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HOUSING IN THE DIGITAL AGE: Trends and implications

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The digitalization of the housing market has had a particularly dramatic effect on cities. Short-term rental platforms are blurring the lines between commercial and residential space, formal and informal housing, tourists and tenants. Known consequences for local rental markets include residential displacement and exclusion.

As the tasks involved in housing transactions have become more digitalized and data-driven, the volume of technological tools tailored to property management has expanded. Increased surveillance of tenant microeconomic behavior begs the question of who will have access to this data.

Among growing fears regarding the impact of digital platforms on local businesses during the COVID-19 crisis, local governments have attempted to regulate the platform economy, with potentially serious implications for companies.

The profound impact of technological change on social, economic and political structures is nothing new. Technology is never neutral: as tasks become streamlined, new organizational forms emerge and power balances shift. In his seminal work *Forces of Production: A Social History of Automation*, historian David Noble (1984) draws on the history of industrial automation to reveal how technological developments are mediated by both the contradictions rooted in a given technology and the social relations of production. Far from a Luddite screed, Noble's work focuses on how, throughout history, some technologies have become a naturalized part of society while others have been discarded as a result of politically disputed social choices.

Its historical pervasiveness notwithstanding, technological change has nevertheless gained greater political salience over the last decade. Recent years have seen a flurry of publications dealing with the impact of automation, digitalization and platformization on employment and working conditions. Indeed, these processes are now at the heart of the Future of Work initiatives promoted by governments, companies and international organizations ranging from the World Economic Forum¹ to the International Labour Organization². Yet, their implications go well beyond labour markets, affecting countless aspects of our daily lives. And as Noble's work suggests, the question of who

1. See: <https://www.weforum.org/projects/future-of-work>

2. See: <https://www.ilo.org/global/topics/future-of-work/lang--en/index.htm>

will benefit from these technological changes and who will bear their costs is not predetermined. Rather, it is being actively disputed by citizens, workers, governments and private companies.

Automation, digitalization and platformization

In *As Time Goes By: From the Industrial Revolutions to the Information Revolution*, Chris Freeman and Francisco Louçã (2001) provide a compelling economic history of technological change and innovation. Their framework conceives the current wave of change as the fifth technological revolution of capitalism. The previous four were the Industrial Revolution (circa 1771), the steam and railways revolution (circa 1829), the steel, electricity and heavy engineering revolution (circa 1875), and the oil, automobile and mass production revolution (circa 1908). For Freeman and Louçã, the defining feature of the current wave was the development of the microprocessor in the 1970s, which led to a dramatic change in the performance of existing information and telecommunications technologies, as well as a shift in

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the organizational paradigm of leading firms. The dramatic spatial and temporal changes spurred by these advances facilitated the emergence of a more information-intensive networked model at the expense of the more centralized, hierarchical and energy-intensive Fordist model.

Scholars often use the umbrella term *digitalization* to refer to the broad range of technological changes taking place during this period. Specifically, digitalization involves the translation of physical processes into data, allowing them to exploit improvements in the processing, storage and communication of digital formats. The centrality of digital data in this paradigm is reflected in the processes of automation and platformization. Though *automation* has existed since long before the invention of the microprocessor, digitalization extends the range of human labor tasks that can be replaced by machine input far beyond manual labor to include a great deal of abstract work. Meanwhile, *platformization* encapsulates the organizational changes enabled by the use of digital networks to coordinate commercial and non-commercial transactions via algorithms.

While these concepts are generally used to refer to changes in the world of work (Eurofound 2018), their impacts are felt across social fields. Housing is no ex-

ception, and the digitalization of housing has had a particularly dramatic effect on cities. In the following sections, some examples of the housing practices emerging in urban contexts under the digital paradigm are provided. Let us begin with the familiar case of short-term rental platforms, which have proven especially conflictive due to their implications for local housing costs, neighborhood composition and regulatory frameworks.

The New Dual Housing Market

In cities around the world, short-term rental platforms are blurring the lines between commercial and residential space, formal and informal housing, tourists and tenants. The paradigmatic example of these businesses is Airbnb, a company conceived by Brian Chesky and Joe Gebbia, whose startup funds were raised by selling novelty cereal boxes for the 2008 US presidential campaigns of Barack Obama and John McCain. When it filed its initial public offering in August 2020, the company had been privately valued at \$31 billion.

Airbnb's rapid international expansion was most intense between 2011 and 2014, beginning with the acquisition of the small German clone company Accoleo and the establishment of its first European offices in Hamburg and London. By 2013, the company had added offices in Barcelona, Copenhagen, Milan, Moscow and São Paulo, and established its European headquarters in Dublin. After 2014, however, the platform's profound impact on urban housing markets began to draw the ire of housing advocates, leading a number of local and national governments to challenge the company's business and fiscal practices on legal grounds. Incidentally, Airbnb increased³ its EU lobbying efforts eightfold between 2013 and 2018, from just under 100.000€ to nearly 800.000€, hiring full-time lobbyists and participating in events, workshops and regular meetings with the European Commission through its involvement in key industry organizations like the Digital Tourism Network, the European Collaborative Economy Forum and, especially, the European Holiday Home Association.

Local level opposition to short-term rental platforms should come as no surprise, particularly in urban areas. Known consequences for local rental markets include residential displacement and exclusion. Using a dataset of Airbnb listings in major US metropolitan areas, Barron, Kung and Proserpio (2020) find that the plat-

3. Source: <https://lobbyfacts.eu/representative/e0c603b5d2774f98b0039d356288db56/airbnb-ireland-uc>

form significantly raised house prices and rent between 2010 and 2016. Broadly, their study finds that, at the median owner-occupancy rate zipcode, a 1% increase in the number of properties listed on Airbnb leads to a 0.018% increase in rents and a 0.026% increase in house prices. This effect is primarily caused by the substitution of long-term rental units with short-term rental units, and accounts for roughly one fifth of actual rent growth and one seventh of actual price growth in these areas, or an annual increase of \$9 in monthly rent and \$1,800 in house prices. These effects are considerably stronger in neighborhoods with a higher share of market rate tenants.

This dynamic is most dramatic in neighborhoods with intense tourist activity. The Barri Gotic in Barcelona provides an instructive case, as increasing demographic pressure from tourist flows has led the supply of tourist lodging to nearly equal that of actual residents in 2015 (Cocola Gant 2016). Just three years into the platform's international expansion, the number of Airbnb listings per 100 households was 2.2 in the City of Barcelona, 9.6 in the Ciutat Vella district and 16.9 in the Barri Gotic. The accompanying displacement has not only been powered by rising rents and the substitution of long-term rental units with short-term rentals, but also by daily cohabitation problems in buildings that combine tourist and residential apartments, such as noise and difficulty resting or sleeping at night.

These pressures have led many scholars to conclude that Airbnb has contributed substantially to widening inequalities in urban areas. In a particularly damning report on the platform's impact in New York City, Wachsmuth et al (2018) identify a number of disturbing trends. For instance, the median host of a frequently rented entire home listing earned 55% more than the median long-term tenant in the same neighborhood per year. They also find that Airbnb increased the median long-term rent in New York City by 1.4% between 2014 and 2017, resulting in a \$380 rent increase for the median New York tenant looking for an apartment that year, or up to \$700 in some Manhattan neighborhoods. Revenues from short-term rentals acquired through the platform also showed a disturbing racial dynamic. While white neighborhoods made systematically more money than non-white neighborhoods, Airbnb's presence grew fastest in black neighborhoods. Moreover, hosts in all of the black-majority neighborhoods were five times more likely to be white.

These trends suggest that, while the company has long presented itself as merely providing a way for humble households to make some extra cash by occasion-

ally renting out a room, Airbnb exacerbates a growing conflict in urban rental housing markets. In their rush to add listings, short-term rental platforms are creating new speculative opportunities for property owners and diminishing housing opportunities by pitting market rate tenants against tourists in the search for rental housing, in what is increasingly looking like a dual housing market (Porter et al 2019). Yet the impact of digitalization on urban housing markets extends well beyond that of short-term rental platforms. In the next section, I describe how automation, platform logic and digital labour are dramatically reshaping real estate practices in cities around the world.

Platform real estate

It is frankly difficult to recall the time when housing searches were primarily conducted by reading local listings in the newspaper or calling the telephone numbers displayed on "for sale" or "for rent" signs in front of the properties themselves. Today, the vast majority of housing searches rely on online listing services. In

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Spain, for instance, websites like Idealista.es or Habitaclia.com centralize many of the tasks involved in finding a home, from listing available properties to finding a mortgage lender. As the functions they host have grown, so too has the breadth of their data and their power over housing markets. For instance, the Bank of Spain has relied exclusively on data from Idealista.es to calculate the rental sector trends published in its annual reports (López-Rodríguez and De los Llanos Matea, 2019).

As the tasks involved in housing transactions have become more digitalized and data-driven, the volume of technological tools tailored to property management has expanded. The applications and companies that have emerged in this expansion are commonly referred to as PropTech. According to Baum (2017), these technologies have three main drivers (information, transactions and management) and can be divided into three sub-sectors: the shared economy, smart real estate and real estate financial technologies. The main functions of the platforms in each of these sectors are to share information with prospective users and sellers, to mediate transactions between them and to facilitate service contracting. While the shared economy refers to technology-based platforms mediating the use of real estate assets, smart real estate includes those facilitating

their operation and management. On the other hand, real estate financial technologies (or FinTech) refer to tech platforms that facilitate the trading of buildings, shares, funds, debt or equity.

The concept of PropTech has largely been developed by the real estate sector. As a theoretical concept, it has been strongly criticized by Shaw (2018) as little more than marketing gimmick due to the nebulous boundaries that separate each category. An alternative approach advanced by Shaw and others (Rogers 2016) focuses on the role of the platform in the real

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estate sector. Drawing on Bratton (2015), Shaw refers to the platform as an organizational and technical form that connects users, sellers, goods and services, and gives way to higher-order aggregations that add value to these goods and services, as well as to the platform itself. The resulting notion of *platform real estate* may sound a bit abstract, but it becomes quite tangible when we look at what is happening in urban residential markets.

In recent years, the global production and accumulation of data has been most visible in cities. The so-called 'digital skin' (Rabari & Storper 2014) of the city is becoming increasingly sensitive, as meters and sensors gather detailed information on economic activity, environmental conditions, policing, public services and population flows. This is particularly relevant to the process of determining property values, which depends so heavily on how a location is perceived. While a working knowledge of these factors once relied on some level of intimacy or local attachment, digitalization homogenizes this information through the use of standardized metrics, at once facilitating a bird's eye view and a richly detailed, granular one. This allows applications and programs such as Redfin, Zillow and Trulia to offer statistical insight and estimates for potential buyers and sellers to calibrate negotiations or price-setting activities. This also has tremendous implications for landlording as an economic activity, since the reduced need for local knowledge opens housing markets up to increasingly distant investors.

Further feeding this trend, digitalization allows for most of the tasks typically associated with landlording to be externalized to gig economy workers. Fields (2019) argues that, although market conditions in the wake of the 2008 global financial crisis provided an opportunity for large investors to acquire foreclosed single-family homes, convert them to rental housing, and roll out a new asset class based on bundled rent checks, these conditions were insufficient on their own and required digital innovations to automate core landlording functions. For instance, while housing maintenance and repair tasks can be outsourced through platforms like TaskRabbit, Handy or Amazon Mechanical Turk, the face-to-face interaction that landlords or real estate agents typically engage in with prospective tenants is rendered unnecessary through the keyless entry provided by companies like Rently. The most disturbing examples of outsourced tasks in the housing sector are those provided by Civvl, a gig-economy style platform for hiring eviction crews, as well as other services including property inspections, process serving, foreclosure cleanouts and property preservation. Claiming that "too many people stopped paying

rent and mortgages thinking they would not be evicted" in the aftermath of the pandemic, the company's website bills itself as the "fastest growing money-making gig due to COVID-19."⁴

Digitalization is also changing tenant screening practices. One example is the use of online flatmate finding sites and Facebook groups tailored to adults looking for shared rental housing (Maalsen 2020). Platforms such as Wonego feature online housing profiles and, like dating sites, use algorithms to suggest "top" flatmate and household matches based on user data. Meanwhile, apps such as Easy Share and Splitwise mediate flatmate interactions by streamlining household payments and task management. The potential social implications of these technologies are not too difficult to imagine. On the one hand, the social sorting involved in flatmate finding and tech-assisted surveillance of household tasks and payments suggests a trend towards increasingly homogenous shared households, which could contribute to residential segregation. On the other hand, the proliferation of such technologies would likely further stratify populations in terms of digital literacy through practices of residential exclusion. Finally, increased surveillance of tenant microeconomic behavior begs the question of who will have access to this data. Could this information be obtained by a potential landlord or acquired by a tenant screening platform?

4. See: <https://civvl.com/>

This question is all the more relevant when we consider that, according to a recent joint investigation by *The New York Times* and the non-profit tech watchdog The Markup⁵, roughly 90 percent of US landlords rely on tenant-screening reports to make renting decisions, and 82% intended to increase their use of technology and online services for tenant screening and rental pricing⁶. In many cases, these decisions are automatically generated using matching algorithms, which housing advocates have criticized for years as being error-prone amplifiers of racial inequalities. While tech companies often claim that algorithmic decisions could be less informed by racial biases than human decisions, scholars have claimed that artificial intelligence exacerbates racial biases in housing, just as it does in lending, social services, health care, policing and criminal risk assessments. In any case, the use of algorithmic decision-making in screening practices brings up the critical question of legal liability. While landlords are subject to fair housing laws that prohibit discrimination on the basis of race, age or gender, whether these laws apply to screening services is being disputed in the courts.

Recently, the US Department of Housing and Urban Development (HUD) made it more difficult for tenants to prove they have been discriminated against by allowing housing providers to free themselves from such charges if they use “profit” as a reason for their decision-making, or if they use third-party systems to choose tenants. However, in September 2020 a federal district court judge in Connecticut agreed to let a lawsuit against CoreLogic, a large property data firm offering a variety of services including tenant screening, go to trial⁷. While CoreLogic argued that it is not subject to the Fair Housing Act because its tool can only inform a landlord’s housing decision, a federal district judge previously shot their argument down, claiming the company marketed its automated CrimSAFE service as a decision-making product and gave landlords the option of hiding the details of their decisions. Moreover, in 2015 the US Supreme Court ruled that, regardless of its intention, if a business practice results in disparate results for people of different races, genders or ages, that business can be subject to a fair housing claim. In this sense, the Trump administration’s modification of HUD’s rules to protect landlords and algorithmic screening practices against discrimination claims appears contrary to jurisprudence.

5. Source: <https://themarkup.org/locked-out/2020/09/24/fair-housing-laws-algorithms-tenant-screenings>

6. Source: <https://www.mysmartmove.com/SmartMove/blog/landlord-rental-market-survey-insights-infographic.page>

7. Source: <https://themarkup.org/ask-the-markup/2020/05/28/what-can-you-do-if-your-tenant-background-report-is-wrong>

Institutional responses to the digitalization of housing

Like any social process, technological change takes place over time. The economists Chris Freeman and Francisco Louçã (Freeman and Louçã, 2001) and Carlot Pérez (Pérez, 2003) make three claims regarding how it tends to unfold. First, rather than following linear and incremental trends, changes in the methods and tools used in the economy tend to cluster around periodic ‘revolutions’, such as those mentioned earlier in this article. Second, there is a time lag between the ini-

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tial big bang of innovation provoked by a technological revolution and its full transformation of the socioeconomic structure. Third, for a technological revolution to produce valued and shared benefits to society, the institutional framework has to significantly change in order to deal with the broad socioeconomic implications of the new forms of economic activity.

When faced with criticism of their practices, tech companies often claim that technological innovation moves faster than politicians or the law, and that institutional frameworks are always struggling to catch up. According to this logic, gig economy workers are not employees and Airbnb hosts are not landlords, they are just users of each company’s platform. Such dubious distinctions are increasingly being challenged by local governments and in the courts, with potentially serious implications for the companies⁸. According to the aforementioned report by Wachsmuth et al (2018), two-thirds of Airbnb revenue in New York City (roughly \$435 million) came from listings that were likely illegal according to New York state law at the time of the study’s publication.

Recent years have seen several prominent examples of local government attempting to regulate housing platforms. In May 2016, Berlin put a freeze on new permits for renting out apartments and houses in the city, preventing apartments and houses from being used for short-term rental accommodation through the Prohibition of Misuse of Residential Space Act (Zweckentfremdungsverbot). Though short-term rentals were allowed to resume

8. Source: https://www.eldiario.es/economia/justicia-fallado-glovo-autonomos-deliveroo_1_116336.html

starting in May 2018, strict conditions were put in place, including a 90 day limit on short-term rentals, restrictive permit requirements and fines of up to €500,000 for breaking the rules. Paris and Amsterdam also require hosts to register with local authorities, with the latter limiting the number of days a property may be rented out through platforms like Airbnb to one month per year.

Meanwhile, Barcelona has also made international headlines for its firm stance against illegal listings on Airbnb. In 2016, the city fined the company €600,000 for continuing to advertise unlicensed homes on its platform, dou-

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bled the number of inspectors tasked with identifying illegal tourist apartments and threatened owners with fines of up to €60,000⁹. Perhaps most critically, given the centrality of data in the digital age, as of June 2018 Airbnb must share its data with local officials, thereby facilitating the enforcement of Catalan Decree No. 75/2020, of August 4th, on Tourism, which requires hosts to display their registration numbers on listings¹⁰.

These moves are part of a broader attempt by the local government to regulate the platform economy. In a recent petition presented alongside the city's digital transition strategy, the local government of Barcelona requested the European Commission to grant cities more power to regulate digital platforms. "The digital transition will work for everyone or not at all," claimed deputy mayor Laia Bonet. "If we are unable to put digitalization at the service of the common interest, we will only add another layer of inequality to our societies."

This strategy was announced among growing fears regarding the impact of digital platforms on local businesses during the COVID-19 crisis. However, as we've seen, the implications of digitalization are systemic in nature, with consequences that cut across a variety of social fields. In the wake of the pandemic, digital technologies

will pose serious challenges for urban housing policies in particular, including telework-enabled urban flight, rising residential segregation and a growing digital divide. These problems are hardly confined by national borders, and addressing them will require bold action and international cooperation between cities.

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