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# Time on Market and the Cash Discount for Condos

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**Abstract**

*We investigate whether the cash discount for condos is affected by time on market (TOM). Theoretically and empirically, we show that the cash discount has two components: First, condos purchased with cash sell at a discount compared to mortgage-financed condos, which is in line with the cash discount identified in the housing literature. The second component is a TOM-variable cash discount that increases the longer a condo is on the market. In addition, our empirical analysis suggests the cash discount only exists for low-price condos and disappears in higher price segments. In particular, for low-price condos, the cash discount comprises of a 9.42% fixed cash discount and 0.1% per day TOM-variable cash discount. Our results suggest TOM represents an additional explanation for the cash discount in condos and moderates the relation between cash purchase and sales price.*

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## ABSTRACT

*We investigate whether the cash discount for condos is affected by time on market (TOM). Theoretically and empirically, we show that the cash discount has two components: First, condos purchased with cash sell at a discount compared to mortgage-financed condos, which is in line with the cash discount identified in the housing literature. The second component is a TOM-variable cash discount that increases the longer a condo is on the market. In addition, our empirical analysis suggests the cash discount only exists for low-price condos and disappears in higher price segments. In particular, for low-price condos, the cash discount comprises of a 9.42% fixed cash discount and 0.1% per day TOM-variable cash discount. Our results suggest TOM represents an additional explanation for the cash discount in condos and moderates the relation between cash purchase and sales price.*



**Keywords:** Housing Market, Condominiums, Cash Financing, Time on Market.

## Introduction

Previous studies have identified a discount for cash transactions compared to mortgage-financed transactions in the housing market (Seo, Holmes and Lee, 2021; Jauregui, Tidwell and Sah, 2019; Tidwell et al., 2018; Jauregui, Tidwell and Hite, 2017; Asabere, Huffman and Mehdian, 1992). This cash discount is hypothesized to be the result of the eliminated uncertainty regarding a buyer's mortgage eligibility and the resulting reduced closing time (Jauregui, Tidwell and Sah, 2019; Allen et al., 2018; Jauregui, Tidwell and Hite, 2017). However, it can be argued that this is only one explanation for the discount to sale prices for cash transactions. Another possible explanation represents time on market (TOM), which has been largely ignored by previous studies investigating the cash discount in housing markets.

In this paper, we develop a model to demonstrate that the cash discount has two components. The first component is fixed and reflects the cash discount when TOM is very short, i.e., one day. The second component is TOM-variable and increases the longer a property is on the market. However, our theoretical model suggests that the cash discount should be more pronounced in lower price segments.

In our empirical investigation, we focus on condos for the following reasons: First, a larger share of condos is bought with cash. As an example, Seo, Holmes and Lee (2021) find cash transactions are more common for condos than single-family homes in Tallahassee, Florida. This is in line with Hansz and Hayunga (2012), who show that compared to single-family homes, condos in the Village of Pinehurst, North Carolina were more frequently bought with cash. In 2011, 53.4% of all condo sales in Cook County, IL were cash transactions, while only 38% of all single-family home transactions were cash-only. In fact, over the period from 2005 to 2011, cash

transactions for condos increased from 17.1% to 53.4% (Institute for Housing Study at DePaul University, 2012). In February 2019, condos represented 54.7% of all cash purchases in Miami, FL, while single-family home sales only represented 22.7% (Gerrity, 2019). One explanation for the higher share of cash sales for condos is related to mortgage financing. Generally speaking, condo buyers face stricter mortgage lending requirements, higher down-payments and interest rates than single-family home buyers[1]. Another explanation is that the condo market attracts more buyers who purchase condos as an investment to rent out to long- or short-term tenants, as a vacation property or to flip. These buyers are more likely to pay with cash. Our second motivation to focus on the condo market is driven by the fact that, with the exception of Seo, Holmes and Lee (2021) and Hansz and Hayunga (2012), previous cash discount studies focus on attached or detached (fee simple) single-family housing and neglect condos.

Using a sample of condo transactions over the period of 1993 to 2020 from the Virginia Beach-Norfolk MSA, we provide empirical evidence for 1) a fixed and 2) a TOM-variable component of the cash discount, which is in line with our theoretical model. However, the fixed and TOM-variable cash discount only exist for low-price condos. In particular, we find a 9.42% discount for low-price condos purchased with cash compared to conventional mortgage (fixed component or main effect) and an additional 0.1% discount for each day a condo is on the market (TOM-variable component or interaction effect). These findings suggest that the cash discount increases, the longer a condo is on the market. For a condo that has been on the market for 30 days, the total cash discount is 12.42% (9.42% fixed plus 3% TOM-variable) while for a condo with a TOM of 90 days, the total cash discount is 18.42%. The cash discounts disappear for mid/high and high-price condos. For low/mid-price condos, we find a fixed cash premium and TOM-variable

[1] See https://www.mortgageloan.com/whats-different-about-getting-condo-mortgage-9895#The-rate-may-be-higher.

discount. Further analysis suggests our results are driven by non-crisis periods characterized by easier and cheaper access to financing. We do not find evidence of a cash discount during the crisis period from 2008 to 2011. Our results differ from the results of Seo, Holmes and Lee (2021) and Tidwell et al. (2018) who find cash sales are more common in periods of constrained mortgage availability. Explanations for this difference include condo buyer characteristics and their access to capital.

Our study contributes to the literature on the cash discount in the housing market in a number of ways. We complement earlier studies focusing on single-family homes (Jauregui, Tidwell and Sah, 2019; Tidwell et al., 2018; Jauregui, Tidwell and Hite, 2017; Asabere, Huffman and Mehdian, 1992) by providing insights into the impact of cash purchases on sales prices in the context of condos. Hereby, it complements two previous studies that include condos in their investigation: Seo, Holmes and Lee (2021) combine condos with attached and detached single-family homes in their sample, but do not present separate results for each housing segment. Hansz and Hayunga (2012) present separate results for condos, but have a relatively small sample of 206 transactions, which introduces the issue of low statistical power. We add to the literature by providing theoretical and empirical evidence that the cash discount actually has two components – a fixed and a TOM-variable one. Our findings also suggest considering the TOM of a transaction is important for future investigations into the cash discount in housing markets.

## Literature Review

Several previous studies provide evidence for a price discount associated with cash-only residential transactions. Using a sample of row home sales, Asabere, Huffman and Mehdian (1992) find a 13% discount to sales prices for cash transactions compared to mortgage-financed transactions. Similarly, Lusht and Hansz (1994) find a 16.5% discount for cash transactions of row homes. Hansz and Hayunga (2012) are the first to separately investigate the cash discount for condos. For their sample of 206 condo transactions from the Village of Pinehurst, North Carolina, the authors do not find a relation between cash purchases and sales prices.

Jauregui, Tidwell and Hite (2017) control for the self-selection bias with regard to cash buyers in their empirical analysis and provide evidence for a cash discount in single-family home prices. Depending on the methodology used, this discount ranges from 9% to 12%. They furthermore find that an environmental disamenity in a neighborhood and financial constraints of the buyer influence the cash discount. Tidwell et al. (2018) investigate the cash discount in the context of pre- and post-recessionary environments and conclude the discount varies over time. In particular, the authors find a cash discount of 13% in pre-recessionary and 6.5% in post-recessionary conditions. Further investigating the cash discount in the context of distressed single-family home sales, the authors find a reduction of the cash discount for distressed sales from 23% (pre-recession) to 4% (post-recession). Jauregui, Tidwell and Sah (2019) show that cash-only transactions sell at a discount compared to conventional or VA mortgage financing, but at a premium to FHA financing. House and neighborhood characteristics of single-family homes purchased with cash are also superior to FHA and VA financed properties.

In a study closely related to this paper, Seo, Holmes and Lee (2021) include attached housing (condos, townhomes) and detached housing (single-family homes) in their sample and investigate the cash discount across different price segments. They show that cash transactions are more frequent for distressed, rental, and lower price segment properties. Furthermore, cash transactions are more common when mortgage availability is constrained. On average, the authors find a cash discount of 4.9%. However, upon closer examination, the cash discount is only significant in the low-price segment and varies across time with the smallest occurring before the great financial crisis (5.87%) and the highest afterwards (22.72%). The authors fail to find evidence of a cash discount in the middle and high price segment. For lower price segment transactions, the cash discount is statistically significant for distressed and rental properties.

The evidence that cash sales are more common for distressed, rental and lower price properties (Seo, Holmes and Lee, 2021) suggests that the elimination of uncertainty surrounding mortgage eligibility and reduced closing time (Jauregui, Tidwell and Sah, 2019; Jauregui, Tidwell and Hite, 2017) represent only one explanation for the cash discount. Properties purchased with cash may also fundamentally differ from mortgage-financed transactions regarding physical and locational characteristics. Seo, Holmes and Lee (2021) conclude that properties purchased with cash have fewer bed- and bathrooms and fewer amenities such as a fireplace or proximity to water. While these properties are less attractive to owner-occupying buyers, they are the type of properties professional investors target. In line with this argument, Allen et al. (2018) show that single-family homes bought by investors are commonly of lower quality, age, size and price compared with properties bought by non-investors.

Except for Lusht and Hansz (1994), previous studies investigating the cash discount ignore TOM as a predictor in their models. Focusing on attached fee simple housing in the form of row houses, Lusht and Hansz (1994) find no relation of TOM and the interaction of TOM & cash purchase with sales price. However, two possible explanations exist for their findings. First, their sample only includes about 200 transactions, and the non-significant coefficients for TOM and the interaction term could be the result of low statistical power. Second, the relation between TOM and the cash-TOM interaction effect for single-family homes (fee simple) and condos may differ. This could be a result of differences in buyer types, supply and demand characteristics, and access to financing.

**Theoretical Framework**

The argument that financing, as compared to paying with all cash, will inflate home prices, depends on the assumption that borrowers' subjective discount rate $r$ is higher than the nominal interest rate $r_0$ needed to pay on the mortgage. Typically, such a subjective discount rate is interpreted as an individual-level psychological factor (i.e., the patience or impatience that compares tomorrow's utility with today's). This assumption can also be explained in the context of consumer surplus in the standard demand-supply framework. A borrower can recognize a higher value for mortgage borrowing than the market mortgage rate due to financial constraints. These interpretations make sense when comparing the valuation across different borrowers. For example, among multiple visitors to an open house, the one who is most impatient, likely the one who is a risk taker or a lover of gambling, will be more likely to outbid others.

In this paper, we offer an alternative interpretation of this subjective discount rate, which is to ignore it as a psychological factor, and rather consider it as a measure of return from an

alternative investment in the long run. Suppose the interest rate for the 30-year fixed rate mortgage is currently 3%, such mortgage actually represents a long-term borrowing contract at 3%. Suppose a borrower has some extra cash and can earn 5% from an alternative investment, do they have any incentive to pay a little more each month or prepay the mortgage? No, because instead of paying off the same amount of liability which will generate a return of 3%, they can invest the extra money at 5%, which means they enjoy a 2% net return. When studying the effect of mortgage financing on home prices, two recent studies by Bian, Lin and Liu (2018a, 2018b) take this alternative approach and demonstrate that mortgage financing creates value to borrowers.

The question of how much of the created value can be capitalized into transaction price has been examined in the literature. Bian, Lin and Liu (2018a, 2018b), LaCour-Little, Lin and Yu (2020), and Cheng, Lin and Liu (2008) show that it depends on many factors including bargaining powers between buyers and the seller, borrowers' discount rate, financial leverage, mortgage products, as well as the number of potential buyers interested in purchasing the property. However, we differ from these studies in three important ways.

Firstly, Bian, Lin and Liu (2018a) study the effect of mortgage financing on house prices. They show properties can transact at prices well above their collateral values. Therefore, the commonly used loan-to-value (LTV) ratio suffers a bias that can significantly understate credit risk. Their simulation results suggest many mortgages originated at the peak of the housing bubble in 2006 are, in fact, already "under water" at origination. LaCour-Little, Lin and Yu (2020) derive the impact of capitalizing assumable financing into house prices for assumable FHA loans when interest rates increase, and their simulation results are economically significant and likely to partially offset declines in house prices associated with higher future mortgage rates. Cheng, Lin, and Liu (2008) examine the relation between time-on-market and house price under sequential

search with recall without mortgage financing involved. This paper extends Cheng, Lin, and Liu (2008) by incorporating the effect of mortgage financing on house prices identified in the studies by Bian, Lin and Liu (2018a), and LaCour-Little, Lin and Yu (2020).

Secondly, we focus on price discount for cash transactions (cash discount), and our paper is the first to derive a closed-form formula between the cash discount and time-on-market as well as other mortgage & housing related factors.

Thirdly, with the closed-form formulae for the cash discount, we are able to provide four testable hypotheses and identify the cash discount has two components: The first component is that properties purchased with cash sell at a discount compared to mortgage-financed ones. The second component is a TOM-variable cash discount that increases the longer a property is on the market.

By following Bian, Lin and Liu (2018a, 2018b) and LaCour-Little, Lin and Yu (2020), we assume a homebuyer borrows a loan ($D$) of fixed-rate mortgage with rate of $r_0$ and term of $T$ periods, hence the periodic mortgage payment ($PMT$) from period 1 to period $T$ should satisfy,

$$D = \sum_{t=1}^{T} \frac{PMT}{(1+r_0)^t} \tag{1}$$

Therefore,

$$PMT = D / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t}) \tag{2}$$

If the buyer has a discount rate of $r$ for their future payments, the present value of their mortgage payments can be calculated as follows,

$$PV = \sum_{t=1}^{T} \frac{PMT}{(1+r)^t} \tag{3}$$

Substituting Equation (2) into Equation (3), we have

$$PV = D \times (\sum_{t=1}^{T} \frac{1}{(1+r)^t}) / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t}) \tag{4}$$

The price premium associated with mortgage financing can thus be expressed as follows:

$$Premium = D - PV = D \times [\sum_{t=1}^{T} (\frac{1}{(1+r_0)^t} - \frac{1}{(1+r)^t})] / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t}) \tag{5}$$

The price premium identified in Equation (5) is similar to Equation (9) in Lacour-Little, Lin and Yu (2020) and the last term of Equation (12) in Bian, Lin and Liu (2018a). These two studies identify the price premium using a similar approach. How can we estimate the price premium in real world situations? Let us consider a simple example. Suppose the current interest rate for a 30-year fixed rate mortgage is 3% with a loan amount of $400,000, and there are three potential buyers who are otherwise similar except for their returns of alternative investments. Suppose Buyer A has the highest return of 8%, followed by Buyer B with 5% and Buyer C with 3%. With mortgage financing, the buyers borrow money today and will make monthly payments later. The present value of the future mortgage payments (vPMT) is determined by the discount rate of the alternative return, and the benefit of financing is thus the difference between the loan amount and vPMT (i.e., Equation (5) above). Given a 30-year fixed rate mortgage with an interest rate of 3% and a loan amount of $400,000, the monthly mortgage payment (PMT) and the benefits of financing for Buyers A, B and C with alternative returns of 8%, 5% and 3%, respectively, are as follows:

PMT=PMT(3%/12,360,$400,000,0)=-$1,686.42

The benefit for Buyer A: $400,000-vPMT(8%)=$400,000-PV(8%/12, 360, -$1,686.42, 0)

=$400,000-$229,831=$170,169

The benefit for Buyer B: $400,000-vPMT(5%)=$400,000-PV(5%/12, 360, -$1,686.42, 0)

=$400,000-$314,148=$85,852

The benefit for Buyer C: $400,000-vPMT(3%)=$400,000-PV(3%/12, 360, -$1,686.42, 0)

=$400,000-$400,000=$0

Among these three potential buyers, Buyer A would likely offer a higher price because they receive the most benefit from financing. There are many different ways to calculate the benefit of mortgage financing. We now introduce the second approach. Since Buyer A can earn 8% from an alternative investment, a 3% mortgage interest rate is relatively cheap for them, and they can save money by just taking a mortgage. How much can the buyer save every month if they borrow through a 30-year fixed rate mortgage with an interest rate of 3% and a loan amount of $400,000? We can estimate the monthly saving as follows:

PMT(8%/12,360,$400,000,0)-PMT(3%/12,360,$400,000,0)=$2,935.06-$1,686.42=$1,248.64

Therefore, with mortgage financing, the buyer can earn $1,248.69 every month for the next 360 months, which is equivalent to today's value of $170,169 (PV(8%/12, 360,-$1,248.69,0)= $170,169). In other words, the benefit associated with borrowing through a lower rate mortgage for Buyer A is $170,169 in today's dollars, which is exactly the same as calculated before.

It is worth noting that only when $r \geq r_0$, the borrower will take a mortgage; otherwise, they will be worse off by taking a mortgage. Suppose the home's (intrinsic) value is $V_0$, the borrower is expected to bid a price between $V_0$ and $V_0 + Premium$, where $Premium$ satisfies Equation (5). If they really like the home and are afraid of others outbidding them, they may bid the full price of $V_0 + Premium$, otherwise they may bid a price closer to $V_0$, regardless of whether others may outbid them.

Suppose the buyer's stochastic arrival follows the Poisson process at rate $\lambda$. This assumption is consistent with the empirical findings of Bond et al. (2007), in which UK data are used to investigate several assumptions about the distribution of time to sale, such as the normal, chi-square, gamma and Weibull distributions. The authors find that the exponential distribution explains the data better than the other distributions. Numerous studies in the literature (e.g., Cheng, Lin and Liu, 2020, 2008; Arnold, 1999; Miceli, 1989), also assume that potential buyer's arrival follows the Poisson process.

Denote $t_n$ as the waiting time for the $n$th buyer, then the random arrival time of the $N$th buyer satisfies $T_N = \sum_{n=1}^{N} t_n$. It is worth noting that the arrival of the $N$th buyer at time $T_N$ are both stochastic in nature, and are not exogenously given. When studying the relation between time-on-market and housing prices, Cheng, Lin and Liu (2008) also adopt the same process. At time $T_N$, the seller receives $N$ offer prices. Since the buyer's arrival is assumed to follow a Poisson process at rate $\lambda$, the waiting time for the $n$th buyer, $t_n (n = 1,2,3...N)$, follows an exponential distribution with parameter $\lambda$. Therefore, the expected TOM of waiting for $N$ buyers can be expressed as follows:

$$TOM = E[T_N] = \sum_{n=1}^{N} \frac{1}{\lambda} = \frac{N}{\lambda} \tag{6}$$

Following Read (1988), Lin and Vandell (2007) and He et al. (2020), we assume buyers' valuation, $V_n$, is uniformly distributed over $[V_0, V_0 + Premium]$ ($n = 1,2,...,N$).[2] Hence, the buyer's offer price should be distributed as,

$$f(P^{bid}) = \begin{cases} \dfrac{1}{Premium}, & P^{bid} \in [V_0, V_0 + Premium] \\ 0, & otherwise \end{cases} \tag{7}$$

And its cumulative distribution function is

$$F(P^{bid}) = \begin{cases} 1, & P^{bid} > V_0 + Premium \\ \dfrac{P^{bid} - V_0}{Premium}, & P^{bid} \in [V_0, V_0 + Premium] \\ 0, & otherwise \end{cases} \tag{8}$$

The seller will choose the highest bidder among them to sell the house, i.e.

$$P = \max\left\{P_1^{bid}, P_2^{bid}, ..., P_N^{bid}\right\} \tag{9}$$

Since $P$ is the highest offer price among all $N$ bidders, the density function of $P$ is given by [3]

$$g_P(x) = NF(x)^{N-1} f(x) \tag{10}$$

Substituting Equations (7) and (8) into Equation (10) yields,

[2] For technical simplicity, we adopt the uniform distribution. However, our essential results would hold under a wide variety of more complex distribution function assumptions.

[3] See Ross (2002, p. 275).

$$g_P(x) = \begin{cases} \dfrac{N}{\overline{P} - \underline{P}} \left( \dfrac{x - V_0}{Premium} \right)^{N-1}, & x \in [V_0, V_0 + Premium] \\ 0, & otherwise \end{cases} \tag{11}$$

We thus have

$$\begin{aligned} E[P] &= \int_{V_0}^{V_0+Premium} xN \frac{1}{\overline{P} - \underline{P}} \left( \frac{x - V_0}{Premium} \right)^{N-1} dx \\ &= N \left[ \int_{V_0}^{V_0+Premium} \left( \frac{x - V_0}{Premium} \right)^{N-1} dx + \int_{V_0}^{V_0+Premium} \frac{V_0}{Premium} \left( \frac{x - V_0}{Premium} \right)^{N-1} dx \right] \\ &= N \left[ \frac{V_0 + Premium - V_0}{N+1} + \frac{V_0}{N} \right] \\ &= \frac{N(V_0 + Premium) + V_0}{N+1} \\ &= V_0 + \frac{N}{N+1} Premium \end{aligned} \tag{12}$$

Note that $V_0 = \underline{P}$ and $Premium = \overline{P} - \underline{P}$ in Cheng, Lin and Liu (2008), and by replacing them, Equation (12) above can be rewritten as $E[P] = \dfrac{N\overline{P} + \underline{P}}{N+1}$, which is the same as Equation (6) in Cheng, Lin and Liu (2008). Together with Equation (5), we have the following proposition regarding the price premium associated with mortgage financing:

Proposition 1: With $N$ potential buyers using mortgage financing, the expected transaction price can be expressed as follows,

$$E[P] = V_0 + \frac{N}{N+1} D \times [\sum_{t=1}^{T} (\frac{1}{(1+r_0)^t} - \frac{1}{(1+r)^t})] / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t}) \tag{13}$$

Where $V_0$ is the intrinsic value of the property, $D$ is the loan amount of the fixed-rate mortgage with rate of $r_0$ and term of $T$ periods, and $r$ is buyer's discount rate. In addition, we have,

$$\frac{\partial E[P]}{\partial D} > 0, \ \frac{\partial E[P]}{\partial N} > 0, \ \frac{\partial E[P]}{\partial r_0} < 0, \ \frac{\partial E[P]}{\partial r} > 0, \ \frac{\partial E[P]}{\partial T} > 0$$

Several conclusions can be immediately drawn from Proposition 1. First, with mortgage financing, the transaction price is always higher than the intrinsic value of the house (i.e., $E[P] > V_0$ ). Second, the transaction price will be higher when potential buyers borrow more money (***D***) with a lower rate ($\boldsymbol{r_0}$) or a longer term (***T***)**.** Third, credit supply and economic conditions also affect transaction prices. In particular, if more borrowers (***N***) are eligible for mortgage financing with a higher discount rate (***r***), the transaction price will be even higher.

For cash buyers, since there is no benefit from mortgage financing, they will only pay for a home's intrinsic value, which is $\boldsymbol{V_0}$. As a result, cash transactions will always be discounted, and such a discount can be expressed as follows,

$$Discount^{CashTransaction} = 1 - \frac{V_0}{E[P]} \tag{14}$$

Together with Proposition 1, Equation (6), and given the fact that $LTV = D \big/ E[P]$ or $D = LTV \times E[P]$, we can readily have the following proposition regarding the cash discount:

Proposition 2: The discount for cash transactions can be expressed as follows,

$$Discount^{CashTransaction} = \frac{\lambda \times TOM}{\lambda \times TOM + 1} \times LTV \times [\sum_{t=1}^{T} (\frac{1}{(1+r_0)^t} - \frac{1}{(1+r)^t})] / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t}) \qquad \textbf{(15)}$$

Where: $\lambda$ is the buyer's arrival rate, which varies over market conditions; *TOM* is the time-on-market, *LTV* is the loan-to-value ratio for the fixed-rate mortgage with rate of $r_0$ and term of $T$ periods, and $r$ is the buyer's discount rate. [4]

[4] Similar to Cheng, Lin and Liu (2008), our results can readily be extended to a situation in which some of the earlier bids may drop out and are no longer available for recall, that is, the case of partial recall.

Proposition 2 provides the closed-form formulae for the cash discount. By extending the early work of Cheng, Lin, and Liu (2008), Bian, Lin and Liu (2018a), and LaCour-Little, Lin and Yu (2020), were the first to derive a closed-form formula between the cash discount and time-on-market. With the formulae in Equation (15), we provide the following four testable hypotheses and identify the cash discount has two components. The first component is that properties purchased with cash sell at a discount compared to mortgage-financed ones. The second component is a TOM-variable cash discount that increases the longer a property is on the market. These findings guide us to conduct empirical analysis in the next section:

1. $Discount^{CashTransaction} > 0$, which suggests properties purchased with cash always sell at a discount compared to those with mortgage-financing.
2. $Discount^{CashTransaction}$ is a function of *TOM*, and $\frac{\partial Discount^{CashTransaction}}{\partial TOM} > 0$ indicates there is a *TOM*-variable cash discount, which increases the longer a property is on the market.
3. From Equations (13)-(14) and $D = LTV \times E[P]$, we can rewrite the cash discount as follows:

$$Discount^{CashTransaction} = \frac{N}{N+1} \times LTV \times [\sum_{t=1}^{T} (\frac{1}{(1+r_0)^t} - \frac{1}{(1+r)^t})] / (\sum_{t=1}^{T} \frac{1}{(1+r_0)^t})$$

In other words, $Discount^{CashTransaction}$ is also a function of the number of potential buyers (*N*), and $\frac{\partial Discount^{CashTransaction}}{\partial N} > 0$ suggests cash discounts should be more pronounced in lower price segments than higher price segments due to the fact that more potential buyers are able to afford lower price properties than higher price properties, holding everything else equal.

4. $Discount^{CashTransaction}$ is a function of the market condition $\lambda$, and a higher $\lambda$ implies better market conditions. In addition, $\frac{\partial Discount^{CashTransaction}}{\partial \lambda} > 0$ suggests cash discounts should be more pronounced during non-crisis periods than crisis periods. In the remainder of this study, we empirically test each of these four hypotheses.

**Empirical Analysis**

The dataset for our empirical investigation comprises of a sample of condo sales from the Virginia Beach-Norfolk MSA over the period from 1993 to 2020. We eliminate transactions without sales price and ZIP codes. Our final sample includes 44,870 condo transactions that were either purchased with cash or a conventional mortgage. Our dependent variable is the log of sales price (*logSP*), and we have three independent variables of interest: cash purchase, TOM and their interaction term.

We create a binary variable coded 1 for cash purchases (*Cash*) and 0 for conventional financing. This approach is in line with previous studies investigating the cash discount in the housing market (Seo, Holmes and Lee, 2021; Jauregui, Tidwell and Sah, 2019; Tidwell et al., 2018; Jauregui, Tidwell and Hite, 2017; Asabere, Huffman and Mehdian, 1992). *Cash* hereby represents the fixed component of the cash discount.

We obtain the market time in terms of days on market for each transaction in our sample. Previous studies have yielded mixed results for the relation between TOM and sales prices. Some find evidence of a negative relation resulting from price cuts experienced by properties with higher TOM while others find a positive relation resulting from a longer time to find bidders with higher

offers[5]. An et al. (2013) show that the TOM-price relation varies across market conditions, however, it is predominantly positive. For condos, Hansz and Hayunga (2012) find a negative relation between TOM and sales price.

To address the endogeneity issue of sales price and TOM, we employ an instrumental variable approach. In the first stage, we derive fitted values for TOM ($\widehat{TOM}$) from the regression of TOM onto physical characteristics, year, and month of a transaction. In the second stage, we include $\widehat{TOM}$ as a predictor in our model. While this approach is fundamentally consistent with the two-stage least squares (2SLS) approach employed in previous studies (e.g., An et al., 2013; Hansz and Hayunga, 2012), we derive $\widehat{TOM}$ separately to be able to create the interaction effect of $\widehat{TOM}$ and *Cash* ($Cash x \widehat{TOM}$). This interaction effect captures the TOM-variable component of the cash discount. It represents the additional cash discount over and above the main effects (*Cash*) explained by a condo's time on the market.

In our analysis we control for several condo characteristics such as the age of a condo (*Age*), defined as the difference between the years it was sold and built, as well as the quadratic term of age (*Agesq*) to account for the quadratic relation between age and sales price. Furthermore, we control for the number of bedrooms (Bedrooms), full and half-bathrooms (*Full Baths* and *Half Baths*), which are all winsorized (1% level) to reduce the effect of outliers. We also control for the size of a condo, defined as log of the square footage (*logSF*). We create a binary variable (*New Construction*) coded 1 if a condo is new construction. Furthermore, we include variables controlling for the number of stories the condo building has (*Stories*) and the floor on which a condo transacted (*CondoLevel*). We account for whether a condo is attached or detached by

[5] For a review of the TOM literature, please see An et al. (2013).

including a binary variable coded 1 for detached condos (*Detached*). Other characteristics of condos we control for in our analysis are the presences of a pool, a waterfront location, and the number of fireplaces (Fireplaces). In particular, we create binary variables coded 1 for the presence of a pool (*Pool*) and waterfront location (*Waterfront*).

Lastly, we account for green features and certifications of condos in our sample. Previous studies (Freybote, Sun and Yang, 2015; Yoshida and Sugiura, 2015) provide evidence that green building features and certifications yield a premium to sales prices for condos. We include binary variables for green building features aimed at energy efficiency (*Green Feats*) and green building certification such as Energy Star (*Green Cert*).

As presented in the Table 1 descriptive statistics, 23% of condos in our sample are purchased with cash. We conduct parametric t-tests (with unequal variances) to assess whether mean sale prices, list prices and $\widehat{TOM}$ differ between the cash and mortgage-financed condo transactions. As shown in Panel B of Table 1, condos purchased with cash, on average, have a significantly lower sales and list price, but higher time on market compared with condos purchased with conventional mortgage financing. This is consistent with the cash-only transactions in the sample of Seo, Holmes and Lee (2021), which comprise 22% of all transactions and have a significantly lower mean price than financed homes.

**[Insert Table 1 here]**

**Methodology**

Following a significant Hausman test, we employ a ZIP code- and time (year and month)-fixed effects regression to estimate our model in Equation 16. This is in line with previous studies (e.g., Allen et al., 2018; Tidwell et al., 2018) that employ location and time-fixed effects. To account for heteroskedasticity across ZIP code clusters resulting from omitted locational effects, we use ZIP code clustered standard errors.

$$logSP_i = \alpha + \beta_1 Cash_i + \beta_2 \widehat{TOM}_i + \beta_3 Cash x \widehat{TOM}_i + \beta_k X_i + \varepsilon_i \quad \textbf{(16)}$$

Where *logSP* is the log of the sales price for condo i, *Cash*, $\widehat{TOM}$ and *Cash*x$\widehat{TOM}$ represent our predictor variables of interest, and *X* is a vector of the housing characteristics we control for (e.g., age, number of bed- and bathrooms, square footage, waterfront location).

The findings of Seo, Holmes and Lee (2021) suggest the cash discount varies across price segments. Because price categories vary by year, we create quartiles for our sample based on sales price by year. These quartiles represent the 1) low price, 2) low/mid-price, 3) mid/high-price and 4) high price segment. We estimate our model in Equation 16 for the full sample as well as the price segments.

**Results**

Table 2 presents the results for the full sample of sold condos. As a starting point, we employ the approach used by previous studies and first estimate our model in Equation 16 without the interaction effect of *Cash* and $\widehat{TOM}$. As shown in Model 1, the coefficient of *Cash* is negative with

statistical significance and represents a discount of 9.42%[6] to the sale price of condos purchased with cash as opposed to a mortgage. The size of this cash-only discount is comparable to cash discounts identified in previous studies (Tidwell et al., 2018; Jauregui, Tidwell and Hite, 2017).

However, as shown in Model 2, if we include the interaction effect of cash purchase and time on market ($Cash x \widehat{TOM}$), the coefficient on *Cash* becomes smaller and reflects a cash discount of 4.08%. This discount is similar to the results of Seo, Holmes and Lee (2021). The coefficient on the interaction effect is negative with statistical significance and suggests a discount of 0.1% for each additional day a condo is on the market. This means that, for example, a condo that has been on the market for 30 days is associated with a fixed cash discount of 4.08% and a TOM-variant cash discount of 3%, which results in a total cash discount of 7.08%. The longer a condo is on the market, the larger will be the total cash discount.

Our results suggest TOM indeed moderates the relation of cash purchase and sales price. Alternatively stated, our results in Table 2 suggest that eliminated uncertainty regarding a buyer's mortgage eligibility and a reduced closing time (Jauregui, Tidwell and Sah, 2019; Jauregui, Tidwell and Hite, 2017) explain only one component of the cash discount (i.e., the fixed cash discount). TOM represents an additional explanation, and the TOM-variable cash discount is the second component of the total cash discount. Hereby, our results in Table 2 support hypotheses 1 and 2. Our results also suggest investigations into the cash discount, at least for condos, should account for TOM.

Our results for control variables in the model are consistent with expectations. Age has a quadratic relation with sales price. New construction, additional bathrooms, square footage, a pool

[6] Based on (exp(coefficient)-1)*100.

and a waterfront location add a premium to the sale price of condos. Furthermore, green features aimed at energy efficiency also add a premium to condo prices, which is in line with Yoshida and Sugiura (2015). Contrary to Freybote, Sun and Yang (2015), a green certification does not yield a premium for the full sample.

**[Insert Table 2 here]**

The analysis in Table 2 only includes sold condos. However, our sample selection may not be entirely random considering some listings expire or are withdrawn. It is common practice among agents to withdraw listings that have been on the market for a while due to an inappropriate pricing strategy, for example, and relist them as a new listing to mitigate the impact of a lengthy TOM on buyer perception and sale price. Additionally, a listing may be removed because the agreement between agent and seller has expired before the property is sold. The seller may then sign an agreement with a new agent and the property appears as a new listing.

To assess the robustness of our results to any non-random sampling, we employ a Heckman regression to estimate Model 1 (without interaction effect) and Model 2 (with interaction effect). In particular, we predict the probability of a condo being sold based on its list price and whether it was listed in a crisis period of 2008 to 2011. We do not include any other property characteristics to predict the probability of a sale as the sold and non-sold samples are not independent: Condos withdrawn from the market or for which the agreement between agent and seller has expired (not-sold sample) are likely to be back on the market in the form of a new listing and may then sell (either as cash or financed transaction) within a short amount of time.

As shown in Table 3, our Heckman-regression results for both models are in concert with our results from Table 2. This suggests our results are robust to non-random sample selection

regarding a property being sold or not. It is important to note the absence of a sale price for condos in the non-sold sample does not allow for additional analyses at different price segments.

**[Insert Table 3 here]**

Next, we present the results for the cash discount parsed by price segment in Table 4. For brevity, we only report results for the model with the interaction effect (Model 2) in the remainder of the results section. For the low-price segment, the coefficients on *Cash* and *Cashx* $\widehat{TOM}$ are significantly negative. They indicate a fixed cash discount of 9.42% (*Cash*) and a TOM-variable cash discount of 0.1% per additional day a condo is on the market (*Cashx*$\widehat{TOM}$*)*. The coefficient on $\widehat{TOM}$ is positive, albeit only significant at the 10% level. The positive relation between TOM and sale price is in line with An et al. (2013) but contradicts the previous findings of Hansz and Hayunga (2012) for the TOM-sales price relation for condos.

For the low/mid-price segment, we find a fixed cash premium of 2.02% as indicated by the positive coefficient on *Cash*. This is consistent with Seo, Holmes and Lee (2021), who find a cash-only premium for medium-priced homes before the great financial crisis. One explanation for this cash premium, especially in seller markets, is that interested buyers use cash offers as a bidding strategy to obtain a property and avoid bidding wars. Another explanation is that professional buyers such as private equity funds use cash purchases to reduce the transaction time and meet capital commitment deadlines (Allen et al., 2018). The mid-price condo segment is also more likely to receive greater interest from non-professional buyers (owner-occupiers) due to higher quality properties, more amenities, and other desirable features. For single-family homes, Allen et al. (2018) find that properties bought by investors are of lower quality, age, size and price compared with properties bought by non-investors. Consequently, sellers in this segment,

particularly in a seller's market, are more likely to hold out for higher offers, and buyers may employ a cash strategy to secure a condo.

The coefficient of *Cash*x$\widehat{TOM}$ is still statistically significant, but smaller than for low price condos. In particular, the TOM-variable cash discount is 0.04% for each additional day a low/mid-priced condo is on the market. To illustrate, the total cash discount for a condo in the low-price segment that has been on the market for 60 days is 15.42%. On the other hand, the total cash discount for a low/mid-priced condo with the same TOM is only 0.38%.

Our results for mid/high-price and high-price condos suggest time on the market does not result in an additional cash discount as indicated by the statistically insignificant coefficient of *Cash*x$\widehat{TOM}$. Furthermore, for mid/high-priced condos, the coefficient on *Cash* is statistically insignificant while for high-priced condos, a cash premium exists, albeit only at the 10% level. For high-price condos, the coefficient of $\widehat{TOM}$ indicates that time on market has a negative impact on sales prices. Our results for $\widehat{TOM}$ suggest the relation of time on market with sales prices may not only vary across housing market conditions (An et al., 2013), but also across price segments. Our result for $\widehat{TOM}$ in the high-price segment is in concert with the findings of Hansz and Hayunga (2012).

Overall, our results in Table 4 support hypothesis 3 as they provide evidence that the fixed cash discount and TOM-variable cash discount vary across price segments, which is largely consistent with our third hypothesis that cash discounts should be more pronounced in lower price segments. Additionally, these findings suggest our results in Table 2 are driven by condos in the low-price segment. Our results are also in line with Seo, Holmes and Lee (2021), who find the

cash discount for a variety of housing types is most pronounced and consistent in the low-price segment and disappears for mid and high-priced properties.

**[Insert Table 4 here]**

Lastly, to test hypothesis 4, we separate our sample into 1) transactions from 2008 to 2011, which is a period characterized by tighter access to financing and depressed housing markets (crisis period), and 2) transactions from all other years (non-crisis period). In our dataset, the share of cash transactions is 22% in the non-crisis period and 27% in the crisis period. Tables 5 and 6 present the results for different price segments based on crisis and non-crisis period. In periods of non-crisis (Table 5), our results are in line with Table 4. We find a fixed cash discount of 8.33% and a TOM-variable cash discount of 0.1% per day for low-price condos. For low-/mid-priced condos, we find a fixed cash premium of 3.05% and TOM-variable cash discount of 0.04% per day. Mid-/high-price condos yield neither a cash premium nor discount while high-price condos have a cash premium, albeit only significant at the 10% level. Conversely, in periods of crisis (Table 6), we do not find any evidence of a fixed cash discount (*Cash*) and TOM-variable cash discount component ($Cash x \widehat{TOM}$).

Overall, our results in Tables 5 and 6 suggest Table 4 numbers are driven by the non-crisis period, which is consistent with our fourth hypothesis that cash discounts should be more pronounced during a non-crisis period than crisis period. This finding is also in line with Tidwell et al. (2018), who find that the relative supply of cash buyers affects the cash discount. In particular, the authors show that an increase in cash buyers reduces the cash discount. Considering that the supply of cash buyers is likely to be higher during our crisis period (2008-2011) than non-crisis period, the findings of Tidwell et al. (2018) present an explanation for our findings.

One shortcoming of our dataset is that we do not have information on buyer types. Therefore, we are not able to distinguish owner-users from investors to further analyze the two components of the cash discount in the context of cash buyer supply. However, future studies may use our findings as a starting point to further investigate the impact of different types of buyers on the fixed and TOM-variant cash discount across different price segments and time periods.

**[Insert Table 5 and Table 6 here]**

Lastly, we assess whether the relation between cash discount and sales price, identified for the non-crisis period, is non-linear across different TOM levels. We derive indicator variables for the quartiles of $\widehat{TOM}$ based on the respective year ($\widehat{TOM}2$, $\widehat{TOM}3$ and $\widehat{TOM}4$), with the first quartile ($\widehat{TOM}1$), i.e., condos with the shortest marketing time, being the reference group. Then, we create interaction effects between *Cash* and the three binary variables and estimate our model in Equation 16 for the four price segments and the non-crisis period. Our results reported in Table 7 suggest the TOM-variable cash discount does not differ between different quartiles of TOM (i.e., the relation is linear).

**[Insert Table 7 here]**

While this study focuses on condos, we estimate our model in Equation 16 for single-family homes in our geographical market for comparison. We hereby remove the condo level as a predictor and add the log of a property's size to the model. For the full sample in line with Table 2 (see Table A1 in the Appendix), the coefficient on *Cash*x$\widehat{TOM}$ is negative, but insignificant. If we separate our sample by price segment in line with Tables 5 and 6 (see Tables A2-A3 in the Appendix), the TOM-variable cash discount is negative with statistical significance for single-family homes in the low/mid and mid/high price segment in the non-crisis period and consistently statistically

insignificant across all price segments in the crisis period of 2008 to 2011. Our results for single-family homes suggest the TOM-variable cash discount also exists for other housing segments. However, the difference between the two housing segments investigated is that this TOM-variable component of the overall cash discount exists in the low and low/mid-price segments for condos and the low/mid and mid/high-price segments for single-family homes. Explanations for this difference can be a result of differences in the types of buyers, their purchase motivations, and other characteristics. Future studies may build on our results to investigate differences in the TOM-variable cash discount across different housing segments in more detail.

## Conclusion

Previous studies have identified a discount for cash transactions compared to mortgage-financed transactions in housing markets (Jauregui, Tidwell and Sah, 2019; Tidwell et al., 2018; Jauregui, Tidwell and Hite, 2017; Asabere, Huffman and Mehdian, 1992). We extend the existing literature by investigating the cash discount in the context of condos. We develop a theoretical model and provide empirical evidence for two components of the cash discount: a fixed component, as identified in previous studies, and a component that varies with TOM.

Using a sample of 44,870 condo sales from the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, we find evidence for the two cash discount components. However, our results are driven by condos in the low-price segment. In particular, we find a 9.42% fixed cash discount and 0.1% per day TOM-variable cash discount for low-price condos. While the TOM-variable cash discount persists for low/mid-priced condos, condos in this segment have a fixed cash premium. The cash discount disappears for mid/high and high-price condos, which is

consistent with the findings of Seo, Holmes and Lee (2021). Moreover, our results are driven by non-crisis periods as opposed to the crisis period of 2008-2011.

Our results suggest TOM represents an additional explanation for the cash discount and emphasize the importance of accounting for TOM in investigations into the cash discount. We consider our study a starting point for future investigations into different explanations for and components of cash discounts. Future studies may investigate whether the TOM-variable cash discount also exists for detached and attached single-family housing. Future investigations may also provide more insights into the characteristics of cash buyers in different housing market segments.

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**Table 1: Descriptive Statistics**

**Panel A: Summary Statistics**

| | Mean | Median | St.Dev | Min | Max | N |
|---|---|---|---|---|---|---|
| logSP | 12.10 | 12.17 | 0.65 | 6.91 | 15.23 | 44,870 |
| $\widehat{TOM}$ | 71.04 | 67.77 | 30.65 | -104.39 | 197.42 | 37,499 |
| Cash | 0.23 | 0 | 0.42 | 0 | 1 | 44,870 |
| Age | 15.71 | 13 | 17.48 | 0 | 369 | 44,868 |
| New Construction | 0.25 | 0 | 0.43 | 0 | 1 | 44,856 |
| Full Baths | 1.97 | 2 | 0.49 | 1 | 3 | 44,870 |
| Half Baths | 0.47 | 0 | 0.50 | 0 | 1 | 44,870 |
| Bedrooms | 2.46 | 2 | 0.71 | 1 | 4 | 44,870 |
| logSF | 7.28 | 7.28 | 0.35 | 0.69 | 11.51 | 41,213 |
| Stories | 1.76 | 2 | 1.00 | 0 | 37 | 44,868 |
| CondoLevel | 1.29 | 1 | 2.10 | 0 | 47 | 40,931 |
| Detached | 0.09 | 0 | 0.29 | 0 | 1 | 44,870 |
| Green Feats | 0.05 | 0 | 0.21 | 0 | 1 | 44,870 |
| Green Cert | 0.01 | 0 | 0.09 | 0 | 1 | 44,870 |
| Pool | 0.10 | 0 | 0.31 | 0 | 1 | 44,870 |
| Waterfront | 0.21 | 0 | 0.41 | 0 | 1 | 44,868 |
| Fireplaces | 0.70 | 1 | 0.60 | 0 | 20 | 44,870 |

**Panel B: T-Test Results**

| | **Cash** | **Conventional** | **T-Stat** |
|---|---|---|---|
| *N* | *10,198* | *34,672* | |
| logSP | 11.88 | 12.17 | 33.78*** |
| logLP | 11.93 | 12.18 | 30.48*** |
| TOMhat | 81.73 | 67.76 | -38.20*** |

*Note: This table presents the descriptive statistics for a dataset of condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020. logSP is the log of sales price.* $\widehat{TOM}$ *is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal variables. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. The parametric t-tests in Panel B are with unequal variances. The sample sizes for TOMhat are 8,790 for cash and 28,709 for conventional financing.*

**Table 2: Results for Sales Price**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Coef. | SE | Coef. | SE |
| Cash | -0.09*** | 0.02 | -0.04** | 0.02 |
| $\widehat{TOM}$ | -0.0003 | 0.002 | -0.0002 | 0.002 |
| Cashx$\widehat{TOM}$ | | | -0.001** | 0.003 |
| Age | -0.01*** | 0.002 | -0.01*** | 0.002 |
| Agesq | 0.0001** | 0.00002 | 0.0001** | 0.00002 |
| New Construction | 0.12*** | 0.03 | 0.12*** | 0.03 |
| Full Baths | 0.07*** | 0.01 | 0.07*** | 0.01 |
| Half Baths | -0.03 | 0.02 | -0.03 | 0.02 |
| Bedrooms | -0.002 | 0.05 | -0.002 | 0.05 |
| logSF | 0.98*** | 0.09 | 0.98*** | 0.09 |
| Stories | -0.003 | 0.01 | -0.003 | 0.01 |
| Condo Level | 0.02*** | 0.004 | 0.02*** | 0.004 |
| Detached | 0.06 | 0.05 | 0.06 | 0.05 |
| Green Feats | 0.08*** | 0.02 | 0.08*** | 0.02 |
| Green Cert | 0.01 | 0.04 | 0.01 | 0.04 |
| Pool | 0.06*** | 0.02 | 0.06*** | 0.02 |
| Waterfront | 0.24*** | 0.05 | 0.24*** | 0.05 |
| Fireplaces | -0.02 | 0.01 | -0.02 | 0.01 |
| *Zipcode FE* | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | |
| *No of Obs* | *37,499* | | *37,499* | |
| *No of Groups* | *135* | | *135* | |
| *Avg obs/group* | *277.80* | | *277.80* | |
| *Within R2* | *0.75* | | *0.75* | |
| *Between R2* | *0.62* | | *0.62* | |
| *Overall R2* | *0.67* | | *0.67* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020. logSP is the log of sales price. $\widehat{TOM}$ is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal variables. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table 3: Results for Sales Price (Heckman Regression)**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.10*** | 0.02 | -0.04** | 0.02 |
| $\widehat{TOM}$ | 0.001 | 0.001 | 0.001 | 0.001 |
| Cashx$\widehat{TOM}$ | | | -0.001** | 0.0003 |
| Age | -0.01*** | 0.002 | -0.01*** | 0.002 |
| Agesq | 0.00004** | 0.00001 | 0.00004** | 0.00001 |
| New Construction | 0.09*** | 0.02 | 0.09*** | 0.02 |
| Full Baths | 0.07*** | 0.01 | 0.07*** | 0.01 |
| Half Baths | -0.01 | 0.01 | -0.01 | 0.01 |
| Bedrooms | -0.01 | 0.04 | -0.01 | 0.04 |
| logSF | 0.86*** | 0.07 | 0.86*** | 0.07 |
| Stories | -0.01 | 0.01 | -0.01 | 0.01 |
| Condo Level | 0.02*** | 0.003 | 0.02*** | 0.003 |
| Detached | 0.06* | 0.03 | 0.06* | 0.03 |
| Green Feats | 0.08*** | 0.01 | 0.08*** | 0.01 |
| Green Cert | 0.01 | 0.04 | 0.01 | 0.04 |
| Pool | 0.06*** | 0.01 | 0.06*** | 0.01 |
| Waterfront | 0.18*** | 0.03 | 0.18*** | 0.03 |
| Fireplaces | -0.01 | 0.01 | -0.01 | 0.01 |
| *Zipcode FE* | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | |
| ***Sold*** | *logLP, Crisis* | | *logLP, Crisis* | |
| *No of Obs* | *82,351* | | *82,351* | |
| *Selected* | *37,496* | | *37,496* | |
| *Non-Selected* | *44,855* | | *44,855* | |
| *Athrho* | *1.36**** | *0.11* | *1.37**** | *0.11* |
| *LnSigma* | *-0.94**** | *0.07* | *-0.94**** | *0.07* |
| *Rho* | *0.88* | *0.03* | *0.88* | *0.03* |
| *Sigma* | *0.39* | *0.03* | *0.39* | *0.03* |
| *Lambda* | *0.34* | *0.03* | *0.34* | *0.03* |
| *Wald Test of Ind. Eqns* | *145.29**** | | *145.00**** | |

*Note: This table presents the results of a Heckman regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020. logSP is the log of sales price. $\widehat{TOM}$ is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal variables. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table 4: Results for Sales Price Separated by Price Segment**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Cash | -0.09*** | 0.03 | 0.02** | 0.01 | 0.02 | 0.01 | 0.03* | 0.02 |
| $\widehat{TOM}$ | 0.01* | 0.007 | 0.001* | 0.0005 | -0.001 | 0.001 | -0.02*** | 0.01 |
| Cashx$\widehat{TOM}$ | -0.001*** | 0.0003 | -0.0004** | 0.0001 | -0.0002 | 0.0001 | 0.0002 | 0.0002 |
| Age | -0.01*** | 0.003 | -0.002*** | 0.001 | -0.001* | 0.0004 | 0.001** | 0.002 |
| Agesq | 0.0001*** | 0.00003 | <0.001** | <0.001 | <0.001*** | <0.001 | 0.00 | 0.00 |
| New Construction | 0.03 | 0.06 | 0.06*** | 0.01 | 0.03*** | 0.01 | 0.15*** | 0.02 |
| Full Baths | 0.13*** | 0.03 | -0.01 | 0.01 | -0.01 | 0.01 | 0.01 | 0.02 |
| Half Baths | 0.14** | 0.06 | 0.01 | 0.01 | -0.01 | 0.01 | -0.12* | 0.07 |
| Bedrooms | -0.07* | 0.04 | 0.01** | 0.005 | 0.02*** | 0.01 | 0.07 | 0.05 |
| logSF | 0.17 | 0.18 | 0.18*** | 0.03 | 0.18*** | 0.04 | 0.94*** | 0.16 |
| Stories | 0.02* | 0.01 | -0.002 | 0.002 | -0.003 | 0.003 | -0.01** | 0.005 |
| Condo Level | -0.01 | 0.01 | 0.004*** | 0.002 | 0.004*** | 0.001 | 0.04*** | 0.01 |
| Detached | 0.47*** | 0.15 | 0.06** | 0.03 | 0.05* | 0.03 | -0.40*** | 0.11 |
| Green Feats | 0.16*** | 0.03 | 0.02** | 0.01 | 0.01 | 0.01 | -0.03 | 0.04 |
| Green Cert | 0.15*** | 0.04 | -0.03 | 0.05 | 0.04** | 0.02 | -0.08 | 0.05 |
| Pool | 0.08*** | 0.03 | 0.01 | 0.01 | 0.01** | 0.005 | 0.01 | 0.03 |
| Waterfront | -0.05 | 0.12 | 0.02** | 0.01 | 0.03** | 0.01 | 0.43*** | 0.09 |
| Fireplaces | 0.05** | 0.02 | -0.004 | 0.004 | -0.01 | 0.01 | -0.06** | 0.02 |
| *Zipcode FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *10,254* | | *9,875* | | *8,842* | | *8,528* | |
| *No of Groups* | *86* | | *85* | | *73* | | *61* | |
| *Avg obs/group* | *119.20* | | *116.20* | | *121.10* | | *139.8* | |
| *Within R2* | *0.69* | | *0.87* | | *0.87* | | *0.61* | |
| *Between R2* | *0.63* | | *0.84* | | *0.85* | | *0.50* | |
| *Overall R2* | *0.60* | | *0.86* | | *0.86* | | *0.51* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment. logSP is the log of sales price. $\widehat{TOM}$ is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal variables. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table 5: Results for Sales Price Separated by Price Segment and Non-Crisis Period**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.08*** | 0.03 | 0.03** | 0.01 | 0.02 | 0.01 | 0.03* | 0.02 |
| $\widehat{TOM}$ | 0.01* | 0.007 | -0.002 | 0.002 | -0.004 | 0.003 | -0.01* | 0.007 |
| Cashx$\widehat{TOM}$ | -0.001*** | 0.0004 | -0.0004*** | 0.0002 | -0.0002 | 0.0002 | 0.0001 | 0.0001 |
| Age | -0.01*** | 0.003 | -0.001 | 0.01 | 0.0001 | 0.001 | 0.003 | 0.002 |
| Agesq | 0.0001*** | 0.00003 | <0.001** | <0.001 | <0.001*** | <0.001 | 0.00 | 0.00 |
| New Construction | 0.11** | 0.05 | 0.08*** | 0.02 | 0.05*** | 0.01 | 0.11*** | 0.03 |
| Full Baths | 0.13*** | 0.03 | -0.01 | 0.01 | -0.01 | 0.01 | 0.01 | 0.02 |
| Half Baths | 0.13** | 0.06 | -0.003 | 0.02 | -0.04* | 0.02 | -0.11 | 0.07 |
| Bedrooms | -0.06 | 0.04 | 0.02*** | 0.01 | 0.03*** | 0.01 | 0.06** | 0.03 |
| logSF | 0.18 | 0.18 | 0.23*** | 0.04 | 0.24*** | 0.07 | 0.96*** | 0.13 |
| Stories | 0.02* | 0.01 | -0.002 | 0.003 | -0.003 | 0.003 | -0.01** | 0.004 |
| Condo Level | -0.003 | 0.01 | 0.01*** | 0.004 | 0.01** | 0.005 | 0.04** | 0.02 |
| Detached | 0.42*** | 0.14 | 0.002 | 0.05 | -0.03 | 0.06 | -0.33** | 0.14 |
| Green Feats | 0.15*** | 0.03 | 0.004 | 0.01 | -0.01 | 0.01 | -0.02 | 0.05 |
| Green Cert | 0.14*** | 0.04 | -0.03 | 0.05 | 0.03 | 0.02 | -0.07 | 0.04 |
| Pool | 0.08*** | 0.03 | 0.004 | 0.01 | -0.002 | 0.01 | 0.04 | 0.03 |
| Waterfront | -0.04 | 0.12 | 0.07** | 0.03 | 0.09** | 0.04 | 0.38*** | 0.13 |
| Fireplaces | 0.05** | 0.02 | -0.01** | 0.006 | -0.02* | 0.01 | -0.05* | 0.03 |
| *Zipcode FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *8,700* | | *8,365* | | *7,585* | | *7,271* | |
| *No of Groups* | *77* | | *79* | | *70* | | *58* | |
| *Avg obs/group* | *113.00* | | *105.90* | | *108.40* | | *125.40* | |
| *Within R2* | *0.68* | | *0.86* | | *0.86* | | *0.65* | |
| *Between R2* | *0.37* | | *0.78* | | *0.90* | | *0.54* | |
| *Overall R2* | *0.58* | | *0.84* | | *0.86* | | *0.51* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment and for the non-crisis period of 1993-2007 and 2012-2020. logSP is the log of sales price.* $\widehat{TOM}$ *is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal factors. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table 6: Results for Sales Price Separated by Price Segment and Crisis Period**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.11 | 0.08 | 0.03 | 0.03 | -0.07 | 0.05 | 0.10 | 0.14 |
| $\widehat{TOM}$ | 0.01 | 0.02 | 0.001*** | 0.0002 | -0.0001 | 0.0002 | -0.02* | 0.01 |
| Cashx$\widehat{TOM}$ | -0.001 | 0.001 | -0.0003 | 0.003 | 0.001 | 0.001 | -0.0002 | 0.001 |
| Age | -0.01*** | 0.005 | -0.02*** | 0.001 | -0.001 | 0.001 | 0.01*** | 0.002 |
| Agesq | 0.0001** | 0.00004 | 0.00002*** | <0.001 | <0.001* | <0.001 | -0.00003 | 0.00002 |
| New Construction | -0.05 | 0.11 | 0.04*** | 0.02 | 0.04*** | 0.01 | 0.20** | 0.08 |
| Full Baths | 0.14*** | 0.04 | -0.03* | 0.02 | -0.01 | 0.02 | 0.03 | 0.03 |
| Half Baths | 0.12 | 0.12 | -0.02* | 0.01 | -0.01 | 0.01 | -0.06 | 0.05 |
| Bedrooms | -0.12*** | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.14* | 0.07 |
| logSF | 0.32 | 0.31 | 0.19*** | 0.04 | 0.16*** | 0.04 | 0.69*** | 0.15 |
| Stories | 0.01 | 0.01 | -0.001 | 0.004 | -0.01 | 0.01 | -0.02 | 0.03 |
| Condo Level | 0.002 | 0.03 | 0.002 | 0.001 | 0.001 | 0.002 | 0.04** | 0.02 |
| Detached | 0.47 | 0.31 | 0.08 | 0.09 | 0.11 | 0.09 | -0.39 | 0.26 |
| Green Feats | 0.32*** | 0.10 | 0.002 | 0.04 | 0.04 | 0.03 | 0.001 | 0.10 |
| Green Cert | | | | | | | 0.12 | 0.20 |
| Pool | 0.08 | 0.06 | 0.002 | 0.02 | 0.01* | 0.008 | -0.03 | 0.04 |
| Waterfront | 0.05 | 0.25 | 0.03*** | 0.01 | 0.02 | 0.01 | 0.44** | 0.18 |
| Fireplaces | 0.05 | 0.03 | -0.003 | 0.003 | -0.01 | 0.02 | -0.05** | 0.02 |
| *Zipcode FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *1,554* | | *1,510* | | *1,257* | | *1,257* | |
| *No of Groups* | *59* | | *58* | | *51* | | *34* | |
| *Avg obs/group* | *26.3* | | *26.00* | | *24.60* | | *37.0* | |
| *Within R2* | *0.72* | | *0.92* | | *0.89* | | *0.89* | |
| *Between R2* | *0.78* | | *0.89* | | *0.88* | | *0.15* | |
| *Overall R2* | *0.70* | | *0.92* | | *0.89* | | *0.49* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment and for the crisis period of 2008 to 2011. logSP is the log of sales price.* $\widehat{TOM}$ *is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal factors. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table 7: Results for Sales Price with TOM Indicator Variables Separated by Price Segment (Non-Crisis Period)**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.15*** | 0.02 | -0.01 | 0.01 | -0.001 | 0.01 | 0.03 | 0.02 |
| $\widehat{TOM}2$ | 0.02 | 0.01 | 0.004 | 0.006 | 0.02*** | 0.004 | -0.03* | 0.02 |
| $\widehat{TOM}3$ | 0.03 | 0.03 | 0.02 | 0.01 | 0.03*** | 0.01 | -0.04 | 0.04 |
| $\widehat{TOM}4$ | 0.0002 | 0.05 | 0.02* | 0.01 | 0.04*** | 0.01 | -0.04 | 0.05 |
| Cashx$\widehat{TOM}2$ | -0.02 | 0.02 | 0.005 | 0.01 | 0.001 | 0.01 | 0.02 | 0.04 |
| Cashx$\widehat{TOM}3$ | -0.04 | 0.03 | 0.005 | 0.01 | 0.01 | 0.01 | 0.03 | 0.04 |
| Cashx$\widehat{TOM}4$ | 0.02 | 0.04 | 0.004 | 0.01 | 0.001 | 0.01 | 0.01 | 0.04 |
| Age | -0.01*** | 0.003 | -0.002*** | 0.001 | -0.001** | 0.0004 | -0.001 | 0.001 |
| Agesq | 0.0001*** | 0.00003 | <0.0001** | <0.0001 | <0.0001*** | <0.0001 | <0.0001 | <0.0001 |
| New Construction | 0.17*** | 0.03 | 0.06*** | 0.01 | 0.02*** | 0.01 | 0.04*** | 0.01 |
| Full Baths | 0.11*** | 0.03 | -0.01 | 0.01 | -0.004 | 0.01 | 0.04 | 0.02 |
| Half Baths | 0.05 | 0.03 | 0.02 | 0.01 | 0.001 | 0.01 | -0.01 | 0.04 |
| Bedrooms | -0.04 | 0.04 | 0.01*** | 0.005 | 0.02*** | 0.01 | 0.06 | 0.04 |
| logSF | 0.39*** | 0.15 | 0.18*** | 0.04 | 0.15*** | 0.05 | 0.59*** | 0.06 |
| Stories | 0.02* | 0.01 | -0.002 | 0.002 | -0.003 | 0.003 | -0.01** | 0.003 |
| Condo Level | 0.02*** | 0.01 | 0.01*** | 0.002 | 0.003** | 0.001 | 0.01** | 0.005 |
| Detached | 0.20* | 0.10 | 0.06** | 0.03 | 0.07*** | 0.02 | -0.09 | 0.06 |
| Green Feats | 0.10*** | 0.02 | 0.02** | 0.01 | 0.02** | 0.01 | 0.04 | 0.03 |
| Green Cert | 0.09** | 0.04 | -0.02 | 0.05 | 0.05** | 0.02 | -0.03 | 0.05 |
| Pool | 0.05*** | 0.02 | 0.01 | 0.01 | 0.01*** | 0.005 | 0.07* | 0.04 |
| Waterfront | 0.16*** | 0.04 | 0.02** | 0.01 | 0.01 | 0.01 | 0.18*** | 0.03 |
| Fireplaces | 0.03 | 0.02 | -0.01 | 0.01 | -0.01 | 0.01 | -0.02 | 0.01 |
| *Zipcode, Year, Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *9,149* | | *8,795* | | *7,893* | | *7,633* | |
| *No of Groups* | *82* | | *82* | | *70* | | *59* | |
| *Avg obs/group* | *111.6* | | *107.3* | | *112.8* | | *129.4* | |
| *Within R2* | *0.70* | | *0.87* | | *0.87* | | *0.64* | |
| *Between R2* | *0.57* | | *0.81* | | *0.89* | | *0.55* | |
| *Overall R2* | *0.60* | | *0.86* | | *0.87* | | *0.51* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment and for the non-crisis period. logSP is the log of sales price.* $\widehat{TOM}$ *is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal factors.* $\widehat{TOM}2$, $\widehat{TOM}3$ *and* $\widehat{TOM}4$ *are binary variables coded 1 for transaction in the 2nd, 3rd and 4th TOM quartile for the respective year. The reference group is* $\widehat{TOM}1$*. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed condos. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of a condo's square footage. Stories is the number of stories a condo building has and CondoLevel is the level a sold condo is at. Detached is coded 1 for detached condos and 0 for attached condos. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the*

*respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

## APPENDIX

**Table A1: Results for Sales Price**

| | Coef. | SE |
|---|---|---|
| Cash | -0.29*** | 0.03 |
| $\widehat{TOM}$ | 0.0001 | 0.002 |
| Cashx$\widehat{TOM}$ | -0.0002 | 0.0003 |
| Age | -0.01*** | 0.001 |
| Agesq | 0.00001*** | <0.0001 |
| New Construction | 0.05 | 0.06 |
| Full Baths | 0.11*** | 0.01 |
| Half Baths | 0.06*** | 0.01 |
| Bedrooms | -0.04** | 0.02 |
| LogSF | 0.74*** | 0.05 |
| logLot | 0.08*** | 0.02 |
| Stories | -0.05*** | 0.01 |
| Green Feats | 0.11*** | 0.02 |
| Green Cert | 0.01 | 0.04 |
| Pool | 0.05** | 0.02 |
| Waterfront | 0.19*** | 0.03 |
| Fireplaces | 0.06*** | 0.01 |
| *Zipcode FE* | *Yes* | |
| *Year FE* | *Yes* | |
| *Month FE* | *Yes* | |
| *No of Obs* | *89,144* | |
| *No of Groups* | *426* | |
| *Avg obs/group* | *209.3* | |
| *Within R2* | *0.74* | |
| *Between R2* | *0.61* | |
| *Overall R2* | *0.76* | |

*Note: This table presents the results of a fixed effects regression for single-family transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020. logSP is the log of sales price. $\widehat{TOM}$ is the instrumental variable defined as the fitted values of the regression of time on market (TOM) in days onto physical and temporal variables. Cash is coded 1 if a transaction was completed with cash; 0 for a conventional mortgage. Age is the difference between year sold and built and Agesq is its quadratic term. New construction is coded 1 for newly constructed homes. Full baths, half baths and bedrooms are the number of respective rooms. logSF is the log of square footage and logLot is the log of the property's lot. Stories is the number of stories a condo building has. Green Feats is coded 1 if a condo has energy efficiency-related features. Green cert is coded 1 if a condo has a green building certification. Pool and Waterfront are coded 1 for the presence of the respective feature. Fireplaces is number of fireplaces. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table A2: Results for Single Family Homes Separated by Price Segment and Non-Crisis Period**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.34*** | 0.03 | 0.01 | 0.02 | 0.03*** | 0.01 | 0.02 | 0.03 |
| $\widehat{TOM}$ | 0.02 | 0.01 | -0.002* | 0.001 | -0.001 | 0.001 | 0.01*** | 0.005 |
| Cashx$\widehat{TOM}$ | -0.0001 | 0.0004 | -0.001*** | 0.0003 | -0.001*** | 0.0001 | 0.0004 | 0.0003 |
| Age | -0.01*** | 0.003 | -0.001*** | 0.0004 | -0.001*** | 0.0003 | -0.004*** | 0.001 |
| Agesq | <0.0001 | <0.0001 | <0.0001*** | <0.0001 | <0.0001*** | <0.0001 | <0.0001 | <0.0001 |
| New Construction | -0.52 | 0.49 | 0.09** | 0.04 | 0.04 | 0.03 | -0.34** | 0.15 |
| Full Baths | -0.01 | 0.06 | 0.04*** | 0.01 | 0.01*** | 0.004 | 0.03* | 0.02 |
| Half Baths | 0.04** | 0.02 | 0.01*** | 0.004 | 0.01** | 0.002 | 0.04*** | 0.01 |
| Bedrooms | 0.12 | 0.12 | -0.03*** | 0.01 | -0.01 | 0.01 | 0.07** | 0.03 |
| logSF | 0.16 | 0.31 | 0.27*** | 0.03 | 0.27*** | 0.03 | 0.25*** | 0.09 |
| logLot | -0.05 | 0.13 | 0.04*** | 0.01 | 0.02*** | 0.01 | -0.06 | 0.04 |
| Stories | -0.13** | 0.06 | 0.01 | 0.01 | -0.004 | 0.004 | -0.06*** | 0.02 |
| Green Feats | 0.29** | 0.13 | 0.03*** | 0.01 | 0.01 | 0.01 | 0.13*** | 0.04 |
| Green Cert | 0.85*** | 0.24 | 0.01 | 0.04 | 0.02 | 0.02 | 0.19** | 0.08 |
| Pool | 0.18* | 0.10 | -0.01 | 0.01 | 0.01 | 0.01 | 0.14*** | 0.04 |
| Waterfront | -0.09 | 0.16 | 0.06*** | 0.01 | 0.05*** | 0.01 | 0.001 | 0.05 |
| Fireplaces | 0.06*** | 0.01 | 0.02*** | 0.004 | 0.003** | 0.001 | 0.03*** | 0.004 |
| *Zipcode FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *17,908* | | *19,317* | | *20,483* | | *22,069* | |
| *No of Groups* | *276* | | *248* | | *221* | | *198* | |
| *Avg obs/group* | *64.9* | | *77.9* | | *92.7* | | *111.5* | |
| *Within R2* | *0.58* | | *0.76* | | *0.85* | | *0.72* | |
| *Between R2* | *0.21* | | *0.52* | | *0.68* | | *0.46* | |
| *Overall R2* | *0.51* | | *0.73* | | *0.82* | | *0.63* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment and for crisis periods of 2008 to 2011. Variable definitions in Table A. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*

**Table A3: Results for Single Family Homes Separated by Price Segment and Crisis Period**

| | Low Price | | Low/Mid Price | | Mid/High Price | | High Price | |
|---|---|---|---|---|---|---|---|---|
| | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** | **Coef.** | **SE** |
| Cash | -0.17 | 0.12 | -0.19*** | 0.07 | 0.01 | 0.06 | -0.10 | 0.10 |
| $\widehat{TOM}$ | 0.31*** | 0.11 | 0.01 | 0.01 | -0.002*** | 0.0003 | 0.02*** | 0.01 |
| Cashx$\widehat{TOM}$ | -0.002 | 0.001 | 0.001 | 0.001 | -0.0003 | 0.001 | 0.001 | 0.001 |
| Age | -0.07*** | 0.03 | -0.004*** | 0.001 | -0.001*** | 0.0004 | -0.01*** | 0.001 |
| Agesq | -0.0001** | 0.00006 | <0.0001 | <0.0001 | <0.0001*** | <0.0001 | <0.0001 | <0.0001 |
| New Construction | -10.04*** | 3.75 | -0.27 | 0.20 | 0.09*** | 0.01 | -0.68*** | 0.21 |
| Full Baths | -1.16*** | 0.45 | 0.01 | 0.03 | 0.01** | 0.006 | -0.05* | 0.02 |
| Half Baths | -0.23** | 0.11 | 0.02 | 0.01 | 0.004 | 0.01 | 0.003 | 0.01 |
| Bedrooms | 2.32*** | 0.86 | 0.05 | 0.05 | -0.03*** | 0.005 | 0.15*** | 0.05 |
| logSF | -5.87** | 2.31 | 0.10 | 0.12 | 0.37*** | 0.02 | 0.09 | 0.15 |
| logLot | -2.44*** | 0.94 | -0.06 | 0.05 | 0.04*** | 0.01 | -0.16*** | 0.05 |
| Stories | -1.36*** | 0.48 | -0.08*** | 0.03 | -0.01 | 0.01 | -0.13*** | 0.03 |
| Green Feats | 2.64*** | 1.01 | 0.28*** | 0.08 | 0.03** | 0.01 | 0.23*** | 0.06 |
| Green Cert | *Omitted* | | -0.04 | 0.11 | -0.06*** | 0.01 | 0.54*** | 0.17 |
| Pool | 2.24*** | 0.79 | 0.06 | 0.05 | 0.002 | 0.01 | 0.21*** | 0.05 |
| Waterfront | -3.40*** | 1.29 | -0.03 | 0.07 | 0.06*** | 0.01 | -0.14*** | 0.07 |
| Fireplaces | 0.34*** | 0.11 | 0.04*** | 0.01 | 0.01 | 0.01 | 0.07*** | 0.01 |
| *Zipcode FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Year FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *Month FE* | *Yes* | | *Yes* | | *Yes* | | *Yes* | |
| *No of Obs* | *1,912* | | *2,277* | | *2,536* | | *2,642* | |
| *No of Groups* | *163* | | *146* | | *111* | | *107* | |
| *Avg obs/group* | *11.7* | | *15.6* | | *22.8* | | *24.7* | |
| *Within R2* | *0.62* | | *0.73* | | *0.65* | | *0.60* | |
| *Between R2* | *0.38* | | *0.66* | | *0.15* | | *0.22* | |
| *Overall R2* | *0.59* | | *0.73* | | *0.58* | | *0.51* | |

*Note: This table presents the results of a fixed effects regression for condo transactions for the Virginia Beach-Norfolk MSA over the period of 1993 to 2020, separated by price segment and for crisis periods of 2008 to 2011. Variable definitions in Table A. Standard errors are clustered at Zipcode level. '***', '**' and '*' denote significance at the 1%, 5% and 10% level, respectively.*