraisal waivers. In order for a loan to be underwritten with an appraisal waiver, it first must meet the eligibility criteria of the guaranteeing Enterprise, which is typically given by an upper limit

[6]A uniform MBS is an MBS with the same structure regardless of which Enterprise issues it. The TBA market is a forward market for mortgage-backed securities guaranteed by the Enterprises in which details about the security, including the issuing Enterprise in the case of UMBS, is revealed only shortly before delivery.

[7]Note that we find that the incidence of appraisal waivers at the two Enterprises generally became more similar after the alignment of the eligibility criteria, which does not suggest that there were any adverse effects for UMBS.

[8]Moreover, borrowers who use an appraisal waiver are arguably better off since they can satisfy the eligibility criteria (Table 1). Additionally, Section 2 shows that appraisal waivers are more common for borrowers with high credit scores and low debt-to-income ratios.

of the loan-to-value (LTV) ratio depending on the loan purpose and occupancy type (see Table 1).[9] The Enterprise must then determine whether to offer a waiver. Finally, the waiver must be accepted by both the borrower and the lender. Before 2020, Freddie Mac's appraisal waiver eligibility criteria were stricter than Fannie Mae's. On March 29, 2020, Freddie Mac expanded its eligibility criteria for cash-out refinances and rate-term (or "no cash-out") refinances to more closely match the criteria of Fannie Mae.[10] We find that the expansion of Freddie Mac's eligibility criteria was associated with an increase in appraisal waivers. However, many loans that meet the LTV limits still do not use an appraisal waiver. Among loans satisfying the limits, appraisal waivers are more common for refinance loans, nonbank servicers, and high credit score borrowers.[11]

This paper then examines explanations of the association between appraisal waivers and prepayment speeds. During 2020, appraisal waivers were associated with a 6.7 percentage point increase in CPRs by the time a loan's respective pool is 12 months old. However, about 78% of this association can be explained by correlations between appraisal waivers and other observable determinants of prepayment speed. For example, borrowers with higher credit scores or previous refinancing experience are less likely to wait too long to refinance when interest rates are low (Agarwal, Rosen and Yao (2015)), while loans originated by nonbanks are generally associated with faster prepayments (Buchak et al. (2018), Fuster et al. (2019)). After controlling for observable loan, borrower, and servicer characteristics, appraisal waivers were associated with a 1.5 percentage point increase in CPRs. The residual association is stronger for purchase loans compared to refinance loans, which is consistent with appraisal waivers mitigating inconveniences involved in refinancing. In particular, refinances are more likely to be associated with borrowers who already have a low barrier to refinance and thus less to gain from the efficiency benefits of an appraisal waiver. Finally, the association between appraisal waivers and prepayment speeds diminished starting around April 2021, which is simultaneous with a general decrease in refinancing incentives. The observation that appraisal waivers are more strongly associated with prepayment speeds when refinancing

[9] Note that various additional factors can affect eligibility. See Fannie Mae (2022) and Freddie Mac (2022) for further details.

[10] Specifically, it extended eligibility to cash-out refinances loans with an LTV up to 70% for primary residences or 60% for secondary residences, and it raised the LTV limit for rate-term refinance loans from 80% to 90% for both primary and secondary residences. See Freddie Mac (2020). Note that Freddie Mac's eligibility criteria were not exactly aligned with Fannie Mae's, as they remained stricter for investment properties.

[11] We use the term "nonbanks" to refer to financial institutions that do not have deposits.

Table 1: Appraisal Waiver Eligibility Criteria

	Fannie Mae	**Freddie Mac before March 29, 2020**	**Freddie Mac after March 29, 2020**
Purchase			
Primary residence	80%	80%	80%
Second home	80%	80%	80%
Investment property	Ineligible	Ineligible	Ineligible
No cash-out refinance			
Primary residence	90%	80%	90%
Second home	90%	80%	90%
Investment property	75%	Ineligible	Ineligible
Cash-out refinance			
Primary residence	70%	Ineligible	70%
Second home	60%	Ineligible	60%
Investment property	60%	Ineligible	Ineligible

Notes: This table presents the loan-to-value limits across loan purpose and occupancy types in order to be eligible for an appraisal waiver. See Fannie Mae (2022) and Freddie Mac (2022) for details on other factors affecting eligibility. For announcements regarding updates to Fannie Mae's eligibility criteria, see Fannie Mae (2020), particularly Fannie Mae (2016) for the introduction of appraisal waivers for refinances and Fannie Mae (2017) for the expansion of appraisal waivers to purchase loans. Fannie Mae (2018) also provides a summary of the eligibility criteria for Fannie Mae. For announcements regarding updates to Freddie Mac's eligibility criteria, see Freddie Mac (2017*b*) for the introduction of appraisal waivers for rate-term refinances, Freddie Mac (2017*a*) for the expansion of appraisal waivers to purchase loans, and Freddie Mac (2020) for the expansion of the eligibility criteria for appraisal waivers in March 2020.

incentives are high is consistent with lenders prioritizing loans that are more likely to use an appraisal waiver when they are faced with capacity constraints.

Prior research

This paper is related to recent research papers on the prevalence and implications of appraisal waivers. For example, Karamon and McManus (2022) find that appraisal waivers are associated with lower default risk among Freddie Mac loans. This paper also contributes to a literature on the determinants of mortgage prepayment speeds. Buchak et al. (2018) find that nonbanks are generally associated with faster prepayments. Fuster et al. (2019) additionally show that the subset of nonbank lenders with a fully online application process, also known as fintechs, are associated with higher market-wide local refinancing propensities, possibly due to improving the efficiency of the mortgage transaction process. Agarwal, Rosen and Yao (2015) find that borrowers who have refinanced before make smaller refinancing errors.

For more general background on research on appraisal waivers, as early as 2018, industry analysts expressed concern about the effects of appraisal waivers on prepayment speeds, speculating that technological changes at the Enterprises focused on streamlining the origination process, including appraisal waivers and digital verification of assets, income, and employment, could increase prepayment speeds much like streamlined refinance options had increased prepayment speeds for Federal Housing Administration (FHA), Veteran's Administration (VA), Rural Housing Service (RHS) loans and Public and Indian Housing loans (PIH).

Industry analysts initially used loan-level disclosures associated with the Enterprises' credit risk transfer securities, particularly Fannie Mae's Connecticut Avenue Securities (CAS) and Freddie Mac's Structured Agency Credit Risk (STACR) securities, to draw preliminary conclusions about the prevalence of appraisal waiver loans by acquiring Enterprise, loan purpose, originator type, loan or borrower characteristics, and geography. Questions raised in analysts' research reports and complaints of inadequate disclosures spurred the Enterprises under FHFA coordination to release loan-level data on appraisal waivers in their monthly MBS disclosures in March 2020s, with retrospective data going back to January 2017 for Fannie Mae and to June 2017 for Freddie Mac. The data release enabled further analysis to understand the implications of appraisal waivers for prepayment risk and the value of credit risk transfer (CRT) issuances and UMBS.

2 Appraisal Waiver Prevalence

In this section, we find that the expansion of Freddie Mac's appraisal waiver eligibility criteria to align with those of Fannie Mae was associated with an increase in the use of appraisal waivers. We also show that, controlling for eligibility, appraisal waivers are more common for refinances, nonbank servicers, and high credit score borrowers.

2.1 Data

We use the Enterprises' UMBS monthly public disclosures provided by RiskSpan.[12] We focus on new MBS issuances from January 2019 to July 2021. In particular, each observation correponds to a loan when the age of its respective MBS pool age is 1 month. We omit Fannie Mae refinance loans before July 2019, as the data do not distinguish between cash-out and rate-term refinances. We use a 10% random sample from the resulting set of loans. Table 2 presents summary statistics for various servicer, loan, borrower, and timing characteristics. About 31% of loans in the sample used an appraisal waiver.

2.2 Graphical analysis

This section document several facts about how the use of appraisal waivers has varied over time based on various loan, servicer, and borrower characteristics.

As noted in Section 1, Figure 1 shows that the use of appraisal waivers for both Enterprises increases dramatically from 2019 to 2020. Consistent with the alignment of the Enterprises' eligibility criteria in March 2020, Freddie Mac had a lower rate before the update but then caught up with Fannie Mae afterwards.

To further distinguish the role of the Enterprises' eligibility criteria compared to other factors, we also restrict to an approximate set of loans satisfying the eligibility criteria. In particular, this sample consists of loans satisfying the LTV limits to be eligible for an appraisal waiver, as described in Table 1, and omits loans for manufactured housing and co-ops, which are ineligible based on the additional criteria mentioned in Fannie Mae (2022) and Freddie Mac (2022). Note that this sample may include some loans that are actually ineligible since we do not observe all potential determinants of eligibility. Restricting to the set of eligible

[12] That is, the data are provided by RiskSpan with the Enterprises' loan-level public disclosure as the original source.

Table 2: Summary Statistics for Appraisal Waiver Prevalence Analysis

	N	Mean	SD	P25	P75
Waiver	1,461,155	0.312	0.463	0.000	1.000
FHLMC	1,461,155	0.448	0.497	0.000	1.000
Purchase	1,461,155	0.389	0.487	0.000	1.000
Rate-term	1,461,155	0.406	0.491	0.000	1.000
Cash-out	1,461,155	0.205	0.404	0.000	0.000
Nonbank	1,461,155	0.599	0.490	0.000	1.000
FICO	1,461,155	754.587	43.180	725.000	790.000
DTI (%)	1,461,155	34.011	9.743	27.000	42.000
LTV (%)	1,461,155	72.396	17.381	61.000	84.000
Amount ($1000s)	1,461,155	272.069	132.091	171.000	353.000
Post	1,461,155	0.711	0.453	0.000	1.000

Notes: *Waiver* indicates whether a loan used an appraisal waiver. *FHLMC* indicates whether the loan was acquired by Freddie Mac. *Purchase* indicates whether the loan was a purchase loan. *Rate-term* indicates whether the loan was a rate-term refinance. *Cash-out* indicates whether the loan was a cash-out refinance. *FICO* is the FICO credit score. *DTI* is the debt-to-income ratio. *LTV* is the loan to value ratio on origination. *Amount* is the loan amount in thousands of dollars. *Post* indicates months after March 2020, when there was an alignment of appraisal waiver eligibility criteria between Freddie Mac and Fannie Mae. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

loans yields a number of additional insights. First, the fact that the gap in appraisal waiver shares between the Enterprises in 2019 largely closed for the set of eligible loans provides additional evidence that Freddie Mac exhibited a lower appraisal waiver share during this time primarily because of its more restrictive eligibility requirements. Second, the waiver share generally remained below 60%, which suggests that factors other than eligibility had a substantial effect on the use of appraisal waivers.[13]

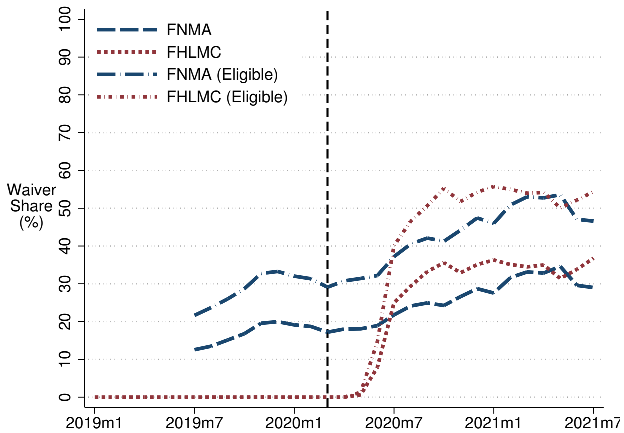
Figure 3 compares the prevalence of appraisal waivers for different loan purpose categories. Figure 3a indicates that the appraisal waiver share for Freddie Mac loans increased especially dramatically for cash-out refinance loans shortly after Freddie Mac expanded its eligibility criteria, increasing from virtually zero in March 2020 to around 35% in November. Figure 3b shows that the alignment of the Enterprises' eligibility criteria was also associated with an acceleration in the use of appraisal waivers for rate-term refinance loans, as reflected in the convergence between the appraisal waiver shares for the full sample and the subsample of eligible loans. By contrast, the appraisal waiver share for purchase loans, which are not affected by the alignment of the eligibility criteria, increased more modestly. By mid-2021, the appraisal waiver share was only around 10% for purchase loans compared to around 60% for rate-term refinance loans. Differences in the strictness of eligibility within loan purpose groups can explain some of the difference. In particular, after the alignment of the Enterprises' eligiblity criteria, both Enterprises only required a 10% downpayment for a refinance loan but required a 20% downpayment for a purchase loan. However, sizable differences remain even when restricting to the set of eligible loans.

Figure 4 compares the prevalence of appraisal waivers based on whether the servicer is a bank or nonbank. For both Enterprises, nonbanks generally exhibited higher rates of appraisal waivers. Nonbank servicers of Freddie Mac loans increased the share of appraisals particularly dramatically after the alignment of the Enterprises' eligibility criteria, although the difference between bank and nonbank servicers diminished starting in late 2020. When restricting to the set of eligible loans, the difference between banks and nonbanks widens, particularly for Freddie Mac. The larger gap for the set of eligible loans suggests that nonbanks tend to more often underwrite loans that ineligible, even though they are also more likely to use an appraisal waiver for loans that are eligible. Consistent with these aggregate results, Figure 5 shows that the appraisal waiver shares of loans acquired by Freddie Mac

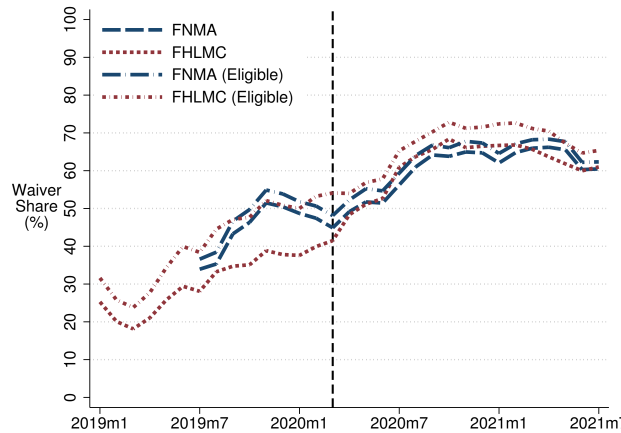
[13] Reasons for ineligibility that are not observed may have also limited the waiver share.

Figure 3: Appraisal Waiver Share by Loan Purpose

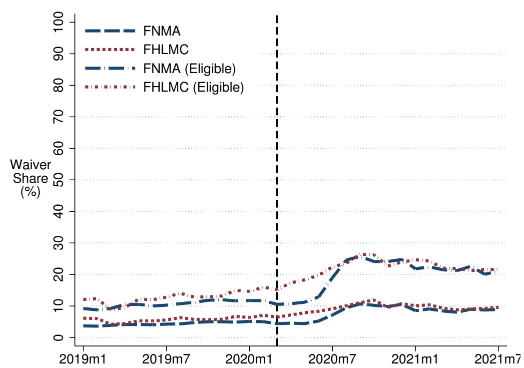
(a) Cash-out



(b) Rate-term



(c) Purchase



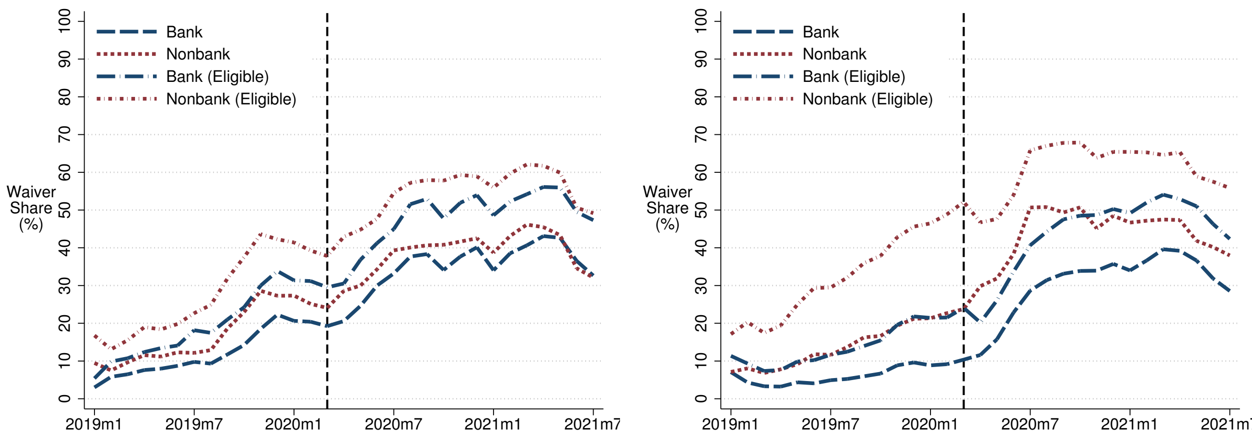
Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for purchase loans, share-term refinances, and cash-out refinances as well as for a subsample of loans that were approximately eligible for a waiver within each of these groups. Approximate eligibility is determined by the loan-to-value limits in Table 1 and omitting loans for manufactured housing and co-ops. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. Note that some series are curtailed since the data for Fannie Mae does not distinguish between cash-out and rate-term refinances before July 2019. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

for United Wholesale Mortgage and Quicken Loans, the two largest nonbank servicers in the sample, increased abruptly in 2020 and peaked at around 90% and 70%, respectively. The appraisal waiver share at Wells Fargo, the largest bank servicer, generally increased more gradually and evenly between the two Enterprises.

Figure 4: Appraisal Waiver Share by Servicer Type: Bank vs Nonbank

(a) Fannie Mae

(b) Freddie Mac



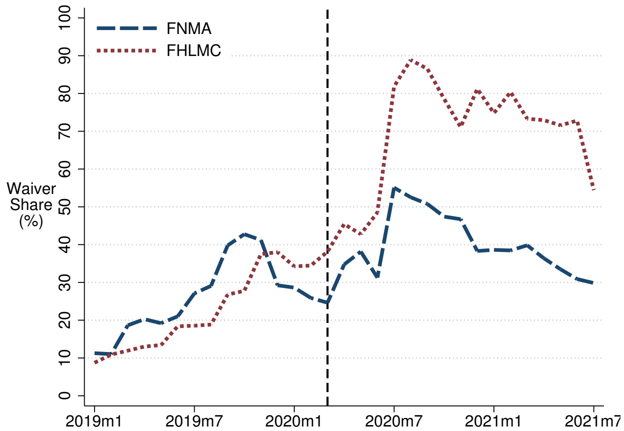
Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for loans serviced by banks and nonbanks as well as for a subsample of loans that were approximately eligible for a waiver within each of these groups. Approximate eligibility is determined by the loan-to-value limits in Table 1 and omitting loans for manufactured housing and co-ops. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

Figure 6 compares the prevalence of appraisal waivers based on the borrower's credit score. Credit score does not determine eligibility for an appraisal waiver, but it could be correlated with factors that do affect eligibility, such as the LTV ratio, or it could affect the willingness of an Enterprise, borrower, or lender to all agree to an appraisal waiver conditional on the loan satisfying the eligibility criteria. While both Enterprises have higher appraisal waiver shares for loans with FICO scores above 750, Freddie Mac has a notably higher share for loans with FICO scores below 750. In addition, both Enterprises exhibit little differentiation in appraisal waiver shares between loans with FICO scores below 700 and loans with FICO scores between 700 and 750.

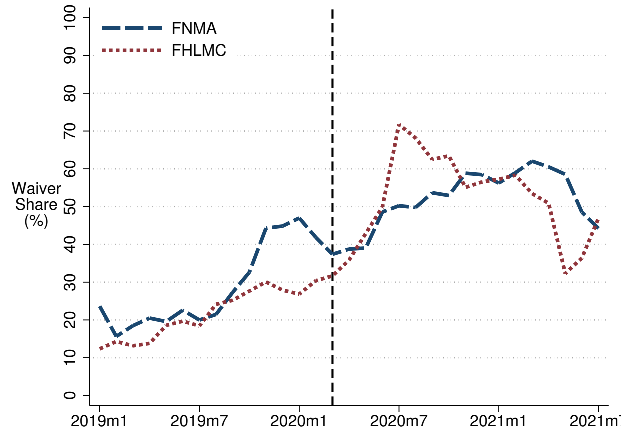
Section A in the appendix shows the association between appraisal waivers and various additional attributes.

Figure 5: Appraisal Waiver Share for United Wholesale Mortgage, Quicken, and Wells Fargo

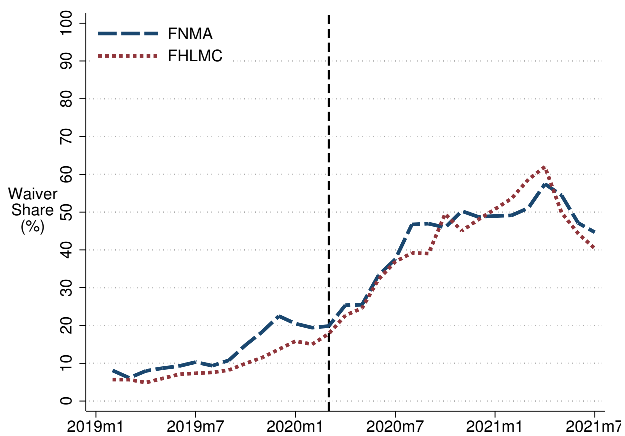
(a) United Wholesale Mortgage



(b) Quicken Loans



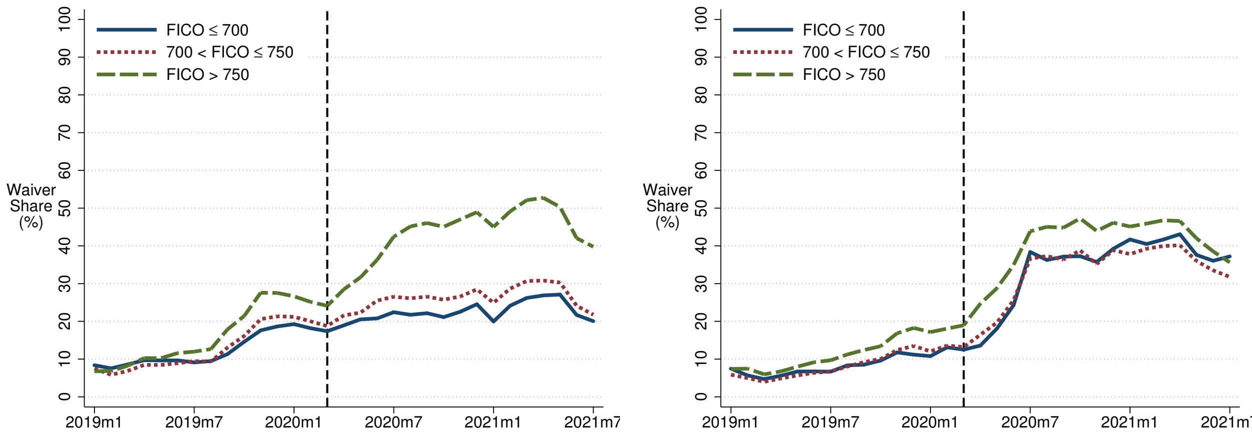
(c) Wells Fargo



Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for United Wholesale Mortgage, Quicken Loans, and Wells Fargo. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

Figure 6: Appraisal Waiver Share by FICO

(a) Fannie Mae (b) Freddie Mac



Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for loans with FICO scores less than 700, between 700 and 750, and greater than 750. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

2.3 Regression analysis

This section implements a regression analysis to assess the joint association between appraisal waivers and many of the characteristics considered in Section 2.2. For example, Section 2.2 shows that appraisal waivers are more common for refinance loans and loans serviced by nonbanks, but this association could possibly be driven by correlations with other characteristics that are also associated with the use of appraisal waivers, such as risk, loan amount, or location.

We estimate variations of the following specification:

$$\begin{aligned} 100 * waiver_{it} = {} & \beta_1 FHLMC_{it} + \beta_2 rateterm_{it} + \beta_3 cashout_{it} \\ & + \beta_4 nonbank_{it} + \gamma X_{it} + \psi_t + \epsilon_{it} \end{aligned} \tag{1}$$

where $waiver_{it}$ indicates whether an appraisal waiver was used for loan i whose respective pool has an age of 1 month at month t, $FHLMC_{it}$ indicates whether the loan was acquired by Freddie Mac, $rateterm_{it}$ indicates whether the loan is a rate-term refinance, $cashout_{it}$ indicates whether the loan is a cash-out refinance, $nonbank_{it}$ indicates whether the servicer is a nonbank, X_{it} is a set of controls that includes FICO score, debt-to-income ratio, loan to value ratio, the logarithm of the loan amount, and indicators for occupancy type and state, and ψ_t indicates month fixed effects.

Column (1) of Table 3 shows the results from estimating a baseline version of equation (1) during the period before the alignment of the Enterprises' eligibility criteria, which correponds to January 2019 to March 2020. Consistent with the figures in Section 2.2, refinance loans and loans serviced by nonbanks exhibit a higher appraisal waiver share, while loans acquired by Freddie Mac exhibit a lower appraisal waiver share. Column (2) restricts to the set of loans satisfying the basic eligibility criteria, in which case there is a notably stronger association between appraisal waivers and nonbanks. Additionally, the association between appraisal waivers and Freddie Mac becomes slightly positive. Column (3) adds the control variables. Appraisal waivers are more likely to be used for loans that appear to be safer in some respects, such as having a higher credit score or lower debt-to-income ratio, although they are also more likely to be used for loans with higher LTV ratios conditional on satisfying the eligibility limits. They are also associated with higher loan amounts. In terms of magnitudes, appraisal waivers are 30% more common for rate-term refinance loans compared to purchase loans, 12% more common for cash-out refinance loans compared to purchase loans, 10% more common for loans serviced by a nonbank compared to loans that are not, and 3% more common for Freddie Mac loans.

Columns (4)-(6) estimate an analogous series of regressions except for the period after the alignment of the Enterprises' eligibility criteria, which corresponds to April 2020 to July 2021. The association between appraisal waivers and nonbanks or Freddie Mac is similar compared to the earlier period, while both types of refinance loans become even more strongly associated with appraisal waivers compared to purchase loans. In particular, appraisal waivers became 41% more common for rate-term refinance loans compared to purchase loans and 21% more common for cash-out refinance loans. Appraisal waivers also appear to be more strongly associated with safer loans, as the positive correlation with credit score and the negative correlation with the debt-to-income ratio both increased in magnitude while the positive correlation with the LTV ratio diminishes. However, the association between appraisal waivers and loan size diminished.[14]

[14]In unreported results, we also find that larger servicers are positively associated with the use of appraisal waivers both before and after the change of the eligibility criteria.

Table 3: Determinants of Appraisal Waiver Prevalence

	(1) Pre	(2) Pre	(3) Pre	(4) Post	(5) Post	(6) Post
FHLMC	-4.541***	0.814***	0.317*	1.505***	3.020***	2.371***
	(-46.09)	(4.25)	(1.68)	(17.97)	(27.76)	(22.08)
Rate-term	33.666***	32.657***	31.010***	52.380***	42.921***	40.763***
	(207.90)	(156.92)	(143.83)	(608.46)	(322.26)	(290.81)
Cash-out	2.060***	13.796***	13.731***	18.244***	22.389***	20.929***
	(19.37)	(41.29)	(38.87)	(170.34)	(128.52)	(111.86)
Nonbank	5.472***	11.315***	9.467***	6.658***	10.077***	9.435***
	(57.47)	(63.11)	(52.20)	(78.19)	(89.43)	(83.21)
FICO			0.052***			0.133***
			(26.04)			(104.99)
DTI			-0.076***			-0.128***
			(-8.52)			(-23.52)
LTV			0.054***			0.006
			(7.85)			(1.45)
Log(amount)			3.076***			-0.338***
			(16.81)			(-2.73)
Observations	422,545	212,025	212,025	1,038,610	736,082	736,082
R^2	0.196	0.165	0.198	0.248	0.139	0.185
Eligible sample	No	Yes	Yes	No	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	No	No	Yes	No	No	Yes
Occupancy FE	No	No	Yes	No	No	Yes

Notes: This table presents results from estimating variations of the regression equation $100 * waiver_{it} = \beta_1 FHLMC_{it} + \beta_2 rateterm_{it} + \beta_3 cashout_{it} + \beta_4 nonbank_{it} + \gamma X_{it} + \psi_t + \epsilon_{it}$, where $waiver_{it}$ indicates whether an appraisal waiver was used for loan i whose respective pool has an age of 1 month at month t, $FHLMC_{it}$ indicates whether the loan was acquired by Freddie Mac, $rateterm_{it}$ indicates whether the loan is a rate-term refinance, $cashout_{it}$ indicates whether the loan is a cash-out refinance, $nonbank_{it}$ indicates whether the servicer is a nonbank, X_{it} is a set of controls that includes FICO score, debt-to-income ratio, loan to value ratio, the logarithm of the loan amount, and indicators for occupancy type and state, and ψ_t indicates month fixed effects. Columns (1) estimates a baseline specification for all loans in the period before the Enterprises' eligibility criteria were aligned (January 2019 to March 2020). Column (2) restricts to the subsample of loans that were approximately eligible for an appraisal waiver. Approximate eligibility is determined by the loan-to-value limits in Table 1 and omitting loans for manufactured housing and co-ops. Column (3) adds controls. Columns (4)-(6) are analogous for the period from April 2020 to July 2021. T-statistics computed using heteroskedasticity-consistent standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

3 Appraisal Waivers and Prepayment Speeds

In this section, we first outline hypotheses for how appraisal waivers could be associated with faster prepayment speeds. We then show that other determinants of prepayment speeds can explain much but not all of the positive association between appraisal waivers and faster prepayment speeds. Finally, we find evidence consistent with the efficiency gains of appraisal waivers leading to faster prepayment speeds by showing that the association is stronger for purchase loans and during periods when refinancing activity is high.

3.1 Hypotheses

Appraisal waivers could be associated with faster prepayments due to a joint correlation with observables, a joint correlation with unobservables, or a direct causal relationship. Identifying the source of the association is important for public and business policy purposes. In the first case, directly controlling for the appraisal waiver share at each Enterprise is not likely to be important to ensure prepayment alignment, as UMBS investors and the Enterprises can instead assess prepayment risk based on the underlying causes. One argument that appraisal waivers are correlated with, but do not cause, increased prepayment speeds is based on the observation that loans that are eligible for an appraisal waiver are generally less risky, as they must satisfy limits on the LTV ratio that are particularly strict for cash-out refinances, secondary homes, and investment properties. In particular, loans with low LTVs and collateralized by primary residences may be likely to prepay faster because they are subject to less stringent underwriting standards and are more likely to be offered attractive interest rates.[15]

If, however, the relationship between appraisal waivers and prepayment speeds cannot be explained by observable characteristics, then a key question is how the use of an appraisal waiver in a previous refinancing could be independently predictive of a loan's prepayment speed. On the one hand, appraisal waivers could be associated with faster prepayment speeds due to a joint correlation with unobservables. For example, a borrower who accepts an appraisal waiver offer may generally be more proactive about financial opportunities. On the other hand, appraisal waivers could directly cause faster prepayment speeds.[16] For

[15]Gerardi, Willen and Zhang (2020) find that the LTV ratio is negatively associated with prepayment due to refinancing.

[16]Note that the relevance of identifying a direct causal effect may depend on the application. For MBS pricing, the implications are similar as long as appraisal waivers predict repayment speeds independently of observable characteristics.

example, a borrower who uses an appraisal waiver for the first time may come to believe that it reduces the hassle of the mortgage transaction process, which could reduce the anticipated inconvenience of future refinances. Additionally, servicers may solicit refinances more aggressively to borrowers who used an appraisal waiver on their existing loan, as they might expect such borrowers to be more likely to accept an appraisal waiver in future transactions and therefore yield the associated efficiency benefits.[17]

3.2 Data

Similar to Section 2, we use RiskSpan data for loans included in MBS that were issued from January 2019 to July 2021. We measure prepayment speeds using the conditional prepayment rate (CPR), which is an estimate of the portion of a loan's principal that is likely to be repaid early. Since there is relatively little variation in the CPR for newly issued loans, our main sample instead focuses on loans in MBS pools with an age of 12 months. We use a 10% random sample from this set of loans. Table 4 presents summary statistics for all of these characteristics in the sample used for this analysis.[18] The average CPR at 12 months is about 33%.

3.3 Graphical analysis

Figure 2a shows the average CPR for pools with an age of 12 months for loans with or without an appraisal waiver. During 2020, which corresponds to loans issued in 2019, the loans with an appraisal waiver exhibited a CPR that was about 3 to 9 percentage points higher. To graphically assess whether using an appraisal waiver causes a loan to prepay faster than other loans with similar credit and borrower characteristics, we examine prepayment speeds for a group of mortgages within the same cohort and with similar credit characteristics. Figure 2b shows the prepayment speeds for purchase mortgages included in the Freddie Mac 2019 3.0 coupon cohort that have a FICO score greater than 720, LTV less than or equal to 80 percent, and loan size between $200,000 and $400,000. Consistent with Figure 2a, loans with a prior appraisal waiver exhibited a higher CPR throughout 2020, although the difference in 2b is smaller than the one in 2a.[19]

The figures also show that the average CPR and the increase in CPRs associated with

[17] Aside from efficiency, lenders also benefit from relief from representations and warranties on the value, condition, and marketability of the property.

[18] Note that restricting to older loans reduces the sample size compared to Section 2.

[19] Note that there is also some variation among servicers. For example, we find in unreported results that appraisal waivers are associated with faster prepayment speeds for United Wholesale Mortgage and Wells Fargo for at least part of the sample period but not as much for Quicken Loans.

Table 4: Summary Statistics for Prepayment Speed Analysis

	N	Mean	SD	P25	P75
CPR (%)	600,424	32.851	19.086	17.384	50.054
Waiver	600,424	0.208	0.406	0.000	0.000
FHLMC	600,424	0.435	0.496	0.000	1.000
Purchase	600,424	0.467	0.499	0.000	1.000
Rate-term	600,424	0.334	0.472	0.000	1.000
Cash-out	600,424	0.199	0.399	0.000	0.000
Nonbank	600,424	0.551	0.497	0.000	1.000
FICO	600,424	751.518	43.469	722.000	787.000
DTI (%)	600,424	34.645	9.654	28.000	43.000
LTV (%)	600,424	74.630	17.144	65.000	89.000
Amount ($1000s)	600,424	257.216	123.149	164.000	333.000
Coupon (%)	600,424	3.024	0.645	2.500	3.500
Post	600,424	0.363	0.481	0.000	1.000

Notes: *CPR* is the conditional prepayment rate. *Waiver* indicates whether a loan uses an appraisal waiver (property inspection waiver). *FHLMC* indicates whether the loan is acquired by Freddie Mac. *Purchase* indicates whether the loan is a purchase loan. *Rate-term* indicates whether the loan is a rate-term refinance. *Cash-out* indicates whether the loan is a cash-out refinance. *FICO* is the FICO credit score. *DTI* is the debt-to-income ratio. *LTV* is the loan to value ratio on origination. *Amount* is the loan amount in thousands of dollars. *Coupon* is the coupon. *Post* indicates months starting in April 2021. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

appraisal waivers simultaneously diminished starting around April 2021. One potential explanation is that, during 2020, historically low mortgage rates brought about an environment in which lenders and appraisers became so capacity-constrained that loans with appraisal waivers may have been prioritized due to their shorter processing time. In particular, lenders may have anticipated that borrowers who used an appraisal waiver on their existing loan would be more likely to accept an appraisal waiver in future transactions. Beginning in the second quarter of 2021, as refinance applications started to decline, lenders and appraisers became less capacity-constrained, and the efficiency advantages of an appraisal waiver became less urgent.

For additional evidence on the role of capacity constraints, a typical benchmark is the primary/secondary (P/S) spread, as shown in Figure 7.[20] The long-term historical P/S spread is around 100 basis points (bps). Beginning in the second half of 2019, as mortgage rates start to decline, the P/S spread jumped from 80 bps to as high as 140 bps. Since then, the P/S spread continued moving up and reached a historic high of over 200 bps before settling around 130 bps during the first half of 2021, indicating a relaxation of capacity constraints. This relaxation of capacity constraints is simultaneous with the diminishing association between appraisal waivers and prepayment speeds, which is consistent with the explanation that appraisal waivers have a larger effect on prepayment speeds when lenders face capacity constraints.

3.4 Regression analysis

This section generalizes the approach in Figure 2b by estimating a regression to assess how appraisal waivers affect prepayment speeds while controlling for a variety of servicer, borrower, and loan characteristics.

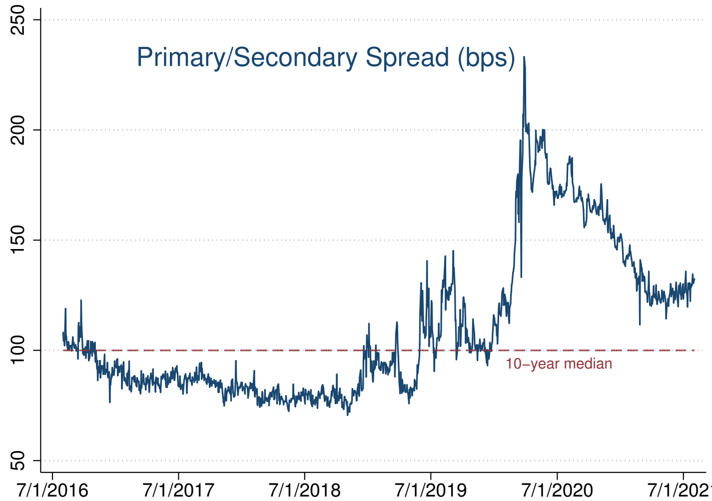
We estimate variations of the following specification:

$$\begin{aligned} CPR_{it} = {} & \beta_1 waiver_{it} + \beta_2 FHLMC_{it} + \beta_3 rateterm_{it} + \beta_4 cashout_{it} \\ & + \beta_5 nonbank_{it} + \gamma X_{it} + \psi_t + \epsilon_{it} \end{aligned} \tag{2}$$

where CPR_{it} indicates the CPR for a loan i whose MBS pool age is 12 months in month t, $waiver_{it}$ indicates whether the loan used an appraisal waiver, $FHLMC_{it}$ indicates whether

[20] Fuster, Lo and Willen (2017) show that the price of intermediation is positively associated with application volume, consistent with capacity constraints.

Figure 7: Mortgage Primary/Secondary Spread



Data source: Bloomberg.

the loan was acquired by Freddie Mac, $rateterm_{it}$ indicates whether the loan is a rate-term refinance, $cashout_{it}$ indicates whether the loan is a cash-out refinance, $nonbank_{it}$ indicates whether the servicer is a nonbank, X_{it} is a set of controls that includes FICO score, debt-to-income ratio, loan to value ratio, the logarithm of the loan amount, the coupon, and indicators for occupancy type and state, and ψ_t indicates issue month fixed effects.[21,22]

Column (1) of Table 5 shows the results from estimating a baseline version of equation (2) from January 2020 to March 2021, that is, up to the shift in April 2021. Consistent with Figure 2a, appraisal waivers were associated with faster prepayment speeds by a margin of about 6.7%. When controls are added in Column (2), the association becomes weaker but remains positive and significant, with an appraisal waiver being associated with a 1.5% higher CPR. Column (2) also shows that prepayment speed is positively associated with

[21] We focus on the CPR when the MBS pool age is 12 months because CPRs at shorter durations exhibit less variation and are more concentrated near zero. In unreported results, we find qualitatively similar, albeit somewhat smaller, results if we estimate a specification with an observations for each loan and month while also including issue month $\times$ CPR month fixed effects.

[22] In unreported results, we find qualitatively similar, albeit somewhat smaller, results if we include servicer fixed effects instead of an indicator for nonbanks.

both types of refinances, nonbanks, and Freddie Mac.[23] Column (3) shows that appraisal waivers have a relatively weaker effect on prepayment speeds for refinances and Freddie Mac loans.

The stronger effect of appraisal waivers on prepayment speeds for purchase loans is consistent with the hypothesis that appraisal waivers mitigate barriers to refinance. In particular, existing refinance loans may tend to prepay faster when interest rates are low because the borrowers already have a relatively low barrier to refinance. An appraisal waiver has relatively little effect for these borrowers because they are more likely to refinance when it is profitable. By contrast, a borrower of a purchase mortgage may be more likely to perceive more of hassle associated with applying for refinance, even if it is profitable. A borrower who uses an appraisal waiver may come to view the mortgage transaction process as less of a hassle, which could increase the propensity to refinance when it is profitable.

Columns (4)-(6) estimate an analogous series of regressions except for the period from April 2021 to July 2021. The association between appraisal waivers and prepayment is much weaker, although it is still positive and statistically significant. The effect of appraisal waivers on prepayment speeds continues to be strongest for purchase loans.

4 Conclusion

This paper shows that the use of appraisal waivers is affected by not only the Enterprises' eligibility criteria but also various loan, servicer, and borrower characteristics, such as loan purpose, nonbank status, and credit score. These characteristics can explain much but not all of the association between appraisal waivers and prepayment speeds. We find evidence that the efficiency advantages of appraisal waivers could also contribute to prepayment speeds, as the association with prepayment speeds is weaker for refinance loans, which are more likely to be made by borrowers who already have low barriers to refinance, and stronger when refinancing incentives are high, in which case lenders are more likely to face capacity constraints. These hypotheses regarding the effect of appraisal waivers on prepayment speeds could be further tested using more detailed data distinguishing the decisions of borrowers

[23] The positive association between refinance loans and prepayments during a low interest rate environment is consistent with Agarwal, Rosen and Yao (2015), who find that borrowers with previous refinancing experience are less likely to wait too long to refinance. The positive association between nonbanks and refinance loans is similar to the findings in Buchak et al. (2018), who use the Fannie Mae and Freddie Mac Single Family Loan Performance Data, and Fuster et al. (2019), who use Equifax's Credit Risk Insight Servicing McDash data.

Table 5: Determinants of Prepayment Speed

	(1) Pre	(2) Pre	(3) Pre	(4) Post	(5) Post	(6) Post
Waiver	6.708***	1.501***	2.259***	0.864***	0.544***	1.365***
	(79.55)	(20.90)	(12.79)	(15.88)	(9.61)	(8.00)
FHLMC		1.048***	1.166***		0.542***	0.511***
		(22.14)	(22.73)		(10.75)	(7.73)
Rate-term		1.522***	1.730***		1.499***	1.631***
		(23.85)	(24.56)		(22.55)	(22.03)
Cash-out		1.943***	1.962***		2.314***	2.311***
		(27.69)	(27.02)		(26.96)	(24.68)
Nonbank		5.253***	5.157***		3.768***	3.951***
		(105.77)	(96.98)		(69.95)	(58.61)
Waiver × FHLMC			-1.114***			0.143
			(-8.30)			(1.46)
Waiver × Rate-term			-1.347***			-0.668***
			(-8.19)			(-4.03)
Waiver × Cash-out			-0.955***			-0.228
			(-3.95)			(-1.10)
Waiver × Nonbank			0.922***			-0.591***
			(6.64)			(-5.80)
Observations	382,195	382,195	382,195	218,228	218,228	218,228
R^2	0.037	0.452	0.453	0.258	0.429	0.429
Issue Month FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	No	Yes	Yes	No	Yes	Yes
Occupancy FE	No	Yes	Yes	No	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes

Notes: This table presents results from estimating variations of the regression equation $CPR_{it} = \beta_1 waiver_{it} + \beta_2 FHLMC_{it} + \beta_3 rateterm_{it} + \beta_4 cashout_{it} + \beta_5 nonbank_{it} + \gamma X_{it} + \psi_t + \epsilon_{it}$, where CPR_{it} indicates the CPR at a MBS pool age of 12 months for a loan i at month t, $waiver_{it}$ whether the loan used an appraisal waiver, $FHLMC_{it}$ indicates whether the loan was acquired by Freddie Mac, $rateterm_{it}$ indicates whether the loan is a rate-term refinance, $cashout_{it}$ indicates whether the loan is a cash-out refinance, $nonbank_{it}$ indicates whether the servicer is a nonbank, X_{it} is a set of controls that includes FICO score, debt-to-income ratio, loan to value ratio, the logarithm of the loan amount, the coupon, and indicators for occupancy type and state, and ψ_t indicates issue month fixed effects. Column (1) estimates the baseline correlation between CPR and the use of appraisal waivers with only issue month fixed effects during the period from January 2020 to March 2021, column (2) adds controls, and column (3) adds interactions of $waiver_{it}$. Columns (4)-(6) are analogous for the period from April 2021 to July 2021. T-statistics computed using heteroskedasticity-consistent standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

and lenders to accept or reject an appraisal waiver offer, which we leave for future research. Another consideration for future research is to further examine the relative speeds at which different lenders adapted to the change in the appraisal waiver eligibility conditions, perhaps with a specific focus on the agility of fintechs or the needs of lenders specializing in rural housing.

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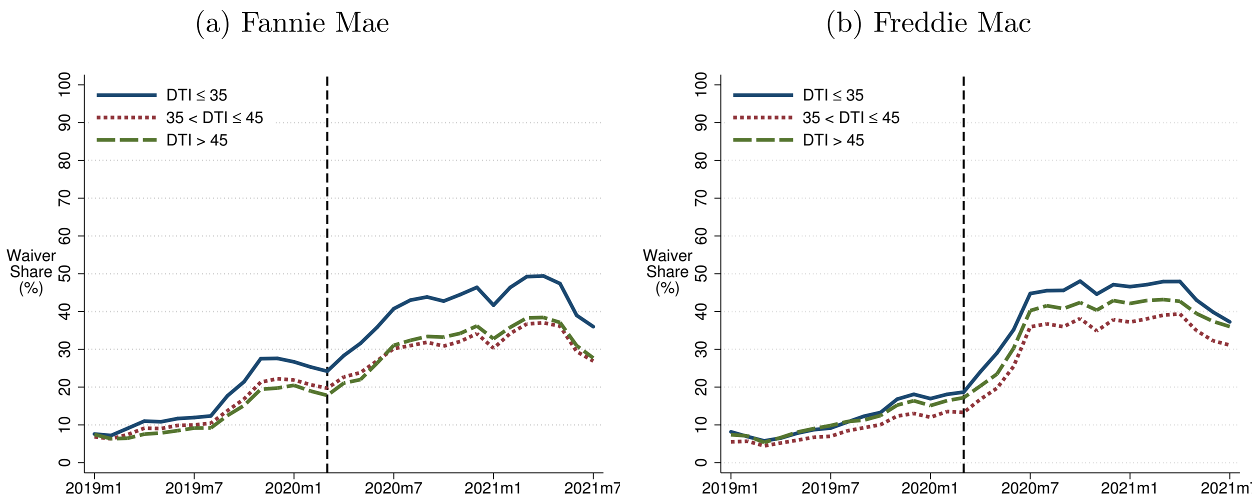
Appendix

A Appraisal Waiver Prevalence: Additional Results

This section extends the graphical analysis of appraisal waiver prevalence from Section 2.2 to an additional set of attributes.

Figure 8 shows that appraisal waivers are more common for borrowers with lower debt-to-income (DTI) ratios, particularly less than 35%, even though DTI also does not directly affect appraisal waiver eligibility.

Figure 8: Appraisal Waiver Share by Debt-to-Income Ratio



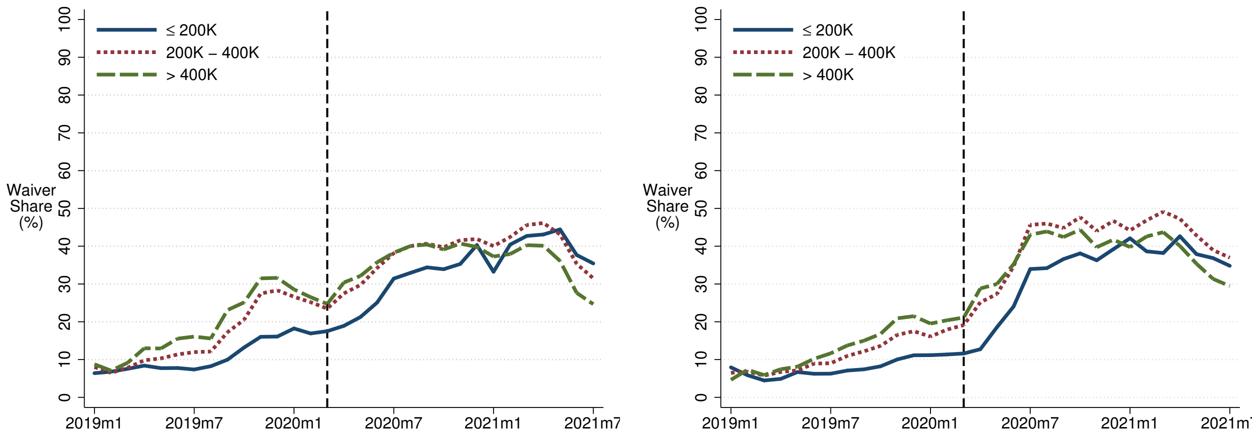
Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for loans with debt-to-income (DTI) less than 35, between 35 and 45, and greater than 45. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

Figure 9 shows that medium-sized loans between \$200K and \$400K exhibit the highest appraisal waiver shares for both Enterprises, while loans under \$200K have the lowest shares.

Finally, Figure 10 shows that, among California, Texas, and Florida, the three largest states in the sample, California has the highest appraisal waiver share, reaching around 50-60% by mid-2020 compared to less than 40% for the other two states.

Figure 9: Appraisal Waiver Share by Loan Size

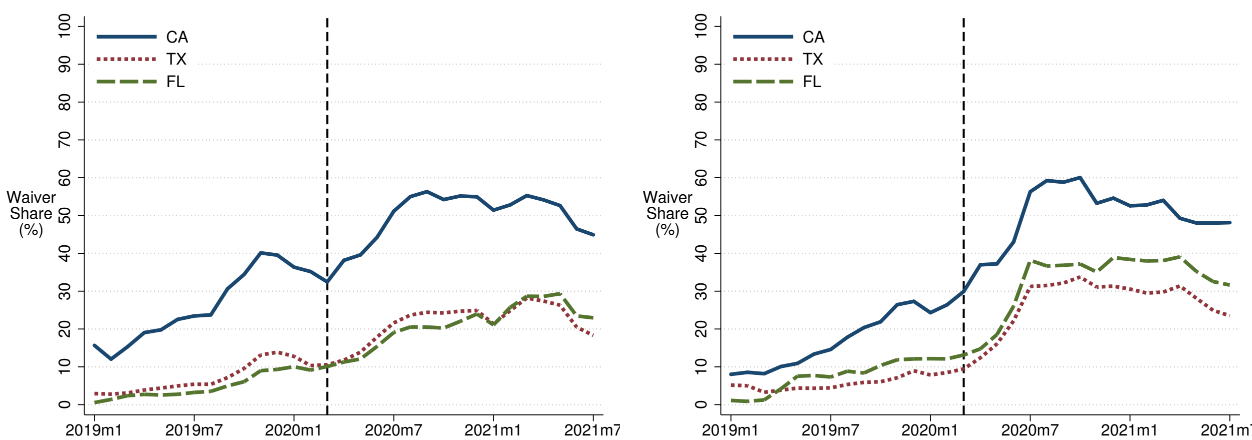
(a) Fannie Mae (b) Freddie Mac



Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for loans with less than \$200,000, between \$200,000 and \$400,000, and greater than \$400,000. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.

Figure 10: Appraisal Waiver Share for Selected Large States

(a) Fannie Mae (b) Freddie Mac



Notes: This figure shows the share of appraisal waivers for Fannie Mae and Freddie Mac for loans in California, Texas, and Florida. The dashed line in March 2020 marks the approximate date at which the Enterprises' eligibility critera were aligned. The date corresponds to the month when a loan's respective MBS pool age is 1 month. Data source: Enterprises' UMBS disclosures accessed via RiskSpan.