
Hanchen Jiang
Department of Economics, Johns Hopkins University

This Version: November 15, 2019

Job Market Paper

Link to Latest Version

*Email: hjiang15@jhu.edu. Link to the Online Appendix. I would like to express my great appreciation to Robert Moffitt, Yingyao Hu, Matthew Kahn, Luis Quintero, and Richard Spady for their encouragement, guidance, and support. I would also like to acknowledge invaluable suggestions from Ingrid Gould Ellen and Katherine O’Regan. For other useful comments and thoughtful conversations, I would like to thank the following: Brent Ambrose, Burt Barnow, Jaclene Begley, Paul Carrillo, Edmund Crawley, Edward Coulson, Vadim Elenev, Edward Glaeser, Daniel Gubits, Chris Herbst, Nicholas Hill, Benjamin Keys, Sandra Newman, Hal Martin, Raven Molloy, Gary Painter, Mark Partridge, Nicholas Papageorge, Stuart Rosenthal, Bryan Stuart, Erdal Tekin, Rich Trapp, Stijn Van Nieuwerburgh, Xi Yang, and Yves Zenou, along with participants at the 2018 Workshop on Urban and Regional Economics at Singapore Management University, 2019 American Real Estate and Urban Economics Association (AREUEA) Doctoral Session and National Conference, 2019 Eastern Economics Association Annual Conference, 2019 American Real Estate Society (ARES) Doctoral Session, 2019 Conference on Real Estate and Housing at Fisher School of Business at Ohio State University, 2019 Workshop on Urban and Regional Economics at Bogotá, Colombia, 2019 National Association for Business Economics (NABE) Tech Econ Conference, Johns Hopkins Carey Business School, and Vanderbilt University. Research funding from the 21st Century Cities Initiative Award for Doctoral Research on Urban Issues at Johns Hopkins University is appreciated. All errors are my own.
Abstract: Rent regulation is central to the affordable housing policies of local municipalities and is on the rise in the United States and worldwide. In this paper I explore the unintended consequences of rent regulation on tenant labor market outcomes, along with the impact that policy awareness has on those outcomes, using a novel data set on rent stabilization in New York City. Recognizing the potential endogeneity of living in a rent-stabilized unit, I construct an instrumental variable that leverages variation in the availability of rent-stabilized units across New York boroughs over three decades of data. I then use the sorted effects method in Chernozhukov, Fernández-Val, and Luo (2018) to investigate heterogeneous effects. I find that rent-stabilized tenants are more likely to be unemployed compared with tenants in private market-rate units, particularly among white and high-skilled tenants. Furthermore, I identify policy awareness using a unique feature of the data, and show that a large share of rent-stabilized tenants are either misinformed or unaware of their rent regulation status. The impact of rent stabilization on unemployment only exists among tenants who are aware of their regulation status.

Keywords: rent regulation, rent stabilization, labor market, unemployment, policy awareness, New York City
1 Introduction

Rent regulation is central to the affordable housing policies of local municipalities. Its modern version, which limits rent increases, has recently regained legislative momentum as a result of the rental housing affordability crisis. For example, Oregon, New York, and California all passed rent regulation bills in 2019. Many more states in the United States are also considering bringing back rent regulation, with some presidential candidates even calling for national rent control.\(^1\) In this paper I explore the hitherto understudied effect of rent regulation on labor market outcomes.

In particular I answer two questions: what are the impacts of rent regulation on tenant labor market outcomes, and would the impacts be different depending on policy awareness - whether rent-regulated tenants correctly know their rent regulation status? While there have been extensive studies evaluating the policy’s impacts on housing price, supply, and quality from the seminal work by Olsen (1972) to the recent paper by Autor et al. (2014),\(^2\) much less is known about the policy’s spillover effects on behavioral outcomes. Interest in spillover effects has grown recently, where the outcomes of interest vary from crime (Autor et al., 2017) to eviction (Asquith, 2017) to tenant mobility, displacement, and inequality (Diamond et al., 2019).\(^3\) However, the effect of rent regulation on tenant labor market outcomes in the United States remains an unexamined question. Rent regulation matters for labor market outcomes because it generates a rent subsidy for rent-regulated tenants. Such a rent subsidy not only offers insurance value and eases the intertemporal budget constraint, but it also induces “lock-in” by reducing residential and geographical mobility, both of which could affect labor outcomes, such as job search behavior and unemployment.\(^4\)

One of the main contributions of this paper is to propose and quantify a novel causal claim of rent regulation on tenant labor market outcomes. Researchers have studied the spillover effects of other assisted housing programs on recipients’ labor market outcomes, such as

---

\(^1\)Outside the United States, Berlin has introduced a five-year rent freeze plan to counter rising rents in 2019 as well. A rent freeze is usually regarded as first generation rent regulation, commonly known as rent control. Paris also reintroduced rent control earlier in 2019.

\(^2\)Other empirical studies include Olsen (1988); Gyourko and Linneman (1990); Moon and Stotsky (1993); Nagy (1997); Early and Olsen (1998); Early (2000); Sims (2007) and others. For excellent reviews, see Arnott (1995); Turner and Malpezzi (2003); Metcalf (2018) and Pastor et al. (2018).

\(^3\)Most studies are within the partial equilibrium framework in nature. The only exception is Favilukis et al. (2019), who build a general equilibrium model and discuss the role of different affordable housing policies on city welfare.

\(^4\)To the best of my knowledge, the only paper that also links rent regulation with labor market outcomes is Svarer et al. (2005), which looks at rent control in Denmark. However, the policy institutions and the rental housing markets are fundamentally different between the United States and Denmark. Moreover, to reach causation, my paper pays close attention to the self-selection in rent-regulated housing, which is likely to be an endogenous choice.
However, rent regulation differs in critical ways from most assisted housing programs that have been studied, in particular, public housing and housing voucher programs. Specifically, rent regulation is not a means-tested welfare program targeted at the low-income population. It has no income eligibility rule, no formal application requirement, and no work requirement, nor does the benefit decrease when a renter’s earnings increase. From an ex-ante perspective, rent regulation acts like a universal in-kind transfer in which tenants with all backgrounds are eligible to participate. Hence, not only is the overall effect of rent regulation on tenant labor market outcome important, but so is the evidence on the ex-post incidence of the program and its potential heterogeneous effects. Such evidence sheds light on the equity, efficiency, and potential misallocation of rent regulation policy, which have been emphasized in Gyourko and Linneman (1989), Glaeser (1996) and Glaeser and Luttmer (2003).

This paper also offers empirical evidence about policy awareness and highlights its important role in affecting tenant labor market outcomes. Program participants are commonly assumed to be rational in the program evaluation/treatment effect literature. This assumption suggests that rent-regulated tenants are fully aware of their regulation status and, accordingly, their rent subsidy. However, I document new evidence to verify this assumption and explore its implication. Policy awareness matters because it affects tenants’ forward-looking decision-making - tenants who are unaware of their status will not behave in this way.

This paper focuses on rent stabilization in New York City, in which rent increases are limited.\(^6\) The empirical analysis uses the New York City Housing and Vacancy Survey (NYCHVS). This data set is representative for the entire city and is conducted about every three years by the U.S. Census Bureau. It contains detailed information on both housing and household characteristics. A unique feature of this data set is it provides accurate rent regulation status of each housing unit verified by administrative sources, irrespective of being occupied or vacant.

There are endogeneity concerns in assessing the causal impact of rent regulation on tenant labor market outcomes, because renters living in rent-stabilized units might be systematically different from those living in private market-rate units. Those differences, such as individual skills, preferences, or labor market shocks, might also directly affect tenant labor market

\(^5\)Olsen (2003) and Collinson et al. (2015) offer excellent reviews on the effect of assisted housing programs on various outcomes.

\(^6\)In 2017, New York City had about 1 million rent-stabilized housing units - even more than private market-rate units.
outcomes but be unobservable to researchers. Therefore, any statistically significant association does not necessarily convey causation. I first provide evidence that rent-stabilized tenants are observationally similar to tenants in private market-rate units, particularly in terms of education and income. This pattern is distinct from that is commonly found in other assisted housing program studies in which program beneficiaries often have lower socioeconomic background and educational attainment.

I use an instrumental variable (IV) strategy to overcome the possible self-selection concerns. Equipped with three decades of housing and vacancy data since 1978, I achieve causation by leveraging the variation in the availability of rent-stabilized units across New York boroughs over time. To strengthen the validity of the instrument, various procedures are applied to alleviate different concerns such as unobserved confounding factors at the borough level, move-in year endogeneity, and model mis-specification. Last but not least, I apply the sorted effect method, recently developed by (Chernozhukov et al., 2018), to discover heterogeneous effects beyond their averages.

Furthermore, a unique feature of the data allows identification of policy awareness because the data contain information about both the legal rent regulation status and tenants’ self-perception on all units. This paper also leverages local rent-regulation knowledge differences at the sub-borough level (inspired by Chetty et al. (2013)) as an additional instrument for policy awareness to strengthen the causation and to investigate whether policy awareness matters for the impacts of rent stabilization on tenant labor market outcomes.

Both ordinary least squares (OLS) and probit baseline estimates show that rent-stabilized tenants are more likely to be unemployed (about 2.3-3.5%) when compared with renters in private market-rate units. The IV estimates confirm that the negative effect on unemployment is indeed causal. Moreover, the estimated coefficients are larger under IV estimation when compared with OLS and probit baseline estimation. This suggests that the self-selected tenants may have better characteristics, which is unobservable and leads to underestimating the negative effect in baseline estimation\(^7\). Moreover, the effects are heterogeneous and possibly counterintuitive: the unemployment effects are only significant among high-skilled, white tenants, while no significant effects having been found among low-skilled, non-white tenants. There are no significant causal impacts regarding other labor market outcomes, such as labor force participation or hourly wage rate.

This paper also documents a new empirical fact about the policy awareness of rent stabilization: not everyone knows about it! Among all rent-stabilized tenants, I find that only 34 percent of those who live in rent-stabilized units are able to correctly identify their

\(^7\)Possible examples of such characteristics include strong search skills or local networks that help tenants to find both rent-stabilized units and jobs more easily.
rent regulation status. In contrast, more than 24 percent are misinformed, believing their housing units are not regulated at all despite living in rent-stabilized units.\textsuperscript{8} Descriptive analysis shows that aware renters have a much better socioeconomic background compared with renters in private market-rate units, while misinformed renters have a much worse socioeconomic background compared with renters in private market-rate units.

Results based on the IV strategy demonstrate that rent-stabilized tenants who are aware of their rent regulation status are more likely to be unemployed, when compared to renters in private market-rate units. However, no significant causal impact found when comparing rent-stabilized tenants who are misinformed with renters in private market-rate units. Such findings may help readers understand why the effect of rent stabilization on unemployment is only seen among high-skilled tenants: the aware group has a much higher education attainment even when compared with private market renters. High-skilled workers are commonly observed to have higher geographical mobility than low-skilled workers.\textsuperscript{9} Therefore, rent stabilization may be expected to have a greater effect on the aware, high-skilled tenants who are “locked-in” in a superstar city like New York City (Gyourko et al., 2013). This issue is also broadly related to the Oswald hypothesis, which postulates the negative effect of homeownership on unemployment and other labor market outcomes (Oswald (1996, 1999); Blanchflower and Oswald (2013)).\textsuperscript{10}

The rest of the paper proceeds as follows: Section 2 discusses the institutional background. Section 3 introduces the data and the descriptive analysis. Section 4 offers theoretical discussion and then elaboration on the empirical strategy. Section 5 reports the main results about the effect of rent regulation on labor market outcomes. Section 6 extends the discussion to the role of policy awareness. Section 7 offers evidence on suggestive mechanisms and checks the robustness. Section 8 discusses policy implications and conclusions.

2 Institutional Background

Rent stabilization is the modern version of rent regulation, which began in New York City in 1969. Rent stabilization protects tenants in two major ways: (1) tenants are protected from sharp rent increases; (2) tenants have the right to renew their leases and are protected

\textsuperscript{8}In addition, 22 percent do not know about regulation status and another 20 percent refused to answer.
\textsuperscript{9}See Topel (1986); Bound and Holzer (2000); Ganong and Shoag (2017); Austin et al. (2018); Notowidigdo (2019) among others.
\textsuperscript{10}Several studies have found negative effects of homeownership on unemployment and wages across multiple countries and periods (Belot and van Ours, 2001; Green and Hendershott, 2001; Coulson and Fisher, 2002; Di Tella and MacCulloch, 2005; Munch et al., 2006; Yang, 2019).
against arbitrary evictions.\textsuperscript{11} It is far more popular today than its predecessor - rent control, which is also known as the first generation of rent regulation (Arnott, 1995). Rent control involves more stringent restrictions on rent increases (even freezing rents in extreme cases), but it has dwindled in popularity due to rent-controlled units either become rent-stabilized or completely deregulated upon vacancy. In 2017, of the 2 million rental market units in New York City, there were 966,000 rent-stabilized apartments while only about 22,000 rent-controlled apartments.\textsuperscript{12} This paper focuses exclusively on rent stabilization.\textsuperscript{13} Figure 4 shows the spatial distribution of rent-stabilized units in the rental market.\textsuperscript{14}

\textit{Eligibility of Rent Stabilization.} In New York City, rent stabilization generally applies to three types of apartments in buildings of: (1) six or more units built between February 1, 1947, and January 1, 1974; (2) six or more units built before February 1, 1947, and tenants who moved in after June 30, 1971; and (3) three or more apartments constructed or extensively renovated since 1974 with special tax benefits, such as J-51, 421a, or other programs. The third category only applies to the period when tax abatement is effective, which usually lasts for 10-20 years. The criteria are shown in Figure 1, wherein the shadowed areas represent rent-stabilized units.

\textit{Rent Determination.} The annual rent increases of rent-stabilized units in New York City are capped and adjusted by the Rent Guidelines Board (RGB). For example, between October 1, 2019, and September 30, 2020, a maximum 1.5 percent increase is allowed for a one-year lease. This guideline has been re-set and has fluctuated every year since 1969.\textsuperscript{15} Such adjustment is calculated based on the following criteria: consideration of housing market conditions, economic trends, owner costs and revenues, availability of financing, changes in housing supply, affordability of rental housing, rental vacancy rates, cost-of-living indices and other factors. The main impact of rent stabilization is that this annual adjustment is lower than the market rent growth. Figure 2 documents the average monthly contract rent for private market-rate and rent-stabilized units in New York City. Clearly, rent increases are significantly smaller for rent-stabilized units compared with private market-rate units.

Greater rent increases are allowed in two situations: (1) when certain types of capital

---

\textsuperscript{11}This provides more protection against eviction than in a private market-rate apartment. However, eviction may occur if a rent-stabilized unit is not used as a primary residence, among other situations.

\textsuperscript{12}Rent control in New York City is regarded as a dwindling stock occupied by an elderly, low-income population. The median age of rent-controlled tenants was 70 in 2011, and the median annual total household income in 2013 was less than $30,000 (in 2016 dollars).

\textsuperscript{13}A brief comparison between these two types of rent regulation is summarized in Table A10. For a complete history of rent regulation in New York City, readers can refer to \url{https://www1.nyc.gov/assets/rentguidelinesboard/pdf/history/historyoftheboard.pdf}.

\textsuperscript{14}The spatial distribution of rental units and private market-rate units in the rental market are shown in Figures A1 and A2.

\textsuperscript{15}The historical maximum increase approved by RGB is documented in Table A12.
improvements are undertaken in the unit or large investments are put into the building and
(2) when turnover (known as “vacancy bonus” or “vacancy allowance”) occurs if an unit is
still subject to rent regulation.

Deregulation. There are several main cases for when a rent-stabilized unit is deregulated.
Most commonly, a rent-stabilized unit is deregulated when the rent reaches the deregulation
rent threshold (DRT)\(^1\) and when one of the following two conditions are met: (1) there is a
vacancy, or (2) the household’s income is above the deregulation income threshold (DIT).
A rent-stabilized unit may also be deregulated upon vacancy during the conversion to a
co-op or condo. Lastly, deregulation may occur when tax abatements or exemptions that
the owner receives expire (for example, J-51 or 421-a tax benefits).

Comparisons with Federal Assisted Housing Programs. Rent regulation is special because
it differs in critical ways from most assisted housing programs that have been studied at the
federal level.\(^2\) Specifically, rent regulation is not a means-tested welfare program targeted
at the low-income population. As a result, rent-stabilized tenants have a much wider income
distribution. In contrast, most assisted housing programs have certain forms of income eligi-
bility rules. For example, public housing tenants can technically earn up to 80 percent of the
area median income (AMI), while such numbers have been lower for both the low-income
housing tax credit (LIHTC) program (60 percent) and housing choice voucher program (50
percent).\(^3\) Also, most assisted housing programs require participants to pay about 30 per-
cent of their adjusted income, such as the public housing or housing choice voucher programs.
In contrast, the rents of rent-stabilized units are not based on tenants’ income at all, which
is more similar to the LIHTC program with a flat rent scheme. Lastly, unlike other assisted
housing programs, rent-stabilized units do not require any formal application process. Many
tenants obtain their rent-stabilized units through good fortune. If an apartment is indeed
rent-stabilized, the landlord is supposed to attach to the lease the rent stabilization “lease
rider.” The rider informs rent-stabilized tenants of their rights and responsibilities. How-
ever, it is not clear how strictly such requirements are enforced in reality given it is the last
step of signing the lease. One of the novel empirical findings of this paper is that many

\(^1\)Between June 19, 1997, and June 23, 2011, the DRT was $2,000. In 2019, the DRT was $2,774.76 for
deregulationrentincomethreshold.pdf.

\(^2\)Between July 1, 1998, and June 30, 2011, the DIT income was $175,000. From July 1, 2011 on-
ward, the DIT has remained at $200,000. See https://hcr.ny.gov/system/files/documents/2018/10/
deregulationrentincomethreshold.pdf. for more information

\(^3\)Rental units in buildings currently receiving J-51 or 421-a benefits are required to be stabilized, regardless
of whether the rent level exceeds the high rent deregulation level.

\(^2\)Regarding U.S. federal assisted housing programs and the related policy discussion, see Green and
Malpezzi (2003); Olsen (2003); Gyourko and Glaeser (2008); Collinson et al. (2015) for excellent reviews.

\(^{20}\)See Table 2.1 in Collinson et al. (2015).
rent-stabilized tenants are indeed not aware of their good fortune.

Rent-Stabilized Units Are Difficult to Find. Rent-stabilized units are difficult to find for the following reasons. First, although a building may contain rent-stabilized units, not all units in the same building have the same rent-stabilization status. Moreover, landlords might not advertise rent-stabilized units publicly. As shown in Figure 3, less than 3 percent of online postings on the StreetEasy website contain advertisements related to rent stabilization.21 However, historical NYCHVS data suggests that at least 25 percent of vacant-for-rent units are rent-stabilized, which makes searching for rent-stabilized apartments more difficult and often requires specialized knowledge or local networks.

3 Data and Descriptive Analysis

3.1 The New York City Housing and Vacancy Survey (NYCHVS)

This paper takes advantage of a novel data set that is underexplored - the New York City Housing and Vacancy Survey (NYCHVS) - for the empirical analysis. It is representative of the entire city and covers all the five boroughs (Bronx, Brooklyn, Manhattan, Queens, and Staten Island). Each wave of data contains approximately 18,000 units, both occupied (either rental-occupied or owner-occupied) and vacant.22 For occupied units, the survey includes comprehensive information about both housing and household characteristics.

The NYCHVS has a high interview rate of 98 percent and is conducted approximately every three years by the U.S. Census Bureau in compliance with New York state and New York City’s rent regulation laws.23 For this purpose, the rent regulation status of each housing unit is verified through administrative sources, because self-reported receipts are not accurate.24 This gives NYCHVS a unique angle on answering how rent regulation affects tenant behavior and labor market outcomes.

This paper uses the pooled 2002 and 2005 waves of NYCHVS to construct the main

---

21 The StreetEasy website (https://streeteasy.com) is unique because it allows users to directly search for keywords in addition to select various criteria. An online posting is considered to have rent stabilization advertisement if any of the following words appear in the description section: rent stabilization, rent stabilized, stabilized, and some others. Other websites do not even include rent stabilization information at all.

22 Each sample unit represents approximately 180 similar housing units. For each occupied housing unit, there is a person-record in addition to a household record for each person in an occupied housing unit. For vacant housing units, a house record is also available.

23 The survey is sponsored by the New York City Department of Housing Preservation and Development.

24 As elaborated in a later section, the distinction between legal regulation status and self-reported regulation status plays an important role - it identifies policy awareness.
analytic sample. Almost three decades of data beginning from 1978 are used to construct IVs for causal identification. Previous studies using NYCHVS have almost exclusively focused on the housing market in isolation.\textsuperscript{25} One of the contributions of this paper is to take advantage of the rich household information and to answer questions linking housing policy to labor market outcomes.

Moreover, the 2002 and 2005 waves are the most recent surveys that provide information on both actual rent regulation status and tenants’ self-perceptions.\textsuperscript{26} Such distinction provides a unique opportunity to differentiate between rent-stabilized tenants who are aware of their good fortune and those who are not aware and even misinformed. To the best of my knowledge, this feature has never been used in the literature before.

\textit{Sample Restriction.} To construct the analytic sample for empirical analysis, I follow these restrictions: (1) Only rental housing units that are either rent-stabilized or private market-rate are kept. This excludes other rental housing units, such as rent-controlled, public housing, and other subsidized rental units, as well as the owner-occupied market. (2) Households benefiting from any federal, state, or city housing subsidy programs are excluded. The main example is the federal Section 8 housing choice voucher program.\textsuperscript{27} (3) Households where the household heads’ nominal non-labor incomes are greater than $100,000 are excluded.\textsuperscript{28} (4) Households where household heads are younger than age 26 or older than 54 are excluded.\textsuperscript{29} (5) Households that moved into their current housing units before 1978, due to data limitations, are excluded.\textsuperscript{30}

\textit{Summary Statistics.} Summary statistics on variables related to household and housing are shown in Table 1.\textsuperscript{31} Detailed variable definitions are provided in Appendix A.5.

As shown in panel A of Table 1, both rent-stabilized and private market-rate tenants have the same high labor force participation rates (89 percent). These rates are higher than the

\textsuperscript{25}The earliest NYCHVS used in the literature was the 1968 wave (Olsen, 1972), (Gyourko and Linneman, 1989, 1990) and (Ault et al., 1994) in which researchers focused on the role of rent control (instead of rent stabilization) in the housing market. Later waves are used almost exclusively for housing market analysis. For example, the 1978, 1981, 1984, and 1987 data are used in Linneman (1987); Moon and Stotsky (1993); Nagy (1995, 1997) and the 2011 data is used in Sieg and Yoon (2016).

\textsuperscript{26}Since 2008, the survey question associated with self-reported perception on rent regulation has been dropped.

\textsuperscript{27}I am grateful for Ingrid Gould Ellen for offering this suggestion.

\textsuperscript{28}In 2002 and 2005, there are only 160 and 180 such cases are excluded out of the entire 15,894 and 15,547 rental units respectively.

\textsuperscript{29}The empirical results are robust if the upper bound of the age range is extended to 64.

\textsuperscript{30}The earliest NYCHVS data that are available are from 1978. IVs are constructed from the time of move-in.

\textsuperscript{31}More detailed summary statistics containing standard deviation, minimum, and maximum are available in Table A1 and Table A2 respectively.
Rent-stabilized tenants have a relatively higher unemployment rate (6.3 percent) than private market-rate tenants (5.2 percent). The difference here is significant at the 5 percent level. Rent-stabilized tenants are also found to have lower wage rates and annual wage incomes. The differences here are significant at the 1 percent level.

Regarding individual characteristics, educational attainment is fairly balanced between rent-stabilized and private market-rate tenants. In terms of demographics, household heads living in rent-stabilized units are more likely to be female and slightly older. They are less likely to be born in New York City, to be married, and to have children, and they are more likely to have smaller families. In terms of ethnicity, household heads living in rent-stabilized units are less likely to be white or Asian (but more likely to be Hispanic). There is no significant difference regarding African-Americans. Lastly, there is no observational difference in terms of the household heads’ non-labor incomes. In the next section, a regression analysis is conducted to further investigate what individual characteristics are predictive of being a rent-stabilized tenant or not. Geographic differences at the sub-borough level, which are not revealed here in the summary statistics comparison, are particularly considered.

Housing characteristics are shown in panel B of Table 1. First, the monthly contract rent and monthly gross rent of rent-stabilized units are significantly smaller than those of private market-rate units. The average rent difference is approximately $300 per month. Second, the tenure of residence is much longer (more than 2 years) for tenants living in rent-stabilized units than for those in private market-rate units. Furthermore, rent-stabilized units are generally smaller than private market-rate units measured by number of rooms and bedrooms. Last, rent-stabilized units seem to be of relatively lower quality at both the unit and building level. In the next section, a regression analysis is conducted that takes such quality difference into account.

3.2 Is Rent Stabilization Valuable?

One may ask if rent stabilization is valuable. When the regulated price is below the market equilibrium price, landlords can financially benefit from reducing housing quality in rent-regulated properties. In a static world, assuming housing quality is linear in price, a landlord may be fully compensated for the wedge between equilibrium price and regulated price by reducing housing quality sufficiently. In such a scenario, tenants living in rent-stabilized

---

32 The labor force participation rate among 25- to 54-year-olds was 83.3 percent in 2002, according to the Bureau of Labor Statistics (BLS) (https://www.bls.gov/opub/ted/2014/ted_20140106.htm).

33 National unemployment in 2002 and 2005 was 5.8 percent and 5.1 percent, respectively, according to the BLS (https://data.bls.gov/timeseries/LNU04000000?periods=Annual+Data&periods_option=specific_periods&years_option=all_years).
units do not benefit at all.

Evidence from Rent Stabilization Dummy. Following Autor et al. (2014), I estimate

\[ P_{ijst} = \alpha + \beta RS_i + \lambda RS_i \times \text{Tenure}_i + \gamma X_{ijbt} + \epsilon_i \]  

(1)

where \( P_{ijbt} \) indexes the monthly rental price (either in level or in log) of a housing unit \( i \) in building/neighborhood \( j \) located in sub-borough \( s \) at year \( t \). \( RS_i \) indicates whether a housing unit is rent-stabilized. \( RS_i \times \text{Tenure}_i \) captures how the value of rent stabilization is larger if one stays in the same dwelling longer. \( X_{ijst} \) is a vector that contains different levels of housing and building traits.

I first look at the effect of rent stabilization at the level of monthly contract rents. The result is documented in panel A of Table 2, wherein different levels of housing traits are progressively added. Overall, rent-stabilized units do have lower quality-adjusted rents. The rent discount also increases with a longer tenure of the residence. On average, the monthly quality-adjusted contract rent is more than $350 per month for a newly moved-in tenant. Every additional year leads to an approximately $20 additional discount per month. For someone who has lived in the same unit for 10 years, the average rent discount could be more than $550 per month.

The log of monthly contract rents is also considered as an alternative outcome variable. The results are shown in panel B of Table 2. The general takeaway is the same as in the previous paragraph: rent stabilization is valuable after adjusting for quality differences. Rent stabilization leads to a 15 percent reduction in contract rent. In addition, one additional year is linked with a further 1.8 percent decrease in rent.\(^{34}\)

Evidence from Hedonic Rent Discount. An alternative approach to investigating the value of rent stabilization is to estimate the rent discount directly, which allows for greater heterogeneity beyond average. The rent discount is defined as the price difference between the actual contract rent and the predicted counterfactual market rent for a rent-stabilized unit. The predicted counterfactual market rent is calculated using a hedonic pricing approach in the spirit of Rosen (1974).\(^{35}\) Detailed discussion on how this rent discount is calculated can be found in Jiang et al. (2019). From this related study, I can draw the estimated rent discount directly. In Figure A3, the rent discount (vertical axis) is plotted against the

\(^{34}\)One might wonder whether there is a nonlinear relationship between rent stabilization and tenure of residence. I have worked on a quadratic interaction term of rent stabilization and tenure of residence, but the result is not significantly different from the current linear interaction specification.

\(^{35}\)Briefly, this exercise involves a two-step procedure. In the first step, the implicit prices of various housing traits are recovered only by private market units. In the second step, the implicit prices are used to predict the market price for rent-stabilized units.
contract rent for rent-stabilized units (horizontal axis), and a local polynomial smooth line is fitted. It is clear that there exists positive rent discount on average. Furthermore, the rent discount is much larger for stabilized units with lower contract rents. The rent discount also, on average, converges to zero when a rent-stabilized contract rent crosses more than $2,500, which is consistent with the high-rent deregulation policy institution. In addition, Figure A4 shows the rent discount against total household income. A flat-fitted line suggests that the overall rent discount is not correlated with family income, which is consistent with the fact that rent stabilization is not means-tested.

3.3 Who Live in Rent Stabilized Units?

Evidence from Observed Characteristics. I first investigate whether rent-stabilized tenants have different socioeconomic and demographic characteristics compared with tenants living in private market-rate units. The answers assist in thinking about the possibly self-selection concern, which is a key question of any empirical policy evaluation.

A regression analysis is conducted where the outcome variable is binary, equaling 1 for rent-stabilized tenants and 0 for private market tenants. The analysis includes a rich set of individual characteristics and uses different model specifications, including the linear probability model (OLS) as well as binary choice models, such as probit and logit models. The results are represented in Table 3.36

Most individual characteristics are not significantly associated with living in rent-stabilized units, particularly with respect to education and income (either the household head’s own total income or the total income of all the other family members). This pattern is distinct from other assisted housing programs, such as public housing or housing voucher programs in which tenants with lower education and income are most likely to participate. Many other characteristics prove insignificant, such as age, coresidence with parents, birth place, and others. The only distinct factors are gender and family size.37 These findings are robust to alternative binary choice models, such as probit and logit.

Sources of Endogeneity. Even though tenants in rent-stabilized units seem to be obser-

36 Column A of Table 3 is the the linear probability model, which means that coefficients can be interpreted as marginal effects directly. Columns B and C of Table 3 are probit and logit models, respectively. The coefficients have been transformed as marginal effects to ease the interpretation and comparison to a linear probability model.

37 In addition to the baseline model, I also further explore whether there is any pattern associated with a specific industry or occupation category. While no significant pattern associated with industry types has been found, there is some level of heterogeneity associated with occupation. For example, being a social scientist or lawyer is negatively associated with living in rent-stabilized units, while being a physical scientist or cleaning and building service worker is positively associated with living in rent-stabilized units. Results are available upon request.
vationally similar to tenants in private market-rate units, one may still be concerned with other sources of endogeneity that are unobservable to researchers but affect tenant labor market outcomes directly, that is, beyond variables included in Table 3.

Let’s first revisit the canonical skill (or ability) bias, which is arguably the most classical source of omitted variable bias in labor economics.\textsuperscript{38} On the one hand, given that rent-stabilized units have lower rents on average, it is plausible that tenants with lower unobserved skills may have stronger incentives to search for cheaper housing units. Such tenants with lower unobserved skills may also have worse labor market outcomes, irrespective of living in rent-stabilized units or not. In this way, a naive OLS estimation may be overestimating, if rent stabilization is found to be negatively associated with labor market outcomes. On the other hand, given that rent-stabilized units are difficult to find, it is plausible that tenants with higher unobserved skills may more easily locate such units. For example, such tenants may be good at online searching or have a strong local network, which may also help with job search and improve other labor market outcomes. In this way, a naive OLS estimation may be underestimating the true effect, and thus, theoretically ambiguous in terms of the direction of bias.

Another source of endogeneity comes from reversed causation. For example, some tenants may expect to have worse labor market outcomes in the future, which causes them to spend more time and effort searching for rent-stabilized units. Hence, an observed negative association between living in rent-stabilized units and labor market outcomes cannot be interpreted as causation either.

A third type of endogeneity stems from unobserved heterogeneity relating to individual preferences and tastes. For example, people who do not want to move and prefer residential stability may spend more time and effort searching for rent-stabilized units. Similarly, people who are more risk averse may also prefer to live in rent-stabilized units so that they do not need to worry about unexpected rent volatility. In contrast, private market renters may be either more risk inclined or have less preference for stability. The preferences could have effects in the labor market performance as well. Therefore, a significant coefficient associated with rent stabilization may not be causal, and living in a rent-stabilized unit may be a proxy for other preferences and tastes.

In sum, people who expect to gain the most from rent stabilization may place greater effort into searching for a rent-stabilized unit. The factors that drive searching may also be correlated with tenants’ future labor market outcomes, which raise concerns related to endogeneity. The next section will address this issue.

\textsuperscript{38}For example, the wage return to schooling literature summarized in Card (2001), among others.
4 The Effect of Rent Regulation on Labor Market Outcomes

4.1 Theoretical Discussion

*Implications from McCall-Type Job Search Model.* I first provide theoretical discussion on the effect of rent regulation on labor market outcomes, particularly unemployment and wage.\(^{39}\) The canonical theoretical framework to understand job search behavior and unemployment goes back to McCall (1970) and Lippman and McCall (1976), where the reservation wage is endogenously determined and affects unemployment duration. Here, rent stabilization is incorporated in a canonical job search model and is found to increase unemployment duration. This section is also motivated by Munch et al. (2006).

Only the rental market is considered. Suppose there are only two types of renters: renters living in private market-rate units \(m\) and rent-stabilized renters \(s\). Each time period, an individual renter needs to pay rent. Rent is assumed to be constant over time for rent-stabilized renters (consider the most extreme rent control in which rent is fixed): \(r_{s,t} = r\). In contrast, rent for private market-rate units is increasing over time \(r_{m,t} = r + \theta(1 - \frac{1}{e^t})\) where \(\theta > 1\). Therefore, the rent discount between the two types of units is thus:

\[
\text{Rent Discount} = r_{m,t} - r_{s,t} = \theta \left(1 - \frac{1}{e^t}\right)
\]

Hence, when time goes to the infinity, \(r_{m,t} - r_{s,t}\) converges to \(\theta\).

The labor market prospects of the worker do not depend on the types of the rental unit; that is, renters in both types of rent units face the same labor market opportunities.\(^{40}\) All workers participate in the labor force: they are either employed or unemployed.

Unemployed workers receive unemployment insurance benefits, \(b\), and the discount rate is \(\rho\). The arrival rate for job offers in this labor market is \(\alpha\) and wage offers \(w\) are generated from an exogenous wage offer distribution \(F(w)\) with support \([w; \bar{w}]\). In this set up, the worker has only one choice variable in the period of unemployment - conditional on receiving a job offer, an unemployed renter decides whether to accept the offer or not. There is no on-the-job search. Jobs are assumed to last indefinitely. The individual renter maximizes

---

\(^{39}\)In the empirical analysis, I also evaluate the effect of rent regulation on labor force participation, given that rent regulation lowers rent and eases intertemporal budget constraint, which may have an income effect.

\(^{40}\)This assumption is acceptable in the case of New York City where public transportation is convenient. Thus, staying in any unit still allows access to all jobs. This is confirmed by the 2005 American Community Survey in which the average commuting time inside New York City is approximately 30 minutes - about 27 minutes in Manhattan and 36 minutes in Brooklyn respectively.
the present discounted value of lifetime net income.

Following the standard job search theory, it is straightforward to derive the value function for an employed worker living in a private market-rate unit \( V^E_m(w) \) and rent-stabilized unit \( V^E_s(w) \) respectively (detailed derivations can be found in the Appendix A.1).

\[
V^E_m(w) = \frac{w - r}{\rho} - \Psi
\]

\[
V^E_s(w) = \frac{w - r}{\rho}
\]

where \( \Psi = \theta\left(\frac{1}{\rho} - \frac{e}{e-1+\rho}\right) > 0 \) captures the higher rent a private market-rate renter has to pay compared with a rent-stabilized renter.

The value function for an unemployed and private market-rate tenant \( V^U_m \) can be derived as the following:

\[
\rho V^U_m = (b - r - \theta) + (1 - \rho)\alpha \int_{w^*_m}^{\infty} (V^E_m - V^U_m) dF(w)
\]

Similarly, the value function for an unemployed and rent-stabilized tenant \( V^U_s \) is thus:

\[
\rho V^U_s = b - r + (1 - \rho)\alpha \int_{w^*_s}^{\infty} (V^E_s - V^U_s) dF(w)
\]

Therefore, the reservation wage for both private market-rate renters \( w^*_m \) and rent stabilized renters \( w^*_s \) can be derived in the following expressions:

\[
w^*_m = b - \frac{e\rho}{e - 1 + \rho} \theta + \frac{(1 - \rho)}{\rho} \frac{\int_{w^*_m}^{\infty} (w - w^*_m) dF(w)}{\int_{w^*_m}^{\infty}}
\]

and

\[
w^*_s = b + \frac{(1 - \rho)}{\rho} \alpha \int_{w^*_s}^{\infty} (w - w^*_s) dF(w)
\]

when \( \theta = 0 \).

By comparing \( w^*_s \) and \( w^*_m \), one can see that the reservation wage for a rent-stabilized unemployed renter is always higher than the reservation wage for a private market-rate unemployed renter. Why would a renter in a private market-rate unit have a lower reservation wage? The intuition comes back to the basic job search model and the concavity of value function: there is uncertainty in the wage offer, leading an unemployed renter to accept a high wage when it is offered rather than wait. But if the rent continues increasing in the
private market, the expected value of the gain from waiting is reduced. Thus, an unemployed
renter in a private market-rate unit is more likely to accept a lower wage job offer and exit
unemployment. In contrast, if the rent discount is assumed to be constant over time, there
is no impact of rent stabilization on job search behavior. Hence, given the prediction of
this bare-bones job search model incorporated with rental price and rent stabilization, one
can expect to observe that rent-stabilized tenants are associated with higher unemployment
when compared with private market tenants on average.

What Does McCall-Type Job Search Model not Account for? The McCall-type job search
model is just one stylized framework to understand the theoretical prediction of rent stabi-
lization on unemployment and other labor market outcomes. There are other alternatives,
which I briefly discuss. First, liquidity constraint is not considered in the current model,
which is important in the job search literature, such as (Card et al., 2007; Chetty, 2008; Bas-
ten et al., 2014) among others. If unemployed renters are liquidity-constrained, then they
would have to accept a job offer earlier than otherwise would be optimal. Rent stabilization
may also help ease liquidity constraint by allowing an unemployed renter to search longer
for a better job.

Second, instead of applying the reservation wage framework, one could also apply the
search effort framework, such as (DellaVigna and Paserman, 2005; Paserman, 2008; Chetty,
2008) and others. By following the standard search effort framework which assumes that
wage does not depend on search effort, then rent stabilization has no impact on job search.

Last, spatial job search is not considered either, which is more commonly applied in the
homeownership and unemployment literature (e.g. Munch et al. (2006, 2008); Morescalchi
(2016)) In particular, as illustrated in Coulson and Fisher (2009), different models would
have completely different theoretical predictions on unemployment and wage, depending on
the specific model assumption. In the end, whether and how rent stabilization affects labor
market outcomes demands empirical investigation.

### 4.2 Preliminary Analysis

I start the preliminary analysis by the following baseline empirical set-up:

\[
Y_{ijst} = \alpha + \beta \text{RS}_{ijst} + \eta X_{it} + \psi V_{jt} + \lambda Z_s + \pi W_t + \epsilon_{ijst}
\]  

(8)

where \(i\) indexes householder, \(j\) indexes the housing unit in a specific building or neighbor-
hood, \(s\) indexes the sub-borough, and \(t\) indexes years.

\(Y_{ijst}\) is the outcome variable of interest. \(\text{RS}_{ijst}\) is the key variable of interest, which
equals 1 when a householder \( i \) lives in a rent-stabilized unit \( j \) with certain housing traits in sub-borough \( s \) and year \( t \).\(^{41}\) The estimate of interest is \( \beta \). \( X_{it} \) stands for individual-level and household-level characteristics. \( V_{jt} \) stands for housing traits at the unit, building, and neighborhood levels. \( Z_s \) is the sub-borough fixed effect and \( W_t \) is the year fixed effect.

The underlying identifying assumption here is that, conditional on regressors \( X_{it}, V_{jt}, Z_s \) and \( W_t \), rent stabilization is randomly assigned. As such, it is particularly important to control variables that affect the rent stabilization eligibility. Thus, I include variables such as how many units a building has and when a building is built, that largely affect rent stabilization status.

Different sets of control variables are added progressively. The individual-level demographic and socioeconomic characteristics include gender, ethnicity, marital status, birth place, educational attainment, and nonlabor income (in log). Other household-level characteristics include whether the householder is coresiding with parent(s), whether younger children (\(< 6 \) years old) or older children (between \( 6 \) and \( 18 \) years old) are present, whether non-relatives are present, total family size, householder’s parental birth places, and total income of other family members (in log). If the householder is married, then the spouse’s educational attainment and labor market status are also controlled. Also controlled are housing traits at different levels, such as the housing unit, building, and neighborhood. The richness of the NYCHVS data also allows me to control for industry and occupation categories, which control those unobserved sector-specific shocks.\(^{42}\) Last, the sub-borough and year fixed effects are included in all model specifications to allow for unobservable local shocks. Households that have lived in their current units for less than one year are excluded to alleviate reverse causation concern.

### 4.3 Instrumental Variable Strategy

#### 4.3.1 Local Availability of Rent Stabilization as Instrumental Variable

To overcome the endogeneity concern from selection-on-unobservables, I propose an instrumental variable (IV) approach to achieve causation. The goal is to find an instrument \( Z \) that affects a tenant’s self-selection into a rent-stabilized unit \( RS \) but does not affect the error term in the structural equation (Equation 8). This study exploits the idea that different boroughs in New York City have different levels of rent-stabilized units that are both vacant

\(^{41}\) \( RS_{ijt} \) equals 0 when a householder lives in a private market-rate unit instead.

\(^{42}\) Both industry and occupation categories are available not only for those who are currently working but also for those who are currently unemployed or out of the labor force. This excludes, however, people who have been unemployed or out of the labor force for longer than 5 years.
and available for rent (vacant-for-rent, hereafter) in different years. This is referred to as the local availability of rent stabilization.

There are two related instruments that capture such variation. The first instrument $IV_{\text{stab}}^{b,t-1}$ is defined as the ratio of the total number of vacant-for-rent units that are rent-stabilized $N_{\text{stab}}^{b,t-1}$ and the total number of vacant-for-rent units $N_{\text{all}}^{b,t-1}$:

$$ IV_{\text{stab}}^{b,t-1} = \frac{N_{\text{stab}}^{b,t-1}}{N_{\text{all}}^{b,t-1}} $$  \hspace{1cm} (9)

where $b$ indexes different boroughs (Bronx, Brooklyn, Manhattan, Queens, and Staten Island) and $t - 1$ indexes the year before a tenant moves into the current dwelling.

Similarly, I construct another instrument $IV_{\text{mkt}}^{b,t-1}$ as the ratio of the total number of vacant-for-rent units that are private market-rate $N_{\text{mkt}}^{b,t-1}$ and the total number of vacant-for-rent units $N_{\text{all}}^{b,t-1}$:

$$ IV_{\text{mkt}}^{b,t-1} = \frac{N_{\text{mkt}}^{b,t-1}}{N_{\text{all}}^{b,t-1}} $$  \hspace{1cm} (10)

First, it is worth mentioning that the sum of $IV_{\text{stab}}^{b,t-1}$ and $IV_{\text{mkt}}^{b,t-1}$ does not equal to 1 and varies in different years because of the existence of other types of housing, such as rent-controlled housing, public, and other subsidized housing. The total stock of such other types of housing also varies by boroughs and years. So is the sum of $IV_{\text{stab}}^{b,t-1}$ and $IV_{\text{mkt}}^{b,t-1}$.

Second, both the numerator and denominator in Equation 9 and Equation 10 specifically refer to units that are vacant-for-rent. A vacant unit could either be for selling only or neither for sale nor rent.\(^{43}\) The differences between vacant-for-rent and vacant have important implications for the validity of the instruments, which are further elaborated on in the next section when discussing the validity of the instruments.

To construct the proposed instruments, one needs to know the following information: (1) when a tenant moves into the current dwelling, (2) how many vacant units there are in each borough at the time 1 year before move-in, and (3) the rent regulation status of all the vacant units in each borough at the time 1 year before move-in.

The data are unique in satisfying all the requirements because NYCHVS depicts a complete picture of the New York City housing market for more than three decades. Condition (1) is easily fulfilled because such information comes from the main analytic sample in the 2002 and 2005 waves.

\(^{43}\)A unit that is neither for sale nor rent could have the following reasons: (a) is under or awaiting renovation; (b) is to be converted to other types of housing; (c) has a legal dispute; and (d) is being held for occasional, seasonal, or recreational use.
Conditions (2) and (3) are more challenging because they require historical data before move-in years. The earliest data available from NYCHVS are from 1978, and later waves are as follows: 1981, 1984, 1987, 1991, 1996, 1999, 2002, and 2005. No earlier data currently exist accordingly to the best of my knowledge.\textsuperscript{44} In each wave of the NYCHVS, even as early as 1978, there is precise, high-quality information regarding condition (2). This precision exists because, as the U.S. Census Bureau states, the primary policy tool out of NYCHVS is the \textit{vacant available for rent rate}, which is defined as the ratio of the vacant available-for-rent units to the total number of renter occupied and vacant available-for-rent units for the entire city.\textsuperscript{45} Regarding condition (3), all rent regulation statuses are also verified through administrative sources, which removes any possibility of self-reported measurement error.

Since the sample of each wave of the NYCHVS is based on the decennial census, which is different for every 10 years, the sampling weights are used to construct $N_{b,t-1}^{\text{stab}}, N_{b,t-1}^{\text{mkt}}, N_{b,t-1}^{\text{all}}$ at the population level to reduce any measurement error coming from different survey methods or sampling designs.\textsuperscript{46} Lastly, for any specific year that is not available from NYCHVS, I conduct within sampling interpolation using a cubic spline interpolation method.

The variations of proposed instruments $IV_{b,t-1}^{\text{stab}}$ and $IV_{b,t-1}^{\text{mkt}}$ are shown in Figures 5 and 6 respectively. In both figures, blue dots are directly obtained and calculated from NYCHVS, while the red lines represent fitted value based on cubic spline interpolation. There are clear variations across different boroughs. Moreover, the value of the instruments also varies within the same borough because it is determined by the year of move-in. There is clearly nonlinear variation over time within the borough. For example, in Manhattan, almost 80 percent of vacant-for-rent units were rent-stabilized in 1985. Such percentage decreases over time, becoming less than 40 percent in the late 1990s. However, it started to increase since 1999. Such nonlinear variation shifts the probability of self-selecting into rent-stabilized units and helps to achieve identification.

\textbf{4.3.2 Instrumental Variable Conditions and Discussion of Potential Violations}

This section assesses the validity of the proposed instruments so that estimation results can be interpreted as local average treatment effects (LATE) (Imbens and Angrist, 1994). The

\textsuperscript{44}I are grateful for the confirmation from Joseph Gyourko, Choon-Geol Moon, Edgar Olsen, Janet Stotsky, and the Furman Center at New York University.

\textsuperscript{45}Such information is of high quality because the “The design requires the standard error of the estimate of the vacant available for rent rate for the entire city be no more than one-fourth of 1 percent, if the actual rate was 3 percent.” See \url{https://www2.census.gov/programs-surveys/nychvs/technical-documentation/source-and-accuracy/source-2005.pdf} for more information.

\textsuperscript{46}For data before 1987, there are no sub-borough identifiers. Hence, the best I can do is construct measures at the borough level.
LATE captures the average causal effect on the subgroup of compliers - tenants whose rent stabilization status is actually affected by the variation of IVs. The discussion is largely inspired by Caliendo et al. (2017); Bhuller et al. (2018); and Arni and Schiprowski (2019).

Relevance. The relevance condition requires that the instrument significantly affects a tenant’s probability of sorting into a rent-stabilized unit given unobservable heterogeneity. This condition is likely to be satisfied and can be easily verified based on the first-stage results. The conceptual discussion uses \( IV_{bstab}^{1} \) for illustration purposes. First, when \( IV_{bstab}^{1} \) is high, there are relatively abundant rent-stabilized units that are vacant and available-for-rent in a borough’s rental market. In that case, whether a household is actively searching for a rent-stabilized unit or not, there is still a relatively higher chance for any household to locate in a rent-stabilized unit. Searching for rent-stabilized housing then becomes much easier and more feasible. The effects change, when \( IV_{bstab}^{1} \) is low. Consider an extreme case in which \( IV_{bstab}^{1} \approx 0 \). No matter how strong the self-selection motive is, the chance of successfully locating and renting in a rent-stabilized unit is significantly low. The same logic holds for \( IV_{mkt}^{1} \), but it affects the probability of a tenant locating in a rent-stabilized unit in the opposite direction.\(^{47}\)

Exogeneity. The second condition for a valid instrument is exogeneity, meaning that the instrument should not correlate with the error term in the structural equation regarding labor market outcomes (conditional independence). Another interpretation is that the only way through which the proposed instrument affects labor market outcomes is directly through its effect on the endogenous variable (exclusion restriction). For this paper, this condition means that the only way through which local availability of rent stabilization affects tenants’ labor market outcomes in the future is by affecting tenants’ probability of locating a rent-stabilized unit or not.

First, one must recognize that the proposed instruments are constructed at the borough-level, the variation of which are not affected by individual tenant’s housing choice decision one year later. Hence, the instruments are not correlated with sources of endogeneity at the individual level, such as unobserved individual skills, preferences, or labor market shocks.

Second, one may be concerned that the move-in year may be endogenous. This endogeneity is unlikely, and there is direct evidence against such concern. In the data, a tenant moves into a unit for certain reasons, which are reported. Following Newman and Wyly (2006), I classify more than 30 different kinds of reasons into several categories. In particular, I am

\[^{47}\text{That is, a larger value of } IV_{mkt}^{1} \text{ indicates more unregulated market-rate units in a specific borough. This further reduces the likelihood for a tenant to locate and secure a rent-stabilized unit irrespective of the search effort.}\]
interested in the employment-related category.\textsuperscript{48} There is no significant difference in terms of share of employment-related reasons among all the reasons between rent-stabilized renters and private market renters.

Third, one may also be concerned that the variation of the instruments may be correlated with other borough-level confounders. Such confounders may also persistently affect the labor market in a way that is unobservable to a researcher. On the one hand, I argue that a lot of factors driving the variations of the instruments are independent of the local labor market. The IV

\begin{equation}
IV_{b,t-1}^{stab} = \frac{N_{b,t-1}^{stab}}{N_{b,t-1}^{all}}
\end{equation}

is used for illustration purposes. The denominator, which is total number of \textit{vacant-for-rent} units ($N_{b,t-1}^{all}$), could change even if the total number of \textit{vacant} units remains unchanged. For example, a vacant unit could become available for rent if renovation is completed, a legal dispute is resolved, or is no longer held for seasonal or recreational use. A vacant unit could also become unavailable for rent if the landlord wants to convert it to other types of housing. The numerator, which is total number of \textit{vacant-for-rent} units that are \textit{rent-stabilized} $N_{b,t-1}^{stab}$, could change if (1) a rent-controlled renter moves out or passes away so that the rent-controlled unit becomes decontrolled and rent-stabilized, (2) a renovated or newly constructed apartment receives tax benefits and becomes rent-stabilized, and (3) a previously rent-stabilized unit becomes deregulated for a variety of reasons.

On the other hand, following Sieg et al. (2002), I measure the average unobserved neighborhood quality directly and denote it as $q_{b,t}$, wherein $b$ indexes borough and $t$ indexes time. $q_{b,t}$ is constructed from the following rental pricing function:

\begin{equation}
\ln P_{ibt}^{mkt} = \beta X_{ibt} + \sum_{b=1}^{5} \ln q_{bt} B_{bt} + \epsilon_t
\end{equation}

where $P_{ibt}^{mkt}$ is the rental price (measured as monthly contract rent) for private market-rate unit $i$ in borough $b$ at year $t$. $X_{ibt}$ contains all the possible physical housing traits at the unit, building, and neighborhood level - it does not represent the borough level. $B_{t}$ is the borough dummy. Notice that the constant term is not allowed in Equation 11, which makes it possible to estimate the coefficient of all borough dummies. Heuristically, $q_{bt}$ captures all borough-level unobserved factors, such as school-quality, crime rate, and pollution, some of which may affect future labor market outcomes. These factors are capitalized into the market rental prices that cannot be explained by observable physical housing traits. Most important, the variation of $q_{bt}$ is informative of the changes in unobserved neighborhood quality dynamics on average. $q_{bt}$ is then included as an additional control variable in the IV

\textsuperscript{48}The employment-related category contains the following reasons: (a) job transfer or new job, (b) retirement, (c) looking for work, (d) commuting reasons, and (e) other financial or employment reasons.
estimation directly.

Such a procedure is feasible by leveraging the entire 30-year NYCHVS information, which is similar to the way the previous instruments were constructed. In every wave of NYCHVS, I use data at the occupied unit module and estimate Equation 11 by focusing only on private market-rate units. For years that are not available in NYCHVS, I also use cubic spline interpolation. The results are shown in Figure 7, with plots for both the estimated unobservable borough quality and average monthly rent (in 2017 real value). The points represent actual data observation, and the lines represent cubic spline interpolation. The rental price pattern is consistent with common expectations and further strengthens the validity of the interpolation. Overall, Manhattan has undergone much larger unobserved quality changes when compared with other boroughs.

**Monotonicity.** The monotonicity condition means that the participation probability (in this case, the probability of sorting into a rent-stabilized unit) is a (positive) monotonic function of the instrument, excluding the presence of defiers. It is highly unlikely that tenants would refuse to choose to live in rent-stabilized units when there are larger availability vacant-for-rent units locally, because rent-stabilized units cover a wide range of prices and quality, even including somewhat luxury apartments. Unlike public housing, there is no stigma effect associated with rent-stabilized units. As a result, the monotonicity assumption should be successfully satisfied.

### 4.4 The Sorted Effects Method

Last but not least, this paper applies the sorted effect method developed by Chernozhukov et al. (2018) to understand heterogenous effects beyond their averages. The basic idea of this method is straightforward: the marginal effect in a nonlinear model (such as the probit model) is evaluated for each observation, which is then collected and sorted in increasing order and indexed by percentiles. Instead of only relying on the average marginal effect, this approach completely represents the range of the heterogeneous effects. One of the major technical advances Chernozhukov et al. (2018) make is to offer a bootstrap procedure to calculate the confidence set. This sorted effect method is applied to both an ordinary probit model (in the preliminary analysis section) as well as one augmented with the IV strategy.
5 Estimation Results

How does rent stabilization affect tenants’ labor market outcomes? First, I report the average effect of rent regulation on different measures of labor market outcomes, based on both OLS estimates and IV estimates, and then I discuss the heterogeneous effects.

5.1 Baseline Results

*OLS Estimates.* Before reporting on the causal effect of rent stabilization, I first discuss OLS results as a baseline. The identifying assumption here comes from selection-on-observables. Three sets of outcome variables - labor force participation, unemployment, and wages - are considered. Table 4 contains results from the OLS estimations, regressing the outcome variables on rent stabilization dummy while controlling for individual covariates progressively and the sub-borough and year fixed effect.

In panel A, there is no strong association between rent stabilization and labor force participation. The estimated coefficient is not only statistically insignificant but also economically negligible. Moreover, when progressively adding different sets of control variables, the model’s explanatory power increases ($R^2$ becomes larger). This suggests that the insignificance is not because of a lack of overall prediction power in the empirical model. Alternative nonlinear model specifications, such as probit and logit models, suggest that the result is robust across different models (panel A of Table A3), meaning that the insignificant results are not because of the special model assumption.

In contrast, a significant relationship emerges when looking at unemployment status (panel B). Specifically, in column (1), when only the sub-borough and year fixed effects are controlled, living in a rent-stabilized apartment is associated with a 1.5 percentage point higher likelihood of being unemployed. This is statistically significant at the 1 percent level. However, this model alone is not very informative given the lack of individual covariates. By adding individual demographic, education, and other household-level covariates, the parameter of interest becomes robust in both magnitude and statistical significance. At the same time, the model explanatory power increases. When housing traits in particular are introduced, the coefficient increases to 2.5 percentage point with a significant increase in model prediction power. Last, when all observable characteristics in column (7) are included, the coefficient is 2.3 percentage point and remains significant at the 1 percent level. Based on the insights from Oster (2019), the estimate is robust, and the model prediction power also increases when more individual covariates are introduced. This strengthens confidence in the results that selection-on-observables is also informative for selection-on-unobservables.
Alternative model specifications, such as probit and logit models, further confirm that such a relationship is not artificially driven by the linear model specification assumption. Rather, non-linear models such as probit shows a relatively larger effect: 3.6 percentage point in the probit model compared to 2.3 percentage point in the linear probability model (Ppanel B of Table A3).

In panel C of Table 4, a similar negative relationship has been found between rent stabilization and hourly wage rate. The coefficient is approximately 7.1. Given the log specification of wage rate, the result is interpreted as rent stabilization is associated with a 7.1 percent lower wage rate.

**IV Estimates.** I now turn to causal analysis using local availability of rent stabilization as an instrument for a tenant’s sorting into a rent-stabilized unit.

First, the first-stage results are in Table 5. The main instrument is IV$^{stab}_{b,t-1}$ (IV1). In column (1) of Table 5, the estimation is precise and the sign is expected. The larger IV$^{stab}_{b,t-1}$ leads to a higher probability of living in a rent-stabilized unit. Specifically, a 10 percent increase of vacant-for-rent and rent-stabilized units in a borough’s rental market leads to about a 4.7 percentage point increase of likelihood for living in a rent stabilized unit. The F-statistics in each panel is above 30, irrespective of various outcome variables of interest. The values of this statistic are much larger than the suggested rule-of-thumb threshold of 10 (Staiger and Stock, 1997; Stock et al., 2002), which suggests a strong first-stage result. In column (2), the instrument is IV$^{mkt}_{b,t-1}$ (IV2). Similarly, the estimate is significant and the sign is as expected, which means that when there are more private market-rate units among all vacant-for-rent units, a tenant is less likely for a tenant to end up in a rent-stabilized unit. The F-statistic is relatively smaller (around 20) but is still much larger than the threshold of 10. Last, these two instruments IV$^{stab}_{b,t-1}$ and IV$^{mkt}_{b,t-1}$ are used together (IV3). Given that there is only one endogenous variable and are two instruments, the over-identifying test can be conducted. As shown in column (3), the over-identifying test cannot be rejected in all the panels, where the p-values are between 0.36 and 0.91 in three panels, which further strengthens confidence in the instruments.

I then turn to the main results of rent stabilization on labor force participation, unemployment, and wage rate, which are shown in panels A, B and C of Table 6, respectively. Overall, there are significant effects on unemployment (panel B) but no significant results emerge regarding labor force participation (panel A) and wage rate (panel C). The insignificant results with respect to labor force participation is not surprising because the results under IV estimates are actually very similar to the ones under the OLS estimates. The results regarding hourly wage rate are somewhat surprising given that there is a significant
negative relationship in the OLS estimates. The estimated sign is still negative, but the standard errors become much larger. This is probably because the hourly wage rate is noisier in such cross-sectional data structure.

I now focus the discussion on unemployment (panel B), wherein both OLS and IV results suggest the same direction and are statistically significant. Panel B of Table 6 confirms that rent stabilization indeed causes higher likelihood of being unemployed. The estimates are robust in all three columns and precisely estimated at the 1 percent level. Notably, the IV estimates are larger than the OLS estimates, though both are statistically significant at the 1 percent level. Under our main instrument (IV1), the point estimate is 0.12. Moreover, the predicted average unemployment rate for rent-stabilized tenants is 8.33% while the predicted average unemployment rate for tenants in the private market-rate units is 2.35%. This suggests an estimated impact of 5.98%.

Why would IV estimates be larger than OLS estimates? This may be possible because of two different types of reasons. First, the self-selected rent-stabilized tenants could have better unobserved characteristics, which makes them less likely to be unemployed in the first place. As mentioned earlier, one possible reason might be that it is not easy to search for rent-stabilized units - it requires strong searching skills that may be correlated with other high (unobserved) skills (see Appendix A.4.1 for real suggestions on how to find a rent-stabilized apartment using strong searching skills). Hence, the IV estimates become larger when removing such unobserved skill premiums underlying sorting behavior.

Similarly, Abel et al. (2019) emphasizes the importance of an intention-behavior gap in job search behavior, and the gap is defined as a disconnection between the intention to perform a particular behavior and the enactment of such behavior. As a result, the self-selected tenants may have a less intention-behavior gap (regarding the housing search), which would also be beneficial to their job search in the labor market.

Another possible reason is related to the local network. Anecdotal stories suggest that the local network is important if a prospective tenant wants to find a rent-stabilized unit (Appendix A.4.1). It is well-established that network plays an important role in the job search as well (Cingano and Rosolia, 2012).

The fact that IV estimates are larger than the OLS or probit estimates is also in line with the second explanation, which is related to the interpretation of IV estimates. IV identifies the local average treatment effect (LATE) on the subgroup compliers, meaning those tenants induced to participate in the treatment because of variation in the instruments (Angrist et al., 1996; Heckman, 1997; Heckman and Vytlacil, 2005; Imbens, 2014). This means that the IV identifies the effects among tenants who choose to sort into rent-stabilized units because of
larger availability of vacant-for-rent and rent-stabilized units. This may, though, be different from the average treatment effect on all treated tenants (ATT). Nevertheless, the LATE in this case is actually the policy relevant parameter (Heckman and Vytlacil, 2001; Mogstad and Torgovitsky, 2018; Mogstad et al., 2018) because the proposed instruments can be easily intervened by policy changes directly.

5.2 Heterogenous Treatment Effect

The IV estimates provide the local average treatment effect. How does the causal treatment effect vary among different sub-groups? This is particularly important given that rent stabilization is not a means-tested program. Answers to this question sheds light on the on the ex-post incidence as well as the equity, efficiency, and potential misallocation of rent stabilization.

Four different types of sub-groups are considered. First, I distinguish between white tenants versus non-white tenants. Secondly, I differentiate by skill level, where low-skilled tenants are those who do not have a college degree while high-skilled tenants hold at least a college degree. Moreover, I follow Diamond et al. (2019) and divide the sample by age and tenure duration.

The IV estimation results for different sub-groups are documented in Table 7. Consistent with the main IV results in Table 6, there are no significant effects across different sub-groups on either labor force participation (panel A) or hourly wage rate (panel C). Again, the discussion is therefore focused on unemployment (panel B).

I first distinguish between whether tenants are white or nonwhite (Hispanic, African-American, Asian, etc.) On the one hand, white tenants have a relatively lower unemployment rate (4.5 percent) on average compared with nonwhite tenants (6.7 percent). On the other hand, the negative effect of rent stabilization on unemployment is only significant among white tenants, which is statistically significant at the 1 percent level. In contrast, no significant effect is found among non-white tenants.

Second, I am particularly interested in the distinction by skill (or educational attainment). Surprisingly, the estimated effect is not significant among low-skilled tenants but is only significant among high-skilled tenants (at the 1 percent level) with larger effects. Why are effects only significant among high-skilled tenants who are commonly found to have shorter unemployment spells compared with low-skilled tenants? I offer one novel explanation that

---

49 About 18 percent of all tenants in the analytic sample hold post-graduate degrees.
50 Diamond et al. (2019) use 4 years of tenure of residence to distinguish between short tenants versus long tenants. I follow their duration cutoff, which is also around the mean of the sample in my paper.
is discussed in the next section - the policy awareness.

I then distinguish tenants by age and tenure duration. The effect is only significant among tenants whose ages are between 41 and 55 while no significant effect is found among tenants whose ages are between 26 and 40. Lastly, I do not have find any significant patterns regarding short-term versus long-term tenants.

**Sorted Effects Method.** Furthermore, the sorted effects method developed in Chernozhukov et al. (2018) is applied to understand the heterogenous effect beyond the average. Since the sorted effects method works with nonlinear models, I first apply this method to an ordinary probit model without using IV. The average marginal effect is about 3.6 percentage point, which is displayed by the black line in the left panel of Figure 8).\(^{51}\) In contrast, the sorted partial effect varies strongly from 0 to about 9 percentage point, which is given as the blue line in the left panel of Figure 8. It does not coincide with the average effect of 3.6 percentage point.

Ideally, I am more interested in applying the sorted effects method to the IV estimation, so that the estimation results can be interpreted as causation directly. However, the difficulty lies in the fact that the sorted effects method applies to nonlinear models while the previous IV estimation is based on two-stage least square estimation in which both first stage and second stage estimations are based on linear models. When the outcome variable is continuous, one can apply the control function method in which the first stage model can be nonlinear. However, for discrete outcome variable, a traditional plug-in approach that would replace the rent stabilization dummy with probit fitted values in the second-stage probit model, is nonparametrically unidentified and inconsistent (Chesher, 2003; Imbens and Newey, 2009; Wooldridge, 2015).

An alternative approach is currently applied by adding residuals from the first-stage probit model to the second-stage probit model (Terza et al., 2008). This might provide an accurate correction for “small” amounts of endogeneity (Wooldridge, 2015). I admit that this approach may not fully remove all the endogeneity concerns. Thus, the result is mainly for illustration purposes and the interpretation needs caution. Nevertheless, the sorted partial effect varies strong from 0 to about 12 percentage point, shown by the blue line in the right panel of Figure 8). It does not coincide with the average effect of 7.5 percentage point either, shown by the black line in the right panel of Figure 8.\(^{52}\)

\(^{51}\)This has been mentioned previously in Table A3.

\(^{52}\)I am currently working on applying the sorted effects method to a “bivariate probit” model to strengthen the causal interpretation. The bivariate probit is applicable because both rent stabilization and unemployment are binary variables.
6 Does Policy Awareness Matter?

So far, the empirical analysis has showed that rent stabilization causes higher unemployment while has no significant impact on labor force participation or hourly wage rate. This section moves beyond the classical assumption that program participants are always aware of their participation status. Instead, I propose a novel strategy that exploits the information set of rent-stabilized tenants and ask whether policy awareness matters.

Theoretically, being aware or not affects tenants’ forecasting on future rent increases. For example, rent-stabilized tenants who are aware of such policy benefits would have a more stable expectation with lower annual rent increases than both rent-stabilized tenants who are unaware and tenants in private market-rate units in superstar cities like New York City. Being aware would further affect other types of forward-looking decision making. It may also make effects more salient based on insights from behavioral economics.

6.1 Not Everyone Knows!

A unique feature of the information in the 2002 and 2005 waves of the NYCHVS is that householders are asked to self-report their rent regulation status in addition to the available legal rent regulation status verified from administrative sources. One might expect that most rent-stabilized tenants are aware of their good fortune, that is, those who live in rent-stabilized units should know that their units are indeed rent-stabilized. However, the simple summary statistics provided in Table 8 show that clearly not every knows!

The first column in Table 8 lists the possible answers a tenant can report: (1) under rent control, (2) under rent stabilization, (3) private market-rate unit (not regulated), (4) do not know, and (5) do not report. The second and third columns report the two possible legal regulation situations in the data: either private market-rate (column (2)) or rent-stabilized (column (3)). This generates a $5 \times 2$ matrix where each cell represents a specific pair of self-reported and legal rent regulation status.

Let’s first focus on the third column, where all participants live in a rent-stabilized unit. However, not all rent-stabilized renters know about their good fortune. It may be more surprising than one expects: approximately 34 percent are properly aware (8.60 percent choosing (1) “Under Rent Control” and 25.55 percent choosing (2) “Under Rent Stabilization”). In other words, these rent-stabilized tenants think their units are either rent-stabilized or rent-controlled. In contrast, there are more than 24 percent of rent-stabilized tenants who think...

---

53 Unfortunately, such information has been unavailable after 2005.
54 Given that housing units without rent control could still be rent stabilized, I think it may be too strict
their housing units are private market-rate units that are not regulated at all. Those tenants are clearly misinformed. There are about 20 percent of rent-stabilized tenants who simply do not know their regulation status.\footnote{Twenty percent of rent-stabilized tenants choose not to report any answer for this question. They are excluded in the analysis.}

Why would so many rent-stabilized tenants not be able to correctly specify their own housing regulation status? One possibility may be that the question is not well-posed during the survey. One good way to verify this concern is to look at the second column, which shows all the tenants who live in private market-rate units. Most private market-rate renters (around 60 percent) have chosen the correct answer. In contrast, there are less than 5 percent of private market-rate renters who are misinformed (1.79 percent choosing (1) “Under Rent Control” and 3.48 percent choosing (2) “Under Rent Stabilization”). This means that they believe their apartments are rent regulated. The misinformation rate among private market-rate tenants is much lower than the rate among rent-stabilized tenants. Therefore, I am confident that the survey question contains useful information.

Distinguishing between legal stabilization status and self-reported status provides a novel strategy for investigating the role of policy awareness by dividing rent-stabilized tenants into two groups: aware and misinformed. The two groups are defined as the follows:

1. Aware tenants: rent-stabilized tenants who choose either “Under Rent Control” or “Under Rent Stabilization” as the self-reported regulation status.
2. Misinformed tenants: rent-stabilized tenants who choose “Private Market-Rate” as the self-reported regulation status - they clearly have the wrong answer and are misinformed.\footnote{An alternative definition could include a set of unaware rent-stabilized tenants, who either choose “Private Market-Rate” or “Don’t Know” as the self-reported regulation status. However, one may express concern regarding the underlying meaning and interpretation of “Don’t Know.”. For example, if a tenant knows that the housing unit is rent-regulated but is unsure whether the housing unit belongs to the rent control or rent stabilization specification, such a tenant may actually choose “Don’t Know.” I express gratitude towards Katherine O’Regan for suggesting this perspective. Such “Don’t Know” tenants should actually be classified in the aware group instead of the unaware group. Defining misinformed tenants avoids any such potential ambiguity. The empirical results are quantitatively similar but less precisely estimated when the unaware tenant instead definition is used instead of misinformed tenant definition. Results are available upon request.}

Descriptive Analysis. Before moving to the empirical analysis, let’s first compare the aware (and the misinformed) rent-stabilized tenants with the private market renters in terms of their socioeconomic and demographic characteristics. The previous section demonstrated how rent-stabilized tenants are observationally similar to tenants in private market-rate units without making such policy awareness distinction.
As shown in Table A6, when comparing the aware group (column (1)) to the private market-rate renters (column (3)), these two groups are considerably different from one another.\textsuperscript{57} Perhaps most important, the aware group has considerably higher educational attainment than private market-rate renters. More than 50 percent of aware and rent-stabilized tenants have at least a college degree, as compared with less than 40 percent of private market-rate renters. Similarly, around 10 percent of aware rent-stabilized tenants are high school dropouts and 16 percent are high school graduates. Both of these numbers are larger among private market-rate renters (15 and 24 percent, respectively). In terms of labor market outcomes, the aware renters have both a higher labor force participation rate and higher unemployment rate - both of which are statistically significant - than private market-rate renters. The aware renters even have a relatively higher wage income (and wage rate) as well as nonlabor income than private market-rate renters.

In contrast, the misinformed group (Table A7) is significantly different when compared with private market-rate renters. In particular, the misinformed group expresses worse educational attainment. Less 35 percent of misinformed rent-stabilized tenants hold college degree or above, which is 5 percent lower than private market-rate renters and 15 percent lower than the aware group). Almost 45 percent of unaware rent-stabilized tenants are only high school graduates or dropouts. The unaware group also expresses lower income. However, there is no significant difference in terms of labor force participation and only a weakly larger unemployment rate among the misinformed compared to private market-rate renters.

6.2 Policy Awareness and Unemployment

This section investigates whether policy awareness matters for the impact of rent stabilization on unemployment. Since being aware is likely to be endogenous, I propose an additional instrumental variable strategy by exploiting the local awareness knowledge differences at the sub-borough level to reach causation.

Preliminary Analysis. This analysis is similar to the empirical model I have previously adopted, where the only difference is that the rent stabilized dummy ($RS_{ijst}$) is decomposed into two groups, aware and misinformed:

$$Y_{ijst} = \alpha + \beta^A \text{Aware}_{ijst} + \beta^B \text{Misinformed}_{ijst} + \eta X_{ist} + \psi V_{jst} + \lambda Z_s + \pi W_t + \epsilon_{ijst}$$  \hspace{1cm} (12)

$Y_{ijst}$ is the outcome variable of interest and I focus on unemployment in this part. $\text{Aware}_{ijst}$

\textsuperscript{57}An overall comparison among the three groups of tenants is documented in Table A4
equals 1 when a householder \( i \) living in a rent-stabilized unit \( j \) in sub-borough \( s \) and year \( t \) is aware, and it equals 0 when either a householder is misinformed or lives in a private market-rate unit. Similarly, Misinformed\( _{ijst} \) equals 1 when a householder \( i \) living in a rent-stabilized unit \( j \) in sub-borough \( s \) and year \( t \) is misinformed, and equals 0 otherwise. Therefore, I am essentially comparing both the aware and misinformed groups with the private market-rate renters, or when Aware\( _{ijst} = 0 \) and Misinformed\( _{ijst} = 0 \). The coefficients of interest are both \( \beta^A \) and \( \beta^B \). The other variables are defined in the same way as previously demonstrated.

There is a high possibility that, besides rent stabilization, policy awareness is also endogenous, particularly given the descriptive analysis provided earlier.

**Instrumental Variable Strategy.** To deal with self-selection, one must recognize the two endogenous variables here: tenants being either aware or misinformed conditional on living in rent-stabilized units. This requires at least two instrument variables to exogenously shift both margins. One option is to use a previously implemented IV, for example, IV\( ^{stab}_{b,t-1} \), which deals with sortint into rent-stabilized units. However, additional instruments are needed that exogenously shift the policy awareness. Inspiration comes from Chetty et al. (2013) who proxy for the Earned Income Tax Credit (EITC) knowledge with the fraction of individuals who manipulate reported self-employment income to maximize their credit refund. Such knowledge varies significantly across areas. Similarly, I use the variation of rent regulation knowledge at the local neighborhood level (sub-borough level). More specifically, I use the share of rent-stabilized tenants who are aware (IV\( ^{aware}_{sb,t} \)), misinformed (IV\( ^{mis}_{sb,t} \)), or don’t know (IV\( ^{dk}_{sb,t} \)) in each sub-borough as the additional instruments.

It is worth mentioning that all IV\( ^{aware}_{sb,t} \), IV\( ^{mis}_{sb,t} \) and IV\( ^{dk}_{sb,t} \) are at the sub-borough level, which is much smaller and local than the borough level. In addition, they are at the same year as when labor market outcomes are measured because self-selection into rent-stabilized units has been taken care of by the inclusion of IV\( ^{stab}_{b,t-1} \).

I first briefly discuss the validity of the proposed instruments, which follows closely with the discussion of the validity of IV\( ^{stab}_{b,t-1} \). On the one hand, the first-stage result relies on meaningful geographic variation that affects individual tenant’s housing regulation knowledge - policy awareness. As shown in Figure 9 (and Figures A5, A6), there is significant variation at the sub-borough level with respect to local knowledge about rent stabilization. On the other hand, in terms of exogeneity, I discuss the share of rent-stabilized tenants who are aware (IV\( ^{aware}_{sb,t} \)) for illustration. One may expect that being aware is highly correlated with educational attainment, therefore Manhattan should have the highest spatial concentration of such local awareness. However, Figure 9 clearly shows that there are other non-Manhattan sub-boroughs that have a large share of local regulation awareness. Moreover, there are sig-
significant differences even between two adjacent sub-boroughs. Last, I control for education, ethnicity, and income level at the sub-borough level in addition to the sub-borough and year fixed effects to tease out other possible confounding factors at the sub-borough level.

Estimation Results. This section discusses results from both OLS and IV estimates. First, OLS estimates are reported as the baseline analysis in Table 9. In the first column, the OLS result suggests that living in a rent-stabilized unit and being aware is associated with a 1.9 percentage point higher likelihood of being unemployed when compared with private market renters. This is significant at the 5 percent level. In contrast, living in a rent-stabilized unit and being misinformed is associated with a 1.5 percentage point higher likelihood of being unemployed when compared with private market renters. This finding is not statistically significant. Both probit and logit models yield similar results that are aligned with the OLS estimates. However, since both the aware group and misinformed group are observationally different when compared with private renters, respectively, the estimated coefficients are unlikely to be causal.

I then turn to the IV estimations. The first stage result is shown in Table 10. Regarding IV (1), the sign of the coefficients is consistent with expectation. The first column marks the endogenous variable as being aware. Here, if a sub-borough has more tenants who are aware on average, then individual rent-stabilized tenants are more likely to be aware. In contrast, if a sub-borough has more tenants who are misinformed on average, then individual rent-stabilized tenants are less likely to be aware. The opposite is true for misinformed tenants in the second column. All of these estimates are conditional on the sub-borough characteristics and fixed effect. One must also recognize that the original IV implemented for rent stabilization - the fraction of vacant-for-rent and rent-stabilized at the borough level - is statistically significant for being aware while insignificant for being misinformed. The share of rent-stabilized tenants who are misinformed or don’t know are sued as an alternative set of instruments - IV (2). It is interesting to observe that when a sub-borough has a larger share of rent-stabilized tenants who report “Don’t Know”, then individual tenants are more likely to be aware and less likely to be unaware. This suggests that “Don’t Know” may contain some hidden information.

The IV results for unemployment are shown in Table 11. The negative impact of rent stabilization on unemployment is only significant among the aware tenants. By removing unobserved confounding factors at the individual level, the estimated causal effect is much larger than the OLS estimates. This effect is probably not surprising, given that the aware tenants have a much better educational attainment, are more likely to be born in New

\footnote{Using all three IVs jointly yield similar results quantitatively. Results are available upon request.}
York City, and are more likely to be white. By removing these socioeconomic premium, the actual causal effect becomes larger. However, there is no significant effect among the misinformed tenants when compared with renters in private market-rate units. In addition, the F-statistics are around 10. This further strengthens confidence in the results.

Last, the results discussed here could also offer a rationale for one of the puzzling findings in the previous section: why is the negative effect of rent stabilization on unemployment only significant among high-skilled tenants but not among low-skilled tenants? One possible explanation is because the policy awareness is also concentrated among high-skilled tenants who live in rent-stabilized units.

7 Discussions

7.1 Rent Discount and Mobility as Alternative Mechanisms

The previous analyses are based on a binary dummy variable that indicates whether a tenant lives in a rent-stabilized unit or private market-rate unit. While this definition captures the extensive margin, it does not succeed in regards to the intensity margin. This is important because rent-stabilized tenants may have different levels of rent discount benefits. Therefore, rent discount is used as an alternative measure to test the robustness of the results. It is reasonable to expect that a larger rent discount is associated with a larger effect on unemployment. Moreover, I add tenure of residence, which is measured by how many years a tenant has lived in the current dwelling as an additional covariate. This may shed light on the possible mechanisms between the rent discount and “lock-in” (mobility) channels. The results are reported in Table 12, wherein the outcome variable is unemployment dummy.

The first column reproduces the result using the rent stabilization dummy from the previous section. The second column, however, uses the continuous rent discount measure (Jiang et al., 2019) instead of the rent stabilization dummy. The effect is still statistically significant at the 1 percent level. More specifically, a $1,000 monthly rent discount resulting from rent stabilization is associated with a 1.9 percentage point higher likelihood of being unemployed on average. The third column adds tenure of residence on top of the rent discount variable. Even though the coefficient in front of rent discount has been slightly absorbed, it remains significant at the 5 percent level. In contrast, even though the coefficient in front of tenure of residence is positive, it is not significant. One might be concerned that by having a single tenure of residence variable, a strong assumption that every additional year of living in the same unit yields the same effect is imposed. As an alternative specification, I discretize
the mobility measure into different categories. As shown in the fourth column, the pattern remains the same. Namely, a higher rent discount is associated with a higher likelihood of being unemployed (at the 1 percent level) while mobility measures are not significant.

The results might be suggestive in terms of the relative importance of the two different mechanisms. However, the interpretation demands caution because (1) both rent discount and mobility are truly endogenous variables, which may also depend on unobservable heterogeneity; and (2) the analytic sample only includes tenants who currently live in New York City, so people who move out of New York City to other states cannot be tracked.

7.2 Sensitivity Analysis

Alternative Instruments for Rent Stabilization. As a robustness check, I also adopt alternative instruments by using the numerators and denominators separately associated with IV$^{\text{stab}}_{b,t}$ and IV$^{\text{mkt}}_{b,t}$. This also allows for an over-identifying restriction test given that the number of IVs are larger than the number of endogenous variables. Therefore, I therefore use the total number of vacant-for-rent units, as well as vacant-for-rent units being rent-stabilized (or market-rate), as instruments, respectively. The same logic still applies. The difference is that I now rely on the change of absolute number of different types of housing units directly, while previous IVs use the relative change in shares of different types.

The first stage results using the alternative instruments are documented in Table A8. The direction of each IV is still as expected. For example, the first column shows a larger total number of vacant-for-rent and rent-stabilized units leads to a higher probability of living in a rent-stabilized unit. More specifically, an additional 1,000 vacant-for-rent and rent-stabilized units leads to a 2.8 percentage point higher likelihood to live in a rent-stabilized unit. The opposite is true for the total number of vacant-for-rent and market-rate units in the second and third columns.

The second stage results for unemployment are documented in Table A9. The qualitative story holds exactly the same as for the previous IV results: rent stabilization does significantly lead to higher unemployment. Using alternative IVs leads to a relatively smaller estimated coefficient - about 1-2 percentage point smaller in the absolute number. Moreover, the analyses do not reject the over-identifying restriction tests. Overall, the estimates are robust and provide convincing causal interpretation.

\footnote{I do not report result on labor force participation and wage rate to save space, given their insignificant results that are consistent with previous findings. Results available upon request.}
8 Conclusion

This paper takes a first step in understanding the relationship between rent regulation and tenant labor market outcomes and emphasized the role of policy awareness. I find that rent stabilization causes higher unemployment for rent-stabilized tenants comparing with tenants in private market-rate units. Effects are more significant among high-skilled, white tenants. I take novel usage of a unique data set on rent stabilization in New York City. To deal with self-selection into rent-stabilized units, I propose an IV strategy. I leverage variation in the availability of rent-stabilized units across New York boroughs over time.

Moreover, this paper moves beyond traditional program evaluation assumptions and asks whether policy awareness matters. The unique data feature allows for differentiating between legal regulation status versus tenants’ perception. The rent-stabilized tenants are classified into two groups: aware and misinformed. Aware tenants know their housing units are regulated. Misinformed tenants live in rent-stabilized units but believe their units are not regulated. Surprisingly, about 25 percent of rent-stabilized tenants are misinformed about their good fortune. Furthermore, the negative impact of rent stabilization on unemployment is only significant among tenants who are aware when local housing regulation knowledge is used as additional instruments to reach causation.

This paper sheds light on important policy implications, particularly in the presence of renewed legislative momentum at the local municipal level to impose new rent control measures. The findings are particularly relevant given the recent rent regulation reform in Oregon, New York, and California since 2019. Rent stabilization is almost like a universal in-kind transfer program. It is not means-tested and poorly targeted. This paper provides novel causal evidence that rent stabilization causes higher unemployment, which has important aggregate implications. Given the data limitation, it is hard to further tell whether higher unemployment could be owning to either eased liquidity constraint or distorted job search behavior, both of which are fundamental in the discussion of optimal unemployment insurance literature (Moffitt, 2014).

The results still offer implications for potential policy improvements. On the one hand, if the higher unemployment effect is due to eased liquidity constraint - allows unemployed rent-stabilized tenants to search longer for better jobs, then such unemployment effect might be socially desirable. However, from a redistribution perspective, who deserves better access to eased liquidity constraint? The current policy seems to be inequitable because the effect is only significant among high-skilled, white tenants. This can also be interpreted as additional

\[60\text{This may also be related to the recent discussion on the universal basic income (UBI) program (Kearney and Mogstad, 2019) in the United States.}\]
type of misallocation cost (Glaeser, 1996; Glaeser and Luttmer, 2003) broadly.

On the other hand, if the higher unemployment effect is because of distorted job search behavior, such effect is thus inefficient and socially undesirable.\(^6\) If this is the case, policy makers could learn from the enforcement of minimum job search effort, which is commonly considered in both unemployment insurance and other welfare programs, to counteract such inefficiency.

Overall, housing subsidy programs (such as the housing voucher) which target lower income families might be much better than rent control or rent stabilization policies, because housing subsidy programs would have more favorable distributional effects than rent stabilization. The recent report “a roadmap to reducing child poverty” by National Academies of Sciences, Engineering, and Medicine\(^6\) has projected that expanding the number of housing vouchers would result in major reductions in the U.S. poverty rate. Given that current housing subsidies are limited, millions of low income families cannot even get a voucher, and many families with vouchers are discriminated by landlords, it seems expanding housing subsidy programs such as the housing voucher with better enforcement would be more desirable than bringing back rent regulation.

In addition to the efficiency and equity consideration, this paper also offers novel evidence that suggests policy awareness matters. The effects on unemployment are only significant among tenants who are aware, which may also suggest a new direction for policy improvement as well as future research - what would happen if landlords are not allowed to inform tenants about the rent stabilization status?

There are multiple avenues for future research. For example, since the data are not longitudinal, I am unable to investigate the effect of rent stabilization on unemployment spell duration and re-employment wage. Both outcome variables are important measures to better understand the implication on unemployment. Moreover, I am not able to households when they move to other places or outside New York City. This would require a similar panel data structure as used in (Diamond et al., 2019). Having better data with more measures about job search and labor market behaviors, as well as longitudinal structure, would allow for deeper understanding of the underlying mechanisms to complement the findings of this paper.

Another important extension would be to investigate the interaction between rent regulation and neighborhood effects (Chetty et al., 2016; Chyn, 2018). Since rent stabilization

---

\(^6\) Another possibility maybe that rent stabilization induces tenants to quit their jobs more frequently than optimal (Topel and Ward, 1992).

leads to longer residential stability, it could potentially have different effects for not only adults contemporaneously but also for children in the long run, depending on different neighborhood qualities. This would be important for understanding the policy consequences on human capital development and intergenerational mobility. These are left for future studies.
References


9 Figures and Tables

Figure 1: Eligibility of Rent Stabilization

Notes: Rent stabilization in New York City generally applies to three types of apartments in buildings of: (a) six or more units built between February 1, 1947 and January 1, 1974; (b) six or more units built before February 1, 1947 and tenants who moved in after June 30, 1971; (c) three or more apartments constructed or extensively renovated since 1974 with special tax benefits such as J-51, 421a, or other programs. This only applies to the period when tax abatement is effective, which usually lasts for ten to twenty years. This figure only considers rent-stabilized units that are not subject to de-regulation.

Figure 2: Average Rent Comparison in New York City

Notes: Data is obtained from 1978 - 2005 waves of the New York City Housing and Vacancy Survey (NYCHVS). Rent is measured as average monthly contract rent in 2017 $1000 real value. The solid line denotes the average monthly contract rent for rent-stabilized units while the dashed line denotes the one for private market-rate units.
Figure 3: Share of Online Postings with Rent Stabilization Advertisement

Notes: Data is obtained by author’s manual collection from StreetEasy website (https://streeteasy.com). An online posting is considered to have rent stabilization advertisement if any of these word appear in the description section: “rent stabilization”, “rent stabilized”, “stabilized”, etc. Historical New York City Housing and Vacancy Survey (NYCHVS) data suggests that at least 25% of total vacant-for-rent units are rent-stabilized. This suggests only a small minority of actual rent-stabilized, vacant apartments are advertised for their stabilization status.
Figure 4: Spatial Concentration of Rent-Stabilized Units in NYC

Notes: Author’s calculation based on pooled 2002 and 2005 waves of New York City Housing and Vacancy Survey (NYCHVS). Darker color represents higher concentration of rent-stabilized units in the rental market in a sub-borough.
Figure 5: The Variation of $IV_{b,t}^{stab}$ over Time by Borough

Notes: The instrument $IV_{b,t}^{stab}$ is defined as the ratio of the total number of vacant-for-rent units that are rent-stabilized $N_{b,t}^{stab}$ and the total number of vacant-for-rent units $N_{b,t}^{all}$. Blue dots are directly obtained and calculated from 1978-2005 waves of the New York City Housing and Vacancy Survey (NYCHVS), while the red lines represent fitted value based on cubic spline interpolation. Staten-Island has fairly small share of rent stabilized rental units and is available upon request.
Figure 6: The Variation of $\text{IV}_{mkt}^{b,t-1}$ over Time by Borough

Notes: The instrument $\text{IV}_{mkt}^{b,t-1}$ is defined as the ratio of the total number of vacant-for-rent units that are private market-rate $N_{mkt}^{b,t-1}$ and the total number of vacant-for-rent units $N_{all}^{b,t-1}$. Blue dots are directly obtained and calculated from 1978-2005 waves of the New York City Housing and Vacancy Survey (NYCHVS), while the red lines represent fitted value based on cubic spline interpolation. Staten-Island has fairly small share of rent stabilized rental units and is available upon request.
Figure 7: The Unobserved Neighborhood Quality by Boroughs

Notes: Y-axis is measured in terms of 2017 U.S. dollar value. Dots are directly obtained and calculated from 1978-2005 waves of the New York City Housing and Vacancy Survey (NYCHVS). Red solid lines represent fitted value for unobserved neighborhood quality based on cubic spline interpolation in each borough. Blue dashed lines represent fitted value for average rental price based on cubic spline interpolation in each borough. The result of Staten-Island is available upon request.
Figure 8: The Sorted Effects Method

Notes: Both figures apply the sorted effects method in Chernozhukov et al. (2018). In each figure, black solid line is the average marginal effect, dashed line is the confidence interval for the average marginal effect, blue solid line represents the collection of sorted effects, and light blue region is the confidence sets. In the left figure, we apply the sorted effects method to an ordinary probit model in Table A3. In the right figure we apply the sorted effects method to a probit model (the second stage) by adding residuals from a first-stage probit model using instruments for illustration purpose. The interpretation of the right panel needs caution.
Notes: Author’s calculation based on pooled 2002 and 2005 waves of New York City Housing and Vacancy Survey (NYCHVS). Darker color represents higher concentration of rent-stabilized tenants who are aware among all rent-stabilized renters in a sub-borough.
## Table 1: Summary Statistics by Rent Stabilization

<table>
<thead>
<tr>
<th>Panel A. Household Characteristics</th>
<th>Rent-stabilized</th>
<th>N</th>
<th>Market-rate</th>
<th>N</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently In the Labor Force</td>
<td>0.89</td>
<td>5514</td>
<td>0.89</td>
<td>3908</td>
<td>0.00</td>
</tr>
<tr>
<td>Currently Unemployed</td>
<td>0.06</td>
<td>4904</td>
<td>0.05</td>
<td>3471</td>
<td>0.01**</td>
</tr>
<tr>
<td>HHH Wage Rate</td>
<td>29.02</td>
<td>4760</td>
<td>30.70</td>
<td>3333</td>
<td>-1.68***</td>
</tr>
<tr>
<td>High School Dropout</td>
<td>0.17</td>
<td>5514</td>
<td>0.15</td>
<td>3908</td>
<td>0.01</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>0.23</td>
<td>5514</td>
<td>0.24</td>
<td>3908</td>
<td>-0.01</td>
</tr>
<tr>
<td>Some College No Degree</td>
<td>0.20</td>
<td>5514</td>
<td>0.21</td>
<td>3908</td>
<td>-0.01</td>
</tr>
<tr>
<td>College Degree and Above</td>
<td>0.40</td>
<td>5514</td>
<td>0.40</td>
<td>3908</td>
<td>0.00</td>
</tr>
<tr>
<td>Female</td>
<td>0.51</td>
<td>5514</td>
<td>0.45</td>
<td>3908</td>
<td>0.06***</td>
</tr>
<tr>
<td>Age</td>
<td>38.92</td>
<td>5514</td>
<td>38.19</td>
<td>3908</td>
<td>0.73***</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>0.36</td>
<td>5514</td>
<td>0.41</td>
<td>3908</td>
<td>-0.06***</td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>0.22</td>
<td>5514</td>
<td>0.22</td>
<td>3908</td>
<td>-0.00</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.31</td>
<td>5514</td>
<td>0.21</td>
<td>3908</td>
<td>0.10***</td>
</tr>
<tr>
<td>Asian</td>
<td>0.10</td>
<td>5514</td>
<td>0.14</td>
<td>3908</td>
<td>-0.04***</td>
</tr>
<tr>
<td>Married</td>
<td>0.35</td>
<td>5514</td>
<td>0.44</td>
<td>3908</td>
<td>-0.09***</td>
</tr>
<tr>
<td>Born in NYC</td>
<td>0.21</td>
<td>5514</td>
<td>0.24</td>
<td>3908</td>
<td>-0.03***</td>
</tr>
<tr>
<td>Born in U.S. (Non-NYC)</td>
<td>0.14</td>
<td>5514</td>
<td>0.13</td>
<td>3908</td>
<td>0.01</td>
</tr>
<tr>
<td>Born in Other Country</td>
<td>0.47</td>
<td>5514</td>
<td>0.45</td>
<td>3908</td>
<td>0.02**</td>
</tr>
<tr>
<td>Birth Place Missing</td>
<td>0.18</td>
<td>5514</td>
<td>0.18</td>
<td>3908</td>
<td>-0.00</td>
</tr>
<tr>
<td>Any Young Child in HH</td>
<td>0.16</td>
<td>5514</td>
<td>0.19</td>
<td>3908</td>
<td>-0.03***</td>
</tr>
<tr>
<td>Any Child in HH</td>
<td>0.36</td>
<td>5514</td>
<td>0.41</td>
<td>3908</td>
<td>-0.04***</td>
</tr>
<tr>
<td>Co-reside with Parents</td>
<td>0.04</td>
<td>5514</td>
<td>0.03</td>
<td>3908</td>
<td>0.00</td>
</tr>
<tr>
<td>HH Size</td>
<td>2.40</td>
<td>5514</td>
<td>2.69</td>
<td>3908</td>
<td>-0.29***</td>
</tr>
<tr>
<td>Any Non-relative in HH</td>
<td>0.11</td>
<td>5514</td>
<td>0.13</td>
<td>3908</td>
<td>-0.02***</td>
</tr>
<tr>
<td>HHH Salary Income, cond. work</td>
<td>52.56</td>
<td>4760</td>
<td>56.98</td>
<td>3333</td>
<td>-4.41***</td>
</tr>
<tr>
<td>HHH Non-Labor Income</td>
<td>2.95</td>
<td>5514</td>
<td>3.12</td>
<td>3908</td>
<td>-0.17</td>
</tr>
<tr>
<td>Other HH Mem. Tot. Inc.</td>
<td>20.04</td>
<td>5514</td>
<td>26.75</td>
<td>3908</td>
<td>-6.71***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B. Housing Characteristics</th>
<th>Rent-stabilized</th>
<th>N</th>
<th>Market-rate</th>
<th>N</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Contract Rent</td>
<td>1.18</td>
<td>5514</td>
<td>1.49</td>
<td>3908</td>
<td>-0.31***</td>
</tr>
<tr>
<td>Monthly Gross Rent</td>
<td>1.27</td>
<td>5514</td>
<td>1.62</td>
<td>3908</td>
<td>-0.35***</td>
</tr>
<tr>
<td>Tenure of Residence</td>
<td>7.00</td>
<td>5514</td>
<td>5.05</td>
<td>3908</td>
<td>1.95***</td>
</tr>
<tr>
<td>Num. of Rooms</td>
<td>3.17</td>
<td>5514</td>
<td>3.91</td>
<td>3908</td>
<td>-0.73***</td>
</tr>
<tr>
<td>Num. of Bedrooms</td>
<td>1.34</td>
<td>5514</td>
<td>1.83</td>
<td>3908</td>
<td>-0.49***</td>
</tr>
<tr>
<td>Num. of Unit Problems</td>
<td>0.91</td>
<td>5514</td>
<td>0.46</td>
<td>3908</td>
<td>0.45***</td>
</tr>
<tr>
<td>Num. of Building Problems</td>
<td>0.26</td>
<td>5514</td>
<td>0.18</td>
<td>3908</td>
<td>0.07***</td>
</tr>
</tbody>
</table>

**Notes:** Data comes from the analytic sample of pooled 2002 and 2005 waves of the New York City Housing and Vacancy Survey (NYCHVS). All the monetary values are in 2017 real dollar. Wage rate is in $ and all the income-related variables are in $1000. “HH” stands for household and “HHH” stands for household head. Unit problems include toilet breakdown, heating equipment breakdown, presence of mice and rats, cracks or holes in interior walls, holes in floors, broken plaster or peeling paint on inside walls, water leakage, etc (see Table A13 for more details). Building problems include issues related to external walls, building windows, stairways, floors, etc (see Table A14 for more details). * p<0.10, ** p<0.05, *** p<0.01.
**Table 2: Effect of Rent Stabilization on Monthly Contract Rent**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A. Level of Monthly Contract Rent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>-0.38***</td>
<td>-0.26***</td>
<td>-0.25***</td>
<td>-0.40***</td>
<td>-0.39***</td>
<td>-0.39***</td>
<td>-0.38***</td>
<td>-0.37***</td>
</tr>
<tr>
<td></td>
<td>(0.067)</td>
<td>(0.059)</td>
<td>(0.053)</td>
<td>(0.085)</td>
<td>(0.079)</td>
<td>(0.076)</td>
<td>(0.075)</td>
<td>(0.074)</td>
</tr>
<tr>
<td>Stab × Duration of Tenure</td>
<td>-0.019***</td>
<td>-0.018***</td>
<td>-0.022***</td>
<td>-0.021***</td>
<td>-0.020***</td>
<td>-0.020***</td>
<td>-0.019***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0024)</td>
<td>(0.0024)</td>
<td>(0.0022)</td>
<td>(0.0019)</td>
<td>(0.0018)</td>
<td>(0.0018)</td>
<td>(0.0018)</td>
<td>(0.0017)</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
<td>1.297</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.425</td>
<td>0.444</td>
<td>0.457</td>
<td>0.548</td>
<td>0.569</td>
<td>0.574</td>
<td>0.581</td>
<td>0.623</td>
</tr>
<tr>
<td><strong>Panel B. Log of Monthly Contract Rent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>-0.24***</td>
<td>-0.13***</td>
<td>-0.13***</td>
<td>-0.16***</td>
<td>-0.16***</td>
<td>-0.16***</td>
<td>-0.15***</td>
<td>-0.16***</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.030)</td>
<td>(0.028)</td>
<td>(0.046)</td>
<td>(0.041)</td>
<td>(0.038)</td>
<td>(0.038)</td>
<td>(0.037)</td>
</tr>
<tr>
<td>Stab × Duration of Tenure</td>
<td>-0.017***</td>
<td>-0.016***</td>
<td>-0.019***</td>
<td>-0.018***</td>
<td>-0.018***</td>
<td>-0.018***</td>
<td>-0.017***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0017)</td>
<td>(0.0017)</td>
<td>(0.0015)</td>
<td>(0.0014)</td>
<td>(0.0013)</td>
<td>(0.0013)</td>
<td>(0.0011)</td>
<td></td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
<td>0.164</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.347</td>
<td>0.376</td>
<td>0.385</td>
<td>0.463</td>
<td>0.492</td>
<td>0.500</td>
<td>0.507</td>
<td>0.552</td>
</tr>
</tbody>
</table>

Sub-borough and Year FE ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Building Year Built ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Structure Characteristics ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Leasing Type ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Unit Amenity and Quality ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Building and Nbhd Quality ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Borough Interaction ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

**Notes:** Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. Structure characteristics include: 1) number of rooms in the unit, 2) number of bedrooms in the unit, 3) number of units in the building, 4) number of stories in the building, 5) unit level, 6) whether apartment building owner lives in the same building. Leasing type includes: 1) the length of leasing, 2) whether electricity is included in rent, 3) whether gas is included in rent, 4) whether gas is included in rent, 5) whether other fuel is included in rent. Unit amenity and quality include: 1) fuel type, 2) additional fuel, 3) plumbing condition, 4) kitchen condition, 5) presence of mice and rats, 6) exterminator service, 7) cracks or holes in interior walls, 8) holes in floors, 9) broken plaster or peeling paint, 10) water leakage, 11) number of heat breakdown, 12) number of toilet breakdown. Building and neighborhood quality include: 1) elevator in building, 2) sidewalk to elevator/unit without using steps, 3) wheelchair access to street entry/elevator/unit entrance, 4) has issue of building’s external wall/windows/stairways/floor, 5) overall rating of building quality, 6) boarded up structures in neighborhood, 7) self-rating of neighborhood quality. Full results containing coefficients of other variables are available upon request.
Table 3: Determinants of Rent Stabilization Eligibility

<table>
<thead>
<tr>
<th></th>
<th>A. LPM</th>
<th>B. Probit</th>
<th>C. Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.040***</td>
<td>0.040***</td>
<td>0.041***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>-0.040*</td>
<td>-0.040*</td>
<td>-0.039*</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.020)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>-0.019</td>
<td>-0.019</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.028)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Age</td>
<td>0.010</td>
<td>0.0092</td>
<td>0.0096</td>
</tr>
<tr>
<td></td>
<td>(0.0063)</td>
<td>(0.0062)</td>
<td>(0.0062)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Co-reside with Parents</td>
<td>0.034</td>
<td>0.033</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.027)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>Born in U.S. (Non-NYC)</td>
<td>-0.014</td>
<td>-0.013</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.015)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Born in Other Country</td>
<td>0.020</td>
<td>0.021</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>High School Dropout</td>
<td>0.0074</td>
<td>0.013</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>0.024</td>
<td>0.027</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>Some College No Degree</td>
<td>0.012</td>
<td>0.015</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Spouse Has College Degree or Above</td>
<td>-0.032</td>
<td>-0.027</td>
<td>-0.027</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.019)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Any Child in HH</td>
<td>0.035</td>
<td>0.037*</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.021)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>HH Size</td>
<td>-0.040***</td>
<td>-0.040***</td>
<td>-0.041***</td>
</tr>
<tr>
<td></td>
<td>(0.0079)</td>
<td>(0.0077)</td>
<td>(0.0079)</td>
</tr>
<tr>
<td>Any Non-relative in HH</td>
<td>-0.035**</td>
<td>-0.035**</td>
<td>-0.034**</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.016)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>HHH Total Income (Log)</td>
<td>-0.0011</td>
<td>-0.0010</td>
<td>-0.00099</td>
</tr>
<tr>
<td></td>
<td>(0.0013)</td>
<td>(0.0013)</td>
<td>(0.0013)</td>
</tr>
<tr>
<td>Other HH Mem. Tot. Inc. (Log)</td>
<td>0.00028</td>
<td>0.00040</td>
<td>0.00036</td>
</tr>
<tr>
<td></td>
<td>(0.0011)</td>
<td>(0.0010)</td>
<td>(0.0010)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>(N)</th>
<th>(R^2)</th>
<th>(V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9422</td>
<td>0.229</td>
<td>0.585</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. Column A is linear probability model (LPM). Column B and C are probit and logit models respectively, and the coefficients have been transformed to be marginal effects to ease interpretation and comparison to LPM.
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A. Labor Force Participation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>-0.0049</td>
<td>-0.0024</td>
<td>-0.0015</td>
<td>-0.0024</td>
<td>0.0067</td>
<td>0.0092</td>
<td>0.0099</td>
</tr>
<tr>
<td></td>
<td>(0.0085)</td>
<td>(0.0082)</td>
<td>(0.0083)</td>
<td>(0.0084)</td>
<td>(0.012)</td>
<td>(0.0072)</td>
<td>(0.0072)</td>
</tr>
<tr>
<td>( \bar{Y} )</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
</tr>
<tr>
<td>( N )</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
<td>9422</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.021</td>
<td>0.083</td>
<td>0.100</td>
<td>0.106</td>
<td>0.120</td>
<td>0.559</td>
<td>0.565</td>
</tr>
<tr>
<td><strong>Panel B. Unemployment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>0.015***</td>
<td>0.015***</td>
<td>0.014***</td>
<td>0.015***</td>
<td>0.026***</td>
<td>0.026***</td>
<td>0.023***</td>
</tr>
<tr>
<td></td>
<td>(0.0055)</td>
<td>(0.0055)</td>
<td>(0.0054)</td>
<td>(0.0055)</td>
<td>(0.0073)</td>
<td>(0.0069)</td>
<td>(0.0067)</td>
</tr>
<tr>
<td>( \bar{Y} )</td>
<td>0.058</td>
<td>0.058</td>
<td>0.058</td>
<td>0.058</td>
<td>0.058</td>
<td>0.058</td>
<td>0.058</td>
</tr>
<tr>
<td>( N )</td>
<td>8375</td>
<td>8375</td>
<td>8375</td>
<td>8375</td>
<td>8375</td>
<td>8375</td>
<td>8375</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.011</td>
<td>0.030</td>
<td>0.033</td>
<td>0.035</td>
<td>0.053</td>
<td>0.128</td>
<td>0.143</td>
</tr>
<tr>
<td><strong>Panel C. Hourly Wage Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>-0.082***</td>
<td>-0.061***</td>
<td>-0.053***</td>
<td>-0.060***</td>
<td>-0.086***</td>
<td>-0.076***</td>
<td>-0.071**</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.022)</td>
<td>(0.019)</td>
<td>(0.019)</td>
<td>(0.032)</td>
<td>(0.032)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>( \bar{Y} )</td>
<td>3.104</td>
<td>3.104</td>
<td>3.104</td>
<td>3.104</td>
<td>3.104</td>
<td>3.104</td>
<td>3.104</td>
</tr>
<tr>
<td>( N )</td>
<td>8093</td>
<td>8093</td>
<td>8093</td>
<td>8093</td>
<td>8093</td>
<td>8093</td>
<td>8093</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.138</td>
<td>0.199</td>
<td>0.268</td>
<td>0.272</td>
<td>0.292</td>
<td>0.315</td>
<td>0.332</td>
</tr>
</tbody>
</table>

Sub-borough and Year FE  
Demographic Control  
Education Control  
Other Household Control  
Housing and Neighborhood Control  
Industry Control  
Occupation Control

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. Labor force participation and unemployment are binary variables, i.e. \( \bar{Y}=1 \) if a renter participates in currently the labor force in Panel A and \( \bar{Y}=1 \) if a renter is currently unemployed in Panel B. Hourly wage rate is a continuous variable conditional on having positive hours of work in previous year in Panel C. Demographic controls include gender, race and ethnicity, age, marital status, co-residence with parents, birth place. Other household controls include presence of children, presence of non-relatives, household size, and spouse’s education and work status for married renters. Housing and neighborhood controls particularly include factors affecting the rent stabilization eligibility such as year a building is built and number of units in a building among others. Full results containing coefficients of other variables are available upon request.
Table 5: First Stage of Instrumental Variable Estimation

<table>
<thead>
<tr>
<th></th>
<th>IV1</th>
<th>IV2</th>
<th>IV3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Panel A. Labor Force Participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Stabilized</td>
<td>0.47*** (0.11)</td>
<td>0.33*** (0.071)</td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Market-Rate</td>
<td>-0.40*** (0.11)</td>
<td>-0.14* (0.074)</td>
<td></td>
</tr>
<tr>
<td>( Y )</td>
<td>0.584</td>
<td>0.584</td>
<td>0.584</td>
</tr>
<tr>
<td>( N )</td>
<td>9372</td>
<td>9372</td>
<td>9372</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.756</td>
<td>0.756</td>
<td>0.756</td>
</tr>
<tr>
<td>Over-Identifying Test</td>
<td></td>
<td></td>
<td>0.8339</td>
</tr>
<tr>
<td>All Other Controls</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td></td>
<td>Panel B. Unemployment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Stabilized</td>
<td>0.49*** (0.11)</td>
<td>0.34*** (0.070)</td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Market-Rate</td>
<td>-0.42*** (0.11)</td>
<td>-0.15* (0.080)</td>
<td></td>
</tr>
<tr>
<td>( Y )</td>
<td>0.585</td>
<td>0.585</td>
<td>0.585</td>
</tr>
<tr>
<td>( N )</td>
<td>8335</td>
<td>8335</td>
<td>8335</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.750</td>
<td>0.750</td>
<td>0.750</td>
</tr>
<tr>
<td>F Statistics</td>
<td>35.962</td>
<td>25.395</td>
<td>19.238</td>
</tr>
<tr>
<td>Over-Identifying Test</td>
<td></td>
<td></td>
<td>0.3631</td>
</tr>
<tr>
<td>All Other Controls</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td></td>
<td>Panel C. Hourly Wage Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Stabilized</td>
<td>0.47*** (0.11)</td>
<td>0.33*** (0.076)</td>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Market-Rate</td>
<td>-0.40*** (0.11)</td>
<td>-0.14* (0.086)</td>
<td></td>
</tr>
<tr>
<td>( Y )</td>
<td>0.587</td>
<td>0.587</td>
<td>0.587</td>
</tr>
<tr>
<td>( N )</td>
<td>8052</td>
<td>8052</td>
<td>8052</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.748</td>
<td>0.748</td>
<td>0.748</td>
</tr>
<tr>
<td>F Statistics</td>
<td>34.191</td>
<td>24.934</td>
<td>18.013</td>
</tr>
<tr>
<td>Over-Identifying Test</td>
<td></td>
<td></td>
<td>0.9145</td>
</tr>
<tr>
<td>All Other Controls</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
<td>( \checkmark )</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * \( p < 0.10 \), ** \( p < 0.05 \), *** \( p < 0.01 \). Number of observations \( (N) \) in each panel varies because the outcome variables are different. For example, comparing with panel A, the \( N \) is smaller in panel B because tenants who are not in the labor force are coded as not applicable for answering question to unemployed or not. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.
### Table 6: Effect of Rent Stabilization on Labor Market Outcomes (Instrumental Variable Estimation)

<table>
<thead>
<tr>
<th></th>
<th>Original OLS</th>
<th>IV1</th>
<th>IV2</th>
<th>IV3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A. Labor Force Participation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>0.010</td>
<td>0.039</td>
<td>0.043</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>(0.0073)</td>
<td>(0.037)</td>
<td>(0.040)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Y</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
<td>0.889</td>
</tr>
<tr>
<td>N</td>
<td>9372</td>
<td>9372</td>
<td>9372</td>
<td>9372</td>
</tr>
<tr>
<td>R^2</td>
<td>0.561</td>
<td>0.555</td>
<td>0.555</td>
<td>0.555</td>
</tr>
<tr>
<td>Over-Identifying Test</td>
<td></td>
<td></td>
<td></td>
<td>0.8339</td>
</tr>
<tr>
<td>All Other Controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| **Panel B. Unemployment** |              |      |      |      |
| Rent Stabilized  | 0.023***     | 0.12***| 0.14***| 0.12***|
|                  | (0.0063)     | (0.037)| (0.044)| (0.037)|
| Y                | 0.058        | 0.058| 0.058| 0.058|
| N                | 8335         | 8335 | 8335 | 8335 |
| R^2              | 0.132        | 0.091| 0.073| 0.088|
| F Statistics     | 35.962       | 25.395| 19.238|      |
| Over-Identifying Test |            |      |      | 0.3631|
| All Other Controls| ✓           | ✓    | ✓    | ✓    |

| **Panel C. Hourly Wage Rate** |              |      |      |      |
| Rent Stabilized  | -0.072**     | -0.17| -0.16| -0.17|
|                  | (0.033)      | (0.13)| (0.14)| (0.13)|
| Y                | 3.104        | 3.104| 3.104| 3.104|
| N                | 8052         | 8052 | 8052 | 8052 |
| R^2              | 0.322        | 0.312| 0.312| 0.312|
| F Statistics     | 34.191       | 24.934| 18.013|      |
| Over-Identifying Test |            |      |      | 0.9145|
| All Other Controls| ✓           | ✓    | ✓    | ✓    |

**Notes:** Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.
Table 7: Rent Stabilization: Heterogenous Treatment Effects

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Skill</th>
<th>Age</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>0.039</td>
<td>-0.0052</td>
<td>-0.14</td>
<td>0.076</td>
</tr>
<tr>
<td></td>
<td>(0.041)</td>
<td>(0.090)</td>
<td>(0.12)</td>
<td>(0.047)</td>
</tr>
<tr>
<td>Rent Stabilized</td>
<td>0.029</td>
<td>-0.0013</td>
<td>-0.082</td>
<td>-0.12</td>
</tr>
<tr>
<td></td>
<td>(0.064)</td>
<td>(0.057)</td>
<td>(0.21)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>( \bar{Y} )</td>
<td>0.888</td>
<td>0.890</td>
<td>0.861</td>
<td>0.932</td>
</tr>
<tr>
<td>N</td>
<td>3562</td>
<td>5810</td>
<td>5606</td>
<td>3766</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.578</td>
<td>0.560</td>
<td>0.586</td>
<td>0.428</td>
</tr>
<tr>
<td>F Statistics</td>
<td>50.745</td>
<td>15.782</td>
<td>13.579</td>
<td>37.002</td>
</tr>
</tbody>
</table>

Panel A. Labor Force Participation

| Rent Stabilized     | 0.15*** | 0.035 | 0.14*** | 0.046 | 0.13** | -0.029 | 0.25 |
|                     | (0.029) | (0.13) | (0.037) | (0.059) | (0.057) | (0.18) | (0.15) |
| \( \bar{Y} \)       | 0.045 | 0.067 | 0.068 | 0.046 |
| N                   | 3163 | 5172 | 4825 | 3510 |
| \( R^2 \)           | 0.031 | 0.152 | 0.132 | 0.051 |
| F Statistics        | 49.359 | 13.886 | 12.634 | 33.091 |

Panel B. Unemployment

| Rent Stabilized     | -0.15 | -0.24 | -0.29 | -0.063 | -0.18 | -0.29 | -0.13 | -0.21 |
|                     | (0.16) | (0.30) | (0.33) | (0.14) | (0.21) | (0.20) | (0.64) | (0.37) |
| \( \bar{Y} \)       | 3.409 | 2.919 | 2.858 | 3.441 |
| N                   | 3044 | 5008 | 4653 | 3399 |
| \( R^2 \)           | 0.227 | 0.273 | 0.204 | 0.217 |
| F Statistics        | 43.101 | 16.575 | 14.667 | 27.840 |

Panel C. Hourly Wage Rate

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. Low skill tenants are those who do not have a college degree while high skill tenants hold at least a college degree. Short tenants are those who have lived in their housing units for less than 5 years while long tenants have lived for at least 5 years. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.
Table 8: Legal Status versus Self-Reported Regulation Status

<table>
<thead>
<tr>
<th>Self-Reported Status</th>
<th>Market-rate</th>
<th>Rent-stabilized</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent-controlled</td>
<td>70</td>
<td>474</td>
<td>544</td>
</tr>
<tr>
<td></td>
<td>1.79%</td>
<td>8.60%</td>
<td>5.77%</td>
</tr>
<tr>
<td>Rent-stabilized</td>
<td>136</td>
<td>1409</td>
<td>1545</td>
</tr>
<tr>
<td></td>
<td>3.48%</td>
<td>25.55%</td>
<td>16.40%</td>
</tr>
<tr>
<td>Market-rate</td>
<td>2317</td>
<td>1338</td>
<td>3655</td>
</tr>
<tr>
<td></td>
<td>59.29%</td>
<td>24.27%</td>
<td>38.79%</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>621</td>
<td>1198</td>
<td>1819</td>
</tr>
<tr>
<td></td>
<td>15.89%</td>
<td>21.73%</td>
<td>19.31%</td>
</tr>
<tr>
<td>Not Reported</td>
<td>764</td>
<td>1095</td>
<td>1859</td>
</tr>
<tr>
<td></td>
<td>19.55%</td>
<td>19.86%</td>
<td>19.73%</td>
</tr>
<tr>
<td>Total</td>
<td>3908</td>
<td>5514</td>
<td>9422</td>
</tr>
<tr>
<td></td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Notes: Data comes from pooled 2002 and 2005 waves of the New York City Housing and Vacancy Survey (NYCHVS).

Table 9: Effect of Rent Stabilization Awareness on Unemployment (Full Sample)

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>Probit</th>
<th>Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aware</td>
<td>0.019**</td>
<td>0.023**</td>
<td>0.022**</td>
</tr>
<tr>
<td></td>
<td>(0.0072)</td>
<td>(0.0097)</td>
<td>(0.0088)</td>
</tr>
<tr>
<td>Misinformed</td>
<td>0.015</td>
<td>0.017</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>(0.0094)</td>
<td>(0.011)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>Y</td>
<td>0.060</td>
<td>0.061</td>
<td>0.061</td>
</tr>
<tr>
<td>N</td>
<td>6192</td>
<td>6192</td>
<td>6192</td>
</tr>
<tr>
<td>R²</td>
<td>0.130</td>
<td>0.104</td>
<td>0.103</td>
</tr>
<tr>
<td>All Other Controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.010. A rent-stabilized tenant is aware if the self-reported regulation status is either rent-controlled or rent-stabilized. A rent-stabilized tenant is misinformed if the self-reported regulation status is market-rate. Unemployment is a binary variable, i.e. Y=1 if a renter is currently unemployed. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.
<table>
<thead>
<tr>
<th>Table 10: First Stage of Instrumental Variable for Policy Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Fraction of Vacant-for-Rent that are Stabilized</td>
</tr>
<tr>
<td>Local Rent Regulation Knowledge: Aware</td>
</tr>
<tr>
<td>Local Rent Regulation Knowledge: Misinformed</td>
</tr>
<tr>
<td>Local Rent Regulation Knowledge: Don’t Know</td>
</tr>
<tr>
<td>$Y$</td>
</tr>
<tr>
<td>$N$</td>
</tr>
<tr>
<td>$R^2$</td>
</tr>
<tr>
<td>All Other Controls</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p < 0.10, ** p < 0.05, *** p < 0.010. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.

<table>
<thead>
<tr>
<th>Table 11: Effect of Policy Awareness on Unemployment (Instrumental Variable Estimation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Aware</td>
</tr>
<tr>
<td>Misinformed</td>
</tr>
<tr>
<td>$Y$</td>
</tr>
<tr>
<td>$N$</td>
</tr>
<tr>
<td>$R^2$</td>
</tr>
<tr>
<td>F Statistics</td>
</tr>
<tr>
<td>All Other Controls</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p < 0.10, ** p < 0.05, *** p < 0.010. A rent-stabilized tenant is aware if the self-reported regulation status is either rent-controlled or rent-stabilized. A rent-stabilized tenant is misinformed if the self-reported regulation status is market-rate. Unemployment is a binary variable, i.e. Y = 1 if a renter is currently unemployed. All controls include sub-borough and year fixed effect, demographic, education, other household, housing and neighborhood, industry and occupation control variables included in the last column of Table 4. Full results containing coefficients of other variables are available upon request.
### Table 12: Rent Discount and Mobility as Suggestive Mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Rent Stab. Dummy</th>
<th>Rent Discount</th>
<th>+ Mobility</th>
<th>Alter. Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent Stabilized</td>
<td>0.022***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0070)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent Discount</td>
<td>0.019***</td>
<td>0.016**</td>
<td>0.017***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0060)</td>
<td>(0.0061)</td>
<td>(0.0063)</td>
<td></td>
</tr>
<tr>
<td>Tenure of Residence</td>
<td>0.00061</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00054)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure: 2-4 Years</td>
<td></td>
<td>-0.0097</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0071)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure: 5-7 Years</td>
<td></td>
<td>0.0029</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0086)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure: 8-10 Years</td>
<td></td>
<td>-0.00085</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure: 10+ Years</td>
<td></td>
<td>0.0041</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.012)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Υ</td>
<td>0.059</td>
<td>0.059</td>
<td>0.059</td>
<td>0.059</td>
</tr>
<tr>
<td>N</td>
<td>8617</td>
<td>8617</td>
<td>8617</td>
<td>8617</td>
</tr>
<tr>
<td>R²</td>
<td>0.149</td>
<td>0.135</td>
<td>0.135</td>
<td>0.136</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses and clustered at sub-borough level. * p<0.10, ** p<0.05, *** p<0.01. Full results containing coefficients of other variables are available upon request. Rent discount is obtained from Jiang et al. (2019).
Appendix A

Appendix A.1 A McCall-type Job Search Model

In this section, we set up a simple job search model incorporating rent cost to describe the potential impact of living in a rent stabilized unit on job search behaviors among renters. Suppose, in general, a worker has to pay an instantaneous rent in period $t$,

$$r_t = r + \theta \left(1 - \frac{1}{e^t}\right), \quad (13)$$

There are only two types of renters: rent stabilized renter, with superscript $s$ and private market renter, with superscript $m$. Hence, $r_t$ can be classified as

$$r_t = \begin{cases} r_t^s = r, & \theta = 0 \text{ for rent stabilized renters} \\ r_t^m = r + \left(1 - \frac{1}{e^t}\right), & \theta = 1 \text{ for private market renters} \end{cases} \quad (14)$$

For a rent stabilized renter, $\theta = 0$, and rent is constant over time ($r_t = r_t^s = r$). For a private market renter, $\theta = 1$, and thus rent is increasing with time $t$ ($r_t^m = r + (1 - \frac{1}{e^t})$).

According to this simple setup, renters live in private market units always pay rents higher than renters live in stabilized units. Therefore, the rent discount is:

$$r_m - r_s = 1 - \frac{1}{e^t} \rightarrow 1, \text{ when } t \rightarrow \infty \quad (15)$$

The labor market prospects of the worker do not depend on the types of the rental unit; that is, renters in both types of rent units face the same labor market opportunities. This is sensible in the case of New York City where public transportation is very convenient. All workers participate in the labor force: they are either employed or unemployed. Unemployed workers receive unemployment insurance (UI) benefits, $b$, and the discount rate is $\rho$. There is no on-the-job-search. Jobs are assumed to last forever.

There is one labor market, and let the arrival rate for job offers in this labor market be $\alpha$ and wage offers $w$ are generated from an exogenous wage offer distribution $F(w)$ with support $[0; 1)$. In this set up, the worker has only one choice variable in the period of unemployment: conditional on receiving a job offer, she decides whether to accept it or not.

Value Function for Employed

Following standard job search theory, the expected discounted lifetime utility for an employed worker (with superscript $E$) who lives in a private market-rate unit (with sub-
script \( m \) is

\[
V_E^m(w) = \sum_{t=0}^{\infty} (1 - \rho)^t (w - r) - \left[ \sum_{t=0}^{\infty} (1 - \rho)^t - \sum_{t=0}^{\infty} \frac{(1 - \rho)^t}{e^t} \right] \tag{16}
\]

\[
= \frac{w - r}{\rho} - \left( \frac{1}{\rho} - \frac{e}{e - 1 + \rho} \right) \tag{17}
\]

\[
= \frac{w - r}{\rho} - \Psi, \tag{18}
\]

where \( \Psi = \frac{1}{\rho} - \frac{e}{e - 1 + \rho} = \frac{(e-1)(1-\rho)}{\rho(e-1+\rho)} > 0 \)

captures how much more rent private market renters have to pay comparing with renters who live in a rent stabilized unit.

Similarly, the expected discounted lifetime utility for an employed worker (with superscript \( E \)) who lives in a rent stabilized unit (with subscript \( s \)) is

\[
V_E^s(w) = \frac{w - r}{\rho}. \tag{20}
\]

**Value Function for Unemployed**

In contrast, the expected discounted lifetime utility for an unemployed worker (with superscript \( U \), \( V_U \) who lives in a private market-rate unit (with subscript \( m \)) is

\[
V_U^m = \left[ b - (r + 1) \right] + (1 - \rho) \left[ \alpha \text{Max} \left( V_E^m(w), V_U^m \right) + (1 - \alpha)V_U^m \right] \tag{21}
\]

Rearrange the above equation, we get

\[
V_U^m = (b - r - 1) + (1 - \rho) \left[ \alpha \text{Max} \left( V_E^m(w), V_U^m \right) \right] + (1 - \rho)(1 - \alpha)V_U^m \tag{22}
\]

\[
\nabla_V^U = (b - r - 1) + (1 - \rho) \left[ \alpha \text{Max} \left( V_E^m(w), V_U^m \right) \right] + \nabla_V^U - \rho V_U^m - (1 - \rho)\alpha V_U^m \tag{23}
\]

\[
\rho V_U^m = (b - r - 1) + (1 - \rho)\alpha \left[ \text{Max} \left( V_E^m(w), V_U^m \right) - V_U^m \right] \tag{24}
\]

\[65\] This is because \( e > 1 \) and \( \rho < 1 \), so the numerator is positive. \( e > 1 \) assures the denominator is also positive.
\[ \rho V_m^U = (b - r - 1) + (1 - \rho)\alpha \int_{w_m^*}^{\infty} (V_m^E(w) - V_m^U) dF(w) + (1 - \rho)\alpha \int_{-\infty}^{w_m^*} (V_m^U - V_m^U) dF(w) \] 

(25)

\[ \rho V_m^U = (b - r - 1) + (1 - \rho)\alpha \int_{w_m^*}^{\infty} \left( \frac{w - r}{\rho} - \Psi - V_m^U \right) dF(w) \] 

(26)

Let’s plug equation (7) into the above equation, we have

\[ \rho V_m^U = (b - r - 1) + (1 - \rho)\alpha \int_{w_m^*}^{\infty} \left( \frac{w - r}{\rho} - \Psi - V_m^U \right) dF(w) \] 

(27)

where \( w_m^* \) is the reservation wage for an unemployed worker who lives in private market-rate unit. The reservation wage is the solution to an optimisation problem, where the worker maximises the expected present discounted value of future income streams. Such an optimal reservation wage exists because the value of employment increases in the wage, \( w \), whereas the value of unemployment does not, i.e., employment is more favorable than continued search for wages above \( w_m^* \).

Since the reservation wage is defined by

\[ V_m^U = V_m^E(w_m^*) \] 

(28)

we have

\[ V_m^U = \frac{w_m^* - r}{\rho} - \Psi \] 

(29)

Then we have

\[ w_m^* - r - \rho \Psi = (b - r - 1) + (1 - \rho)\alpha \int_{w_m^*}^{\infty} \left[ \frac{w - r}{\rho} - \Psi - \left( \frac{w_m^* - r}{\rho} - \Psi \right) \right] dF(w) \] 

(30)

Hence,

\[ w_m^* = b - 1 + \rho \Psi + \frac{(1 - \rho)}{\rho} \int_{w_m^*}^{\infty} (w - w_m^*) dF(w) \] 

(31)

Recall \( \Psi = \frac{1}{\rho} - \frac{e}{e - 1 + \rho} = \frac{(e - 1)(1 - \rho)}{\rho(e - 1 + \rho)} > 0 \), So we have

\[ w_m^* = b - \frac{e}{e - 1 + \rho} + \frac{(1 - \rho)}{\rho} \int_{w_m^*}^{\infty} (w - w_m^*) dF(w) \] 

(32)

Following the same logic, we can derive that the expected discounted lifetime income for
an unemployed worker who lives in a rent stabilized unit (with subscript s) is

\[ \rho V^U_s = b - r + (1 - \rho) \alpha \int_{w^*_s}^{\infty} \left( V^E_s(w) - V^U_s \right) dF(w) \quad (33) \]

Let’s plug equation (8) into the above equation, we have

\[ \rho V^U_s = b - r + (1 - \rho) \alpha \int_{w^*_s}^{\infty} \left( \frac{w - r}{\rho} - V^U_s \right) dF(w) \quad (34) \]

Since the reservation wage is defined by

\[ V^U_s = V^E_m(w^*_s) \quad (35) \]

we have

\[ V^U_s = \frac{w^*_s - r}{\rho} \quad (36) \]

Then we have

\[ w^*_s - r = b - r + (1 - \rho) \alpha \int_{w^*_s}^{\infty} \left[ \frac{w - r}{\rho} - \left( \frac{w^*_s - r}{\rho} \right) \right] dF(w) \quad (37) \]

Hence,

\[ w^*_s = b + \frac{(1 - \rho)}{\rho} \alpha \int_{w^*_s}^{\infty} (w - w^*_s) dF(w) \quad (38) \]

To sum up, we have

\[ w^*_i = b - \frac{\epsilon \rho}{\epsilon - 1 + \rho} \theta_i + \frac{(1 - \rho)}{\rho} \alpha \int_{w^*_m}^{\infty} (w - w^*_m) dF(w) \quad \text{for } i \in \{m, s\} \quad (39) \]

where \( \theta_s = 0 \) for rent-stabilized tenants and \( \theta_m = 1 \) for private market-rate tenants.

**Proposition 1.** \( w^*_s > w^*_m \) i.e. the reservation wage for a rent stabilized unemployed renter is always higher than the reservation wages for a private market-rate unemployed renter.

Proof: Consider the sign of \( w^*_s - w^*_m \). After rearranging terms, we obtain:
\[ w_s^* - w_m^* = \left[ b + \frac{(1 - \rho)}{\rho} \alpha \int_{w_s^*}^{\infty} (w - w_s^*)dF(w) \right] - \left[ b - \frac{e\rho}{e - 1 + \rho} + \frac{(1 - \rho)}{\rho} \alpha \int_{w_m^*}^{\infty} (w - w_m^*)dF(w) \right] \]

\[ = \frac{(1 - \rho)}{\rho} \alpha \left[ \int_{w_s^*}^{\infty} (w - w_s^*)dF(w) - \int_{w_m^*}^{\infty} (w - w_m^*)dF(w) \right] + \frac{e\rho}{e - 1 + \rho} \]

Now assume \( w_m^* \geq w_s^* \), so that \( w_s^* - w_m^* \leq 0 \) must hold. When \( w_m^* \geq w_s^* \), the term in square brackets is positive because the option value of search is a decreasing function in reservation wage. In addition, both \( \frac{(1 - \rho)}{\rho} \) and \( \frac{e\rho}{e - 1 + \rho} \) are positive. So \( w_s^* - w_m^* > 0 \) contradiction! Therefore, it must be \( w_m^* < w_s^* \). QED.

**Proposition 2.** Comparing with private market-rate renters, rent stabilized renters with stabilized rents are less likely to exit from unemployment.

Proof: By definition, the exit rate from unemployment is the product of the arrival rate of job offer and the probability that the offer is accepted. So the hazard rate out of unemployment to a job for a rent stabilized tenant is \( \theta_s \) and the hazard rate to a job for a private market-rate tenant is \( \theta_m \):

\[ \theta_s = \alpha [1 - F(w_s^*)] \]
\[ \theta_m = \alpha [1 - F(w_m^*)] \]

Since \( w_s^* > w_m^* \), it follows trivially that \( F(w_s^*) > F(w_m^*) \) and \( 1 - F(w_s^*) < 1 - F(w_m^*) \). Hence, \( \theta_s < \theta_m \). QED.