WPS8152

Policy Research Working Paper 8152

Rental Regulation and Its Consequences on Measures of Well-Being in the Arab Republic of Egypt

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WORLD BANK GROUP
Poverty and Equity Global Practice Group
July 2017

Abstract

The paper delves into the implications of a failure to account for rental regulation in the measurement of households' welfare, poverty, and inequality when using household surveys. Exploiting previously unavailable data for the Egyptian case, the paper illustrates the long-lasting distortions in the rental market that the 1977 rental law has created. The paper finds evidence that earlier studies may have substantially underestimated households' welfare in urban areas and overestimated urban poverty. National poverty rates show smaller corrections, as poverty is mainly a rural phenomenon in the Arab Republic of Egypt. An appropriate measure of welfare also led to downward corrections in inequality in urban Egypt, while increasing the inequality across regions. These effects counterbalance each other and nationwide inequality estimates are affected only slightly.

This paper is a product of the Poverty and Equity Global Practice Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at glaraibarra@worldbank.org.

Rental Regulation and Its Consequences on Measures of Well-Being in the Arab Republic of Egypt

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JEL: I32, D63, G18

Keywords

Welfare measurement, rental regulation, inequality, Egypt

[1] We are very grateful to the Central Agency for Public Mobilization and Statistics (CAPMAS) for their kind support, comments and suggestions, and for providing access to the necessary data to produce this study. We also thank participants in the World Bank Poverty SAR/MENA Seminar, Dean Joliffe, Sergio Olivieri, and Benu Bidani for very helpful comments and suggestions.

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1. Introduction

For more than 20 years, households' welfare and poverty levels have been at the center of countries' development policies and safety net strategies. International organizations have also relied on poverty and related indicators to draw and design their global strategies. The World Bank's goal to end extreme poverty by 2030, the United Nations Millennium Development Goal of cutting poverty in half in 2015, and the renewed Sustainable Development Goal of "No poverty" by 2030 are but a few examples of how a money metric approach has been used to monitor households' living standards and progress towards global objectives. Accurately tracking of these goals thus becomes crucial and cannot be implemented without a clear understanding of the underlying methodologies and data that are used to inform these global strategies.

Among the components of a welfare measure, the housing services are a key element. For instance, the share of housing as a percentage of household's net disposable income ranged from 13 percent in the Republic of Korea to 25 percent in Greece.[2] When consumption is used as a yardstick of welfare, as it is done in many developing countries, housing services should adequately capture the utility generated by consumption of the dwelling's amenities (**Deaton and Grosh, 2000 and Gaerner and Short 2009**). This estimate of the flow of services received by the households must be comparable across households. If two households with the same number of members and age structure reside in a home of similar characteristics, both should be measured as having the same flow of housing services.

The literature has pointed out several considerations that need to be accounted for in the estimation of housing services. A natural choice to capture the market value of the services of any dwelling could be the rent paid by its tenant. In the cases of owners, or households that received their dwelling free of charge (such as a fringe benefit) the rent is unknown. An approximation of the rental value is sometimes obtained by asking a self-reported guess of a rental price of the dwelling if the household were to rent it. Finally, to correct for misreporting, missing information or to correct potential survey coding errors, analysts rely on the use of hedonic models to derive an imputed rental value (**Freeman 1993, Sirmans et al. 2005,** and **Balcazar et al., 2014**).

A much less explored aspect of the estimation of housing services is the implication of rental regulations, such as rent control. Most studies analyzing rent control, a form of rental regulation, focus on its distortionary effects on the housing market. These include price distortions in uncontrolled housing (**Fallis and Smith, 1984, Frankena, 1975 and Hubert, 1993**) as well as a misallocation of renters (**Glaeser, 1996 and Glaeser and Luttmer, 2003**). On the supply side, rent control results in the deterioration of building units as maintenance costs exceed the rent paid, which lead to landlords deciding not to invest (**Albon**

[2] Source: Own calculations based on European Union Statistics on Income and Living Conditions (EUSILC), 2011.

and Stafford, 1990 and Frankena, 1975). Others have shown an impact on tenant mobility,[3] and tenancy duration (**Munch and Svarer, 2002 and Nagy, 1995**). Finally, some literature has assessed whether regulation ends up benefiting the intended recipients and if the benefits outweigh the allocative distortions (**Gyourko and Linneman, 1989, Ejarque and Kristensen**, 2015, **Arnott and Igarashi**, **2000, Arnott, 2003**).

In this paper, we focus on exploring the implications of rent control in the estimation of welfare, poverty and inequality. We analyze the case of the Arab Republic of Egypt, where rental regulation has a very long history that permeates to this day. The country's rental regulation started after World War I and continues to affect a large share of the housing market (mainly) in Egypt's urban areas. The most recent version of the rental regulation, the law of 1977, has not only frozen rents for all dwellings under its jurisdiction, but allows that any rental contract for an apartment or house regulated under it can be passed down in generations. The 1977 law still applies to an estimated 11 percent of dwellings in the country, and 33 percent in Metropolitan Egypt. By effectively creating a gap between the rent that can be charged to different dwellings, regulation raises the important question on how to correctly measure housing services and welfare across all households in Egypt.

Using previously unavailable detailed data of Egypt's Household Income, Consumption and Expenditure Survey (HIECS) for the year 2012/13, we apply a version of the hedonic model based on the log of rental values (**Malpezzi, 2003**) to correctly estimate the housing services of 1977-law renters. We find evidence that previous studies significantly underestimated the welfare levels of certain Egyptian households, especially in urban areas. We also find evidence of overestimation in overall inequality, especially that of within region inequality but underestimation of between-region inequality. Other indicators, such as poverty levels are also found to decline in metropolitan areas once the value of rents among tenants under rent control is adjusted. Given the renewed global interest in tracking the elimination of poverty and the recent discussions of the role of inequality in social movements, this paper fills an important gap in the literature. Heavily regulated markets are still commonplace in many regions in the world. The results found in this paper highlight the potential misrepresentation of the evolution of welfare in the presence of housing regulation and call for a clearer understanding and transparency of the underlying methodologies used in such publications.

This paper is organized as follows: Sections 2 and 3 detail the context of housing market regulation in Egypt and the literature on the use of hedonic models in rent imputation literature respectively. It also outlines the data we use and presents the descriptive statistics to bolster the case for considering adjustments in reported rent by households living in regulated dwellings. We propose a hedonic model to account for these adjustments and section 4 reports its consequences for measurement of welfare. Section 5 concludes.

[3] For example, **Ault, Jackson and Saba** (1994) find that New York City's rent control reduces mobility and that around 80 percent of the difference in mean expected tenure between controlled and uncontrolled units is attributable to efficiency losses from controls. **Gyourko and Linneman** (1989) find that the size of the tenant's subsidy has an inverse relationship such that the larger the subsidy, the less likely a tenant will move.

2. Rental Regulation in the Egyptian Context

Rent control policy has been active for more than 60 years in Egypt and has taken a variety of forms including freezing rents to certain nominal levels or fixing rent as a percentage of the cost of the building.[4] The regulation was first introduced after World War I and then revamped after World War II to counter the inflationary pressures arising from war. They key feature of the original legislation entailed that the landlord could no longer terminate the lease by the end of the specified period, except under certain conditions where the decision could be passed on to the court. In addition, the landlord could not change the rental value stated in the lease (**McCall, 1988)**.

Many more regulations followed. In 1944, dwellings' rents were frozen at their corresponding values in 1941 for all units constructed before that year. In 1952, law no.199 was passed, which brought tenancy agreements signed between 1944 and 1952 under rent control, and further slashed down the rents by 15 percent. Law no.55 of 1958 further decreased the rental payments by 20 percent for all tenancy agreements signed between 1952 and 1958. Subsequently, law no. 168 of 1961 set rents at 20 percent below for all tenancy agreements signed between 1958 and 1961. In 1965, law no.7 was passed which induced a reduction in rents for units constructed between 1944 and 1961 by 20 percent. All rental contracts signed after 1961, through the enacting of law no. 46 of 1962, set the rent at an additional 35 percent lower than the original amount signed for in them.

Generally speaking, an amendment to the rental law passed in 1977 is the basis of the current rent control regulation in Egypt.[5] The law 49/1977 enforced, over and above the frozen rent, an additional rule that any rental contract for an apartment or house that was regulated under this law could be passed down to generations (i.e. a tenant's son could be entitled to enjoy the same rental agreement through his life). This set of regulations is what constitute the "Old Law" (**Mansour, 2009**).

The Egyptian government, under the Mubarak administration, attempted to relax rent control legislations and passed rent law No. 4 of 1996, which exempted all housing units constructed from that point onwards, from rent controls. This law, usually referred to as the "New Law," effectively created the coexistence of the dual rental market that is observed in Egypt today. In this study, we follow the Old law (regulated dwellings) and New law (unregulated dwellings) naming convention to describe our analyses and results.

In many other countries, rent controls were introduced during or after World War II in order to better cope with war-related inflationary pressures. For example, the U.S. Emergency Price Act of 1942 froze rents in New York City in November 1943 at their March 1943 levels. In 2011, about 68 percent of housing units were rented, among which a third lived in regulated dwellings.[6] Similarly, in Kumasi, one of Ghana's largest cities, about 65.2 percent of households lived in rented accommodation in 1986 (**Willis et al.,**

[4] For a detailed review of rent control in Egypt, please refer to McCall (1988).

[5] This amendment was to an original law passed in 1969. Other amendments to the law were approved in 1976 and 1981.

[6] Regulated dwellings comprised units subject to rent control and units subject to rent stabilization; both of which fell under strict rules governing rent increases. Regulations also described obligations to provide services and the circumstances under which tenants can be evicted ("Rent Stabilization in New York City" by the Furman Center for Real Estate & Urban Policy, New York University).

1990). The rents paid in the city are well below the cost of construction as well as comprise a small percentage of household expenditures. In India, some form of rental regulation was in in place in all states by 1975 (**Tewari and Kumar, 1986**). Even though some attempt was made to reform the rent regulation by the central government through the Model Rent Bill of 1992, no changes have been made in implementation (**Dev, 2006).** Countries like the United Kingdom, Sweden, and Israel have also implemented their own versions of rent controls over extended periods of time (**Arnott, 1995).**

Over time, some countries have abolished or modified rental regulation to better address the needs of the current housing market and to erase the distortionary effects of rent controls, among other reasons. The case of Egypt is unique, in that a large share of households continues to live in rent controlled dwellings until today and pay rents that have been set before 1996. For example, almost a third of all households lived in regulated housing units in 2012/13. It, thus, provides an interesting case to study the potential effect regulation might have in the way poverty and other measures of welfare are calculated.

3. Accounting for Regulation in the Egyptian Context

Estimates of housing services should be obtained in a way that is fully comparable across households. In the Egyptian context, two important characterizations that determine the value assigned to the flow of housing services are the living situation of the household (tenant, owner or rent-free tenant) and the existence of regulated housing. Recognizing that the dwelling occupied by the households is a major durable good, it is not the purchase price that is relevant as an estimate of the services the household receives at any point in time. On the other hand, the rent paid by tenants arguably provides a value to the flow of housing services. For owner-occupied dwellings and rent-free tenants, on the other hand, literature has relied on the use of hedonic models to impute rents.

The Hedonic Theory of Consumption establishes that in equilibrium, hedonic prices are defined as the implicit prices of the goods' attributes. **Rosen (1974)** highlights the hedonic hypothesis that goods are valued for their utility-bearing characteristics. In this specific case, the characteristics of housing (such as roof type, floor type etc.) occupied by tenants that report rental payment in a survey can be used to estimate the coefficients of a hedonic index, which can then be applied to corresponding characteristics of individual owner-occupied units to impute rent.[7]

Frick et al. (2010) impute rent for owner-occupied and subsidized dwellings in five European countries (Belgium, Germany, Greece, Italy and the UK) and show that the inclusion of imputed rents has consequences for measurement of welfare. In particular, they find a decline in measured levels of inequality and poverty as a result of using imputed rents derived from a hedonic model. Similarly, using data from EUSILC 2004, **D'Ambrosio and Gigliarano (2007)** find that using imputed rent to adjust for income, leads to a decline in relative inequality and relative poverty in Italy. Others also find a reduction in inequality in Madagascar (**Guenard and Mesple-Somps, 2010**), the Russian Federation (**Buckley and Gurenko, 1997**), Australia (**Saunders and Siminski, 2005**), Canada (**Crossley and Curtis, 2006**) and Argentina (**Gasparini and Escudero, 2004**).

[7] Malpezzi (2003) notes that a certain level of dynamism is necessary to obtain reliable information from a hedonic model. For instance, to apply econometric methods for imputation, the share of free-market tenants should be about 10 percent.

Regulation is the second characterization to consider when estimating welfare. The presence of regulated housing in a market creates a set of tenants who benefit from housing at a subsidized price. This price is not reflective of the market price or price that would have been paid for the same housing in the absence of regulation. Imputation of rent for subsidized tenants in such a market, thus, becomes important to ensure comparability of welfare across households living in regulated and unregulated housing.

Data and Descriptive Statistics

To better understand the Egyptian context, we exploit very detailed data from the Household Income, Expenditure, and Consumption Survey (HIECS) 2012/13. The HIECS provides very detailed information on the ownership status of dwellings including:

a) Ownership status across different living situations: owners; tenants under the Old Rent Law, tenants under the New Rent law and tenants that enjoy the dwelling "in-kind", and

b) For each type of ownership status, a question on actual or self-reported value of rent is recorded.[8]

In addition, the survey includes information on the characteristics of the dwellings such as type of structure, type of floor, ceiling, materials in walls, dwelling size in square meters, access to water, access to the sanitation network and so on. The survey also has detailed information on consumption expenditures undertaken by households, thus enabling us to look at the impact of adjusted rents on the measures of welfare.

We find evidence that rental regulation still affects a significant share of households in Egypt. Table 1 shows the distribution of households by type of dwelling occupation for each region. About a third of households in metropolitan areas of Egypt live in dwellings governed by the old law. The share of renters under the old law is not as high as in other urban areas but more prevalent as compared to rural areas, as expected. The share of households who own the dwellings they inhabit is significantly higher in rural areas as compared to urban areas. It also seems that rented dwellings under the old law are more prevalent in metropolitan areas.

The share of households living in regulated dwellings in different urban regions has decreased somewhat in the last ten years, with *New law* dwellings becoming increasing prevalent.[9] Nonetheless the share of *Old law* tenants remains significantly higher in Metropolitan and Upper Urban regions. It is, thus, fathomable that with time, even though more housing units are being constructed, an important share of households are reluctant to rent because the associated market rent is high, leading to vacant properties.[10]

[8] Information on secondary dwellings is available, however, very few households have anything to report.

[9] Based on HIECS data. In 2005, the shares of Old law and New law tenants were as follows: Metropolitan (51% and 4%), Lower Urban (27.5% and 5.5%) and Upper Urban (28.9% and 4.7%), respectively. In 2015, the shares of Old law and New law tenants were: Metropolitan (28% and 13.5%), Lower Urban (13% and 11%) and Upper Urban (17% and 9.8%), respectively.

[10] For instance, the National Statistics Office found that approximately 7.5 million housing units were vacant.

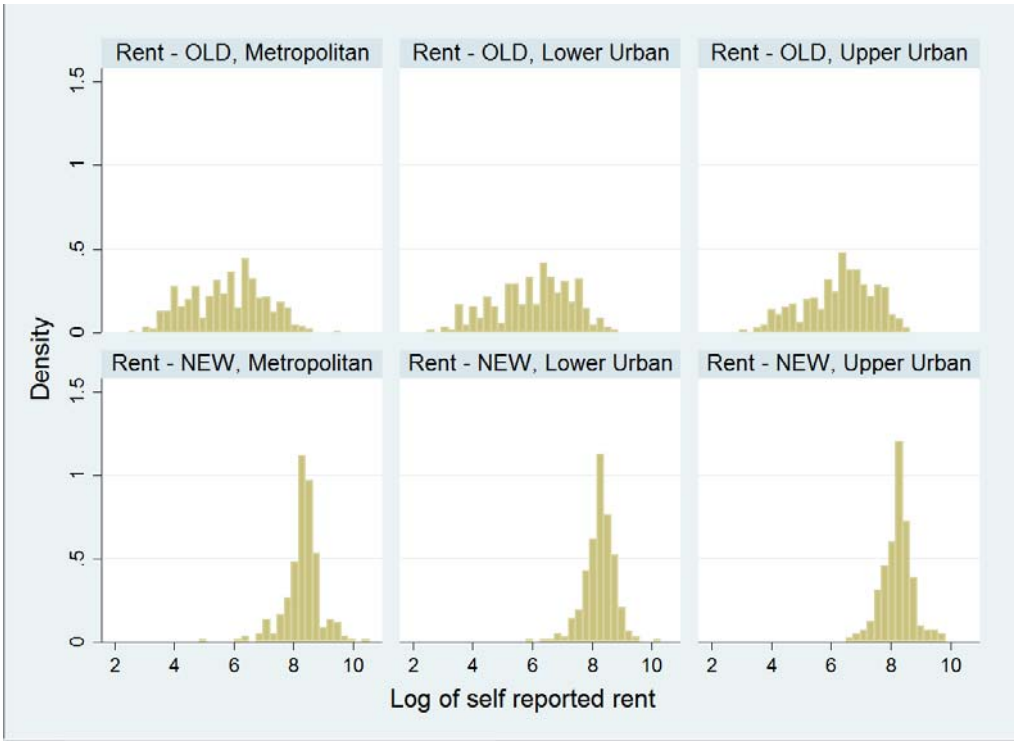
Table 1. Ownership status in percentage by region (share within regions) in Egypt 2012/13

Ownership status	Region				
	Metropolitan	**Lower Urban**	**Lower Rural**	**Upper Urban**	**Upper Rural**
Rent - OLD	31.7	13.9	0.6	18.7	1.7
Rent - NEW	9.6	14.4	2.1	9.8	1.0
Owner	51.7	56.9	79.4	57.1	82.7
In-kind/donation	7.0	14.8	17.9	14.5	14.7

Source: HIECS, 2012/13
Note: Rent-OLD refers to subsidized tenants and Rent-NEW refers to tenants.

The effects of rental regulation are clear when we look at the values of rents declared by households in regulated units and compared these to the declared rent for "new law" tenants. Looking at the distributions of rent paid (Figure 1), it is clear rents paid by households living in unregulated dwellings is higher, on average. Moreover, the distribution of rents paid by households living in regulated dwellings is almost entirely to the left of the distribution of the rents among unregulated units across all urban regions in Egypt.[11] For instance, in the Metropolitan area, the average rent in the 85-90th percentile among rent control units is very similar (1725 LE) to the average in the 5th-10th percentile among the unregulated units (1709 LE). Units under "new law" show lower variation than those under rent control.

Figure 1. Distribution of log of self-reported rent across regions and living situations



Source: HIECS, 2012/13
Note: Rent-OLD refers to subsidized tenants and Rent-NEW refers to tenants

[11] Refer to Figure A1 in Appendix for a more detailed graph.

There could be various explanations possible for the observed differences in rental values across tenant types. A natural explanation could be that the dwellings occupied by households in different living situations have different characteristics or that the access to amenities and the areas in which they live are different. The data does not show evidence sustaining either explanation, however. Table 2 illustrates that dwellings under regulated and unregulated schemes have similar characteristics, and in very few instances there are statistical differences. Rural areas have only a handful of dwellings under the "old law" and are not shown.

Besides the small differences in dwelling characteristics between *Old law* tenants and *New law* tenants, we also explore whether both have access to the same amenities. To do this, we use the data on location available from the HIECS 2012/13. First, when we look at households by governorates and location type (urban/rural) we find that there is a high correlation (0.93) between the numbers of Old- and New-law tenants found in the data. Secondly, for each urban region (Metropolitan, Lower Urban and Upper Urban) we run a regression using the observed Primary Sampling Units (PSU) as observations and test for the correlation between the number of *Old-* and *New-law* tenants. We find evidence of a positive and statistically significant correlation between them. This evidence suggests that the two types of tenants are likely to be found in the same location (i.e. same PSU) and are very likely to benefit from the same amenities (transportation, entertainment, etc.). Thus, it is not this difference in access that drives the difference in rents paid. Taking these results together, households living under the old rent law end up living in dwellings with similar characteristics and close to those under the *New law*, but paying much less rents just because the rental regulation affords them the opportunity to do so.

Table 2. Dwelling characteristics (% of households)

	Metropolitan		***Lower Urban***		***Upper Urban***	
	Rent - OLD	**Rent - NEW**	**Rent - OLD**	**Rent – NEW**	**Rent - OLD**	**Rent - NEW**
Housing: apartment, villa	92.6	92.3	96.8	99.1*	96.2	95.7
country house	0.1	0.7	0.6	0.5	1.1	2.8
Number of rooms	3.4	3.2**	3.4	3.4	3.4	3.4
Area in m2	69.3	70.1	74.0	75.0	68.8	78.2***
Has tap water in the house	96.6	97.1	99.1	99.2	98.5	98.9
Sewage: connected to public network	99.1	98.4	98.3	99.2	96.4	88.5***
connected to local network	0	0	0.6	0.4	0	0
connected to trench/private network	0.9	1.6	1.1	0.3	2.3	6.5**
Dwelling has brick/cement walls	98.5	98.6	98.4	99.2	97.3	94.8
Dwelling has cement ceiling	96.4	97.2	96.6	98.3	98	94.3*
Flooring: Dwelling has ordinary tile floor	68.9	62.8*	71.2	63.2*	70.9	72.2
Dwelling has ceramic-tiles floor	28.4	32.6	24.9	34.8**	27.5	24.2
Dwelling has concrete floor	1.3	3.6*	2.2	1.7	0.7	3.6*
Dwelling has soil floor	0.1	0	0.6	0	0	0

Note: Rent-OLD refers to subsidized tenants and Rent-NEW refers to free-market tenants; ***1%, ** %%, * 10% significance levels of statistical tests across tenant status. Source: HIECS, 2012/13.

Hedonic model

In order to create a comparable valuation of the housing services across regulated and unregulated dwellings, we propose to use a hedonic model. To do so, we use information on rents paid by a subset of the population namely owners, renters under the new law and households that have been given the dwelling in kind.

We argue that the rent paid out by a household (y_h) can be expressed as a function of its characteristics (X_h), neighborhood characteristics (N_h) and its location (L_h) (**Freeman, 1993**).

$$y_h = y(X_h, N_h, L_h) \qquad (1)$$

However, there is no consensus about the specific explicit form the hedonic price function might take (see **Ekeland et al., 2004 and Lisi, 2013**). Thus, we assume the following functional form:

$$\log y_h = \beta X_h + L_h + \varepsilon \qquad (2)$$

The outcome variable is the log of rent paid by households living in dwellings under the new law as well as the log of self-reported rent that would have been paid out by owners and households living in gifted dwelling, had they rented it. We control for dwelling characteristics such as type of housing unit (villa, apartment, country house), type of floor, type of sewage, type of wall, type of ceiling, tap in household, number of rooms and area. We also control for household size, region fixed effects and interaction of region and type of living situation.[12] The full results of the hedonic model are presented in table A1.

The adjustments made to rental payment, after using the hedonic model, are presented in **Table 3**. It is starkly evident that the adjusted rent, i.e. a more accurate welfare valuation based on the market, among households living in dwellings under *Old law* is much higher than the one that is actually paid by them. In metropolitan areas, the adjusted rent is nearly 7 times as compared to the reported rent for regulated units. Thus, the use of reported rent for these households in the calculation of the housing services component is likely to grossly undervalue their welfare aggregate estimate.

[12] It might be possible that the price paid by tenants in unregulated housing is actually not the market price but that it has been driven up because of rent control. Had the rental regulation under the old law not existed, the rent would be determined by the interaction of demand and supply. However, in the case of Egypt, there are two separate rental markets- one under the new law and one under the old law. The equilibrium price in the old rental market is higher than the rent ceiling, thus creating excess demand. This excess demand in the old market shifts the demand curve of the new rental market upwards thus raising the equilibrium rental price. In other words, it could be argued that using the rental price of housing units under the new law to impute rents for units under the old law, could be misleading. However, we are interested in making sure that rent paid by tenants under the new law and the old law is comparable—to the extent that the consumption aggregate is comparable. The hedonic model does exactly that—it imputes rent for tenants living in dwellings governed by the old law to make these rental prices comparable to those living in dwellings under the new law. Thus, we can rule this problem out for the purposes of this paper.

Table 3. Rents paid after adjustment using a hedonic model (in Egyptian pounds)

	Rent - OLD	Rent – OLD*	Rent - NEW
Metropolitan	624.00	4143.12	4807
	(844.98)	(975.67)	(2716.04)
Lower Urban	805.00	3732.22	4316
	(914.72)	(743.37)	(1813.84)
Lower Rural	1419.00	3041.15	2958
	(848.53)	(636.10)	(1133)
Upper Urban	944.00	3727.43	4236
	(936.10)	(731.26)	(2115.07)
Upper Rural	1328.00	2471.74	2633
	(1056.70)	(647.27)	(1040.17)

Source: HIECS, 2012/13

Note: Rent-OLD shows rents paid for subsidized tenants, Rent-OLD* shows rent adjusted rents paid for subsidized tenants and Rent-NEW rents paid for unregulated tenants. Predictions using the hedonic model include the Duan's (1983) correction.

We also find that the adjusted rental payments form a significant share of the total consumption expenditure in Egyptian households. Moreover, the corrected values are in line with other empirical estimates observed in other countries. Table 4 reports these relative shares for Egyptian households living in dwellings under different rental regulations. We further disaggregate the relative shares based on quintiles of consumption expenditure to show that underestimation is a phenomenon that affected households across the entire distribution. As expected, for households living in regulated dwellings, rental payment is a lower share of the consumption expenditure for richer households as compared to poorer households. Most importantly, we find that using imputed rent changes the shares for subsidized tenants dramatically, by more than three times for most quintiles.[13]

Table 4. Share of self-reported rent in total consumption expenditure—by quintile

Per capita expenditure quintile	Rent - OLD	Rent-OLD*	Rent - NEW	Owner	In-kind/donation
Lowest	5.9	18.6	17.8	14.4	14.3
2	4.5	17.3	17.1	14.6	15.3
3	4.0	16.8	16.1	15.0	16.3
4	3.4	15.8	17.0	15.6	15.8
Highest	2.6	15.7	18.0	18.4	16.9

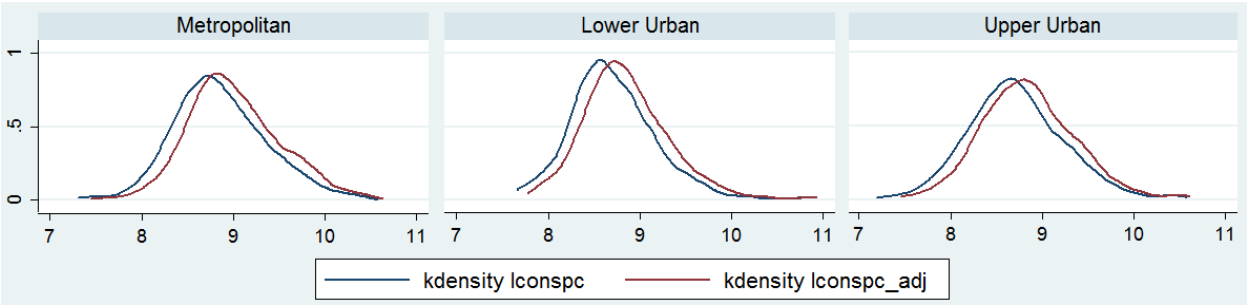
Source: HIECS, 2012/13. Notes: For Rent-OLD*, we used the rent adjusted welfare aggregate to calculate quintiles. For the rest, quintiles are based on the CAPMAS's official welfare aggregate. Rent-OLD shows shares for subsidized tenants, Rent-OLD* shows rent adjusted shares for subsidized tenants and Rent-NEW shows shares for unregulated tenants.

[13] The hedonic model can also be used to correct for misreporting or over-reporting of rents. In our data, we observe that reported rent values for 355 tenants under the new law, owners and in-kind dwellers were exceptionally high. These outlier households were assigned an imputed rent using the hedonic model, along with households living in regulated dwellings.

4. Impact on Measures of Well-Being

A comprehensive measure of welfare is aimed at accurately and adequately capturing the well-being of individuals. It is thus imperative that all the components of the welfare aggregate reflect the *true* valuation of the good or service. In the case of Egypt, we have shown that the market valuation of the rent is significantly higher than the rent actually paid out by households living in regulated dwellings. In order to ensure comparability of the measure of well-being across households or individuals, it is important to use the imputed rent for regulated dwellings, in the calculation of the welfare aggregate. To illustrate this point, Figure 2 shows the distribution of annual consumption expenditure per capita for households residing in regulated dwellings before and after the adjustment for rent. Among this group, there is an unambiguous difference in the distribution of the welfare aggregate once imputed rent for regulated dwellings is used for calculation.

Figure 2. Distribution of log of annual consumption expenditure per capita for regulated dwellings – with and without adjustment for rent



Source: Own calculations using HIECS, 2012/13

The impacts of the rent adjustments from the hedonic model are concentrated in the urban areas, but affect households across the entire distribution. Table 5 shows the median consumption per capita for both scenarios: before and after the correction for *Old law* rents. Results are shown by the corresponding consumption per capita quintile.

Table 5. Median consumption per capita before and after the rent adjustment, by region and quintile of consumption distribution

Quintile of consumption per capita	*Metropolitan*	*Metropolitan – adjusted*	*Lower Urban*	*Lower Urban – adjusted*	*Upper Urban*	*Upper Urban - adjusted*
1	3,036	3,135	3,175	3,193	3,028	3,050
2	4,040	4,055	4,034	4,064	3,952	3,992
3	5,000	5,034	4,924	4,971	4,897	4,939
4	6,387	6,473	6,303	6,395	6,281	6,376
5	11,300	11,592	9,810	9,970	9,928	10,181

Source: Own calculations using HIECS 2012/13. Notes: Consumption per annum in current LE. Notes: * refers to the welfare aggregate once the adjustments for rents are done.

As a direct consequence of the adjustment of consumption levels, we might expect that other indicators that rely on this information will also be affected. We focus here on changes on poverty and inequality. First, we estimate poverty rates using the adjusted and unadjusted welfare aggregate. In doing so, we find

that using imputed rent for subsidized tenants reduces the percentage of population living below the poverty line in all the predominantly urban regions of Egypt. In the Metropolitan region, the adjusted poverty rate is 12.1 (1.2 percentage points lower than the original rate), whereas the Lower Urban and Upper Urban regions experience only minor changes (**Table 6**). Naturally, the decreases in the incidence of poverty are starker if we only look at the Old-law tenants group. Comparing columns [3] and [4] in **Table 6** the poverty rate is 6 percentage points lower in the Metropolitan area among Old-law renters once the adjustment is incorporated into the poverty estimation methodology. Put another way, there appears to be an overestimation of poverty among this group. In the Lower Urban region poverty rate was overestimated by 7.7 percentage points and in Upper Urban by 6.7 percentage points.

Table 6. Poverty rates (% population living below the poverty line)

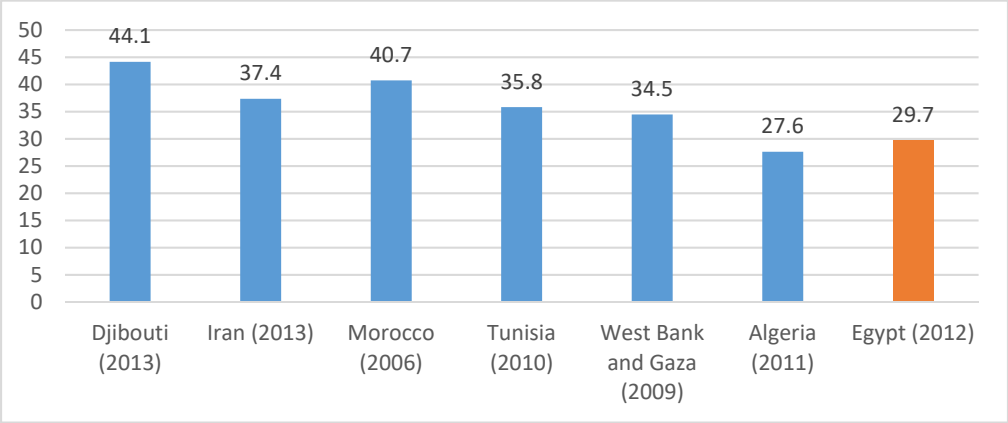
Region	Poverty among OLD-law tenants	Poverty among OLD-law tenants (adjusted)	Poverty rate	Poverty rate *(adjusted)*
Metropolitan	16.5	10.5	13.3	12.1
Lower Urban	17.4	9.7	10.6	9.9
Lower Rural	15.6	12.0	16.1	16.3
Upper Urban	22.6	15.9	24.8	23.9
Upper Rural	46.5	46.7	46.7	46.9
National	19.3	13.3	24.4	24.1

Source: Own calculations using HIECS, 2012/13 Notes: National rate includes Border regions.

Another aspect of welfare that will be affected by the adjustments described will be the level of inequality in Egypt. Previous studies have discussed the issue of inequality in Egypt. In short, given its level of development, Egypt's inequality indexes are typically lower than expected. The HIECS 2012/13 showed a Gini coefficient of 29.7. This level is the second lowest in a selection of countries in the MENA region (**Figure 3**). Tests have been carried out to ex-post correct for potential issues of unit non-response, or by modeling the effects of the missing top incomes by using Pareto distributions (**Hlasny and Verme, 2013**). There is no suggestive evidence of significant differences once these corrections were implemented. In contrast, one study (**van der Weide et al. 2016**) used data on housing prices to simulate the top tail of the income distribution and obtain a corrected inequality measure for the country's urban areas.[14] Using data from 2008/09, the authors find that the Gini is substantially underestimated. The Gini index for Urban Egypt is found to be 47 instead of 36.4 when no correction is made. These studies, as many others that use the total consumption expenditure as obtained from the Household Survey HIECS have overlooked the potential effects of the regulatory framework of Egypt. The differences in valuation of rents and non-comparability across households may have important implications on the distribution of welfare as used and the estimated impact of the studies' corrections.

[14] Other studies have used administrative or tax data to correct for the top incomes that are typically missing in household surveys (see Diaz-Basan 2014 or Morelli et al 2015 for instance). In Egypt, tax records are unavailable.

Figure 3. Gini Coefficient for selected Middle East and North African countries (circa 2012)



Source: All countries but Egypt: World Bank Global Monitoring Database (2017); Egypt own calculations using HIECS 2012/13.

Table 7 summarizes the implications of the adjustment for Old-law tenants in the measurement of a series of inequality measures for Egypt. There is a small decline in inequality after the adjustment as measured by the Gini coefficient and other whole-distribution indexes. In contrast, the ratio of the 90th to 10th percentile indicates an increase in inequality after the adjustment. Moreover, the increase seems to be concentrated in the top half with the ratio of the 90th to 50th percentile increasing, while the ratio 10th to 50th remaining basically constant. These results may hint at some compositional changes in inequality going in different directions. **Table 8** explores this possibility and presents the estimates for the Atkinson (1) inequality measure by regions. For all the urban regions, we observe a decline in inequality when the welfare aggregate is adjusted for imputed rent. The decline is slightly more pronounced for metropolitan area as compared to other regions, where the estimate drops by 0.017. In fact, it appears that due to the adjustment for rents, within-group (region) inequality drops from 0.114 to 0.108, while inequality across regions is now higher (from 0.024 to 0.027). The combination of these two forces cancel each other and the changes in overall inequality are small as we saw in **Table 7**. These results are in line with the estimated changes in poverty above: households living in urban areas are now richer on average as a significant share of them are now reflecting higher housing services, whereas households in rural areas remain at (relatively) the same levels of deprivation.

Table 7. Estimates of inequality measures for Egypt 2012/13, with and without adjustment for the regulatory framework

	No adjustment	With adjustment
Gini	29.7	29.5
GE(0)	.1464	.1427
A(1)	.1362	.133
A(2)	.2276	.2247
P90/p10	3.251	3.262
P90/p50	1.953	1.957
P10/p50	.601	.6

Source: Own calculations using HIECS 2012/13.

Table 8. Atkinson (1) measure before and after adjusting for OLD-law tenants, by region

Region	A(1)	A(1) with adjusted rent
Metropolitan	.179	.162
Lower Urban	.108	.105
Lower Rural	.072	.072
Upper Urban	.145	.134
Upper Rural	.08	.08
Total	.136	.133

Source: HIECS, 2012/13. Note: Based on annual consumption expenditure per capita

In contrast to what had been suggested before, these results point to an *overestimation* of inequality in Egypt. Overall, however, the inequality estimates at the national-level seem to be only slightly overestimated. These results show, to some extent, that using reported rents instead of imputed rents, in the presence of a strong regulatory rental market leads to an underestimation of welfare and an overestimation of inequality in urban Egypt especially the metropolitan areas. This is to be expected as a third of the households in this region live in regulated dwellings.

Testing other hedonic models

We estimated several specifications of the hedonic model as a robustness check on the results presented so far. Besides the model used to estimate the results shown above, we estimate three different specifications. The results are reproduced in **Table 9**. The table shows different indicators obtained directly from the survey data, as well as those obtained by using different hedonic models to correct for the rental regulation. The results include the estimate of housing services (i.e. the component that is incorporated into the welfare aggregate), the poverty rate among Old Law renters and across entire population, and inequality estimates based on the Atkinson Index A(1). Model 1 in the table reproduces the results previously described. Model 2 estimates are obtained from a hedonic model that uses information exclusively from the urban regions of the country (Metropolitan, Lower Urban and Upper Urban) to conduct the adjustments for Old Law tenants. This specification is run to address the potential concern that New Law renters are just a small fraction of dwelling ownership in Rural regions and may affect the quality of the results (**Malpezzi, 2003**). Under model 3, we run three separate regressions for each of the urban regions to allow the returns to dwelling characteristics to vary. Model 4 replicates the same specification as model 1, but performs an additional correction for 'owner's pride'. There is a possibility that owners might overestimate the market value of rent for their dwelling due to "pride", which refers to the affinity that owners might have to their own home (**Frick et al. 2010**). Similarly, in-kind dwellers may not have a good grasp of the market value of rental units and may over- or underestimate the value of the dwellings they inhabit. Under model 4, we use the regression estimates to correct (i.e. we adjust downward) for the average premium found for owners' and in-kind dwellers. The corrections are based on the interaction variables of region and ownership status.[15] As shown in **Table 9**, the results are qualitatively the same across all specifications: i) housing services are underestimated among Old Law tenants if data from the survey is used as face value to calculate the household welfare aggregate; ii)

[15] Results of all regressions are available upon request.

poverty rates for this group of households are overestimated and consequently are overestimated in all urban areas; and iii) inequality was *overestimated* when the unadjusted welfare aggregate is used, but the national-level inequality is adjusted downwards only slightly due to the counteracting effects of lower within-region inequality and higher between-region inequality.

5. Conclusions

In this paper, we aim to shed light on the implications of rental regulation in the measurement of welfare and related indicators. The case of Egypt is well-suited to study this phenomenon. Having started their rental regulation since World War I, a third of all dwellings in Egypt are estimated to be under a strict form of rent control. This control has led to a dual rental market where tenants of the Old-law and the new-law coexist and many times actually end up living very close to each other. Nonetheless, tenants with rental contracts under the 1977 law pay substantially lower rents than those under the New-law. The differences in rents paid are not explained by dwelling characteristics, and there is no strong evidence of important differences in location either.

Failure to account properly for the differential in rental prices of different households creates an inconsistency in the approach to measure welfare. If two households (of the same size) are enjoying the same type of dwelling with similar amenities, the valuation of housing services should be the same. Thus, using the rent paid as collected by the household survey at face value for welfare valuation is incorrect. The study uses a hedonic model approach and illustrates how not correcting for the implications of the rental regulation leads to an underestimation of welfare for a sector of the population, the overestimation of the overall poverty rate and inequality (as measured by the Gini coefficient). This last finding becomes of particular significance at a time when understanding inequality and its role in recent social movements and political shifts is ever important. Further research is warranted to understand how the interplay of rental regulation and other better-known factors affects inequality estimates.

Table 9. Compendium of results by different hedonic model specifications

Indicator	*Region*	*Original estimates*	Adjusted Estimates/2			
			Model 1	*Model 2*	*Model 3*	*Model 4*
Housing services/1	Metropolitan	624	4194.6	3374.8	3590.5	4194.6
		(844.98)	(949.65)	(962.73)	(1265.11)	(949.65)
	Lower Urban	805	3759.1	2998.0	3613.0	3759.1
		(914.72)	(715.03)	(763.22)	(712.83)	(715.03)
	Lower Rural	1419	3154.2	1371.0	1371.0	3154.2
		(849)	(680)	(695)	(695)	(680)
	Upper Urban	944	3783.4	3035.9	3711.9	3783.4
		(936.1)	(687.85)	(743.12)	(761.)	(687.85)
	Upper Rural	1328	2508.6	1197.2	1197.2	2508.6
		(1056.7)	(627.35)	(964.12)	(964.12)	(627.35)
Poverty rates among OLD law tenants	Metropolitan	16.5	10.5	11.4	11.4	9.6
	Lower Urban	17.4	9.7	12.4	10.1	9.3
	Lower Rural	15.6	12.0	15.6	15.6	12.0
	Upper Urban	22.6	15.9	19.4	16.5	15.9
	Upper Rural	46.5	46.7	46.5	46.5	46.7
	Total	19.3	13.3	15.0	14.0	12.7
Poverty rates across all households	Metropolitan	13.3	12.1	12.4	12.4	13.3
	Lower Urban	10.6	9.9	10.3	9.9	10.0
	Lower Rural	16.1	16.3	15.6	15.6	16.4
	Upper Urban	24.8	23.9	24.4	24.0	24.0
	Upper Rural	46.7	46.9	46.0	46.0	47.7
	National	24.4	24.1	23.8	23.7	24.6
Atkinson Index (1)	Metropolitan	0.179	0.162	0.165	0.165	0.161
	Lower Urban	0.108	0.105	0.106	0.105	0.106
	Lower Rural	0.072	0.072	0.071	0.071	0.072
	Upper Urban	0.145	0.134	0.135	0.135	0.135
	Upper Rural	0.080	0.080	0.078	0.078	0.080
	National	0.136	0.133	0.132	0.133	0.131
	Within	0.114	0.108	0.109	0.109	0.108
	Between	0.024	0.027	0.027	0.027	0.026

Source: Own calculations using the HIECS 2013.

/1: Housing services are the interviewee's declared rent as collected in the survey. Estimates from different models are based on predictions of hedonic models under different specifications. Averages are shown, and standard deviations are in parenthesis. /2: Model 1 results are based on one multi-region regression as described in Table A1. Fixed effects for region, owners, owner* region, in-kind dweller, in-kind dwellers* region are included in the regression. Model 2 uses the same multi-region specification but is estimated only with Metropolitan, Lower Urban and Upper Urban regions. Model 3 estimates three region-specific hedonic models for the urban regions. No corrections are done for rural regions. Model 4 uses the estimates from Model 1 and further adjusts the housing services estimates to account for "owner's pride". All models include dwelling type fixed effects.

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Appendix I. Brief description of the poverty measurement in Egypt[16]

The methodology to measure poverty uses the cost of basic needs (CBN) approach and draws largely from the current methodology applied by CAPMAS. This approach defined a poverty line for each household, taking into account each household's location, size, age and gender composition. The implementation of this approach followed these steps:

Step 1. Create a household- and region-specific food poverty line

a) Using tables from the World Health Organization (WHO), caloric needs were separately specified for urban and rural individuals, by gender and 13 age categories. For example, for men over 18 years of age an average weight of 70kg and for women, 60 kg were assumed. Urban individuals were assumed to need 1.8 times the average basal metabolic rate (BMR) and rural individuals were assumed to need twice the average BMR. By adding the caloric requirements of all individuals in the household, a household-specific caloric requirement was obtained (called k_h).
b) Using the nominal consumption expenditure per capita distribution, households in the bottom 40 percent were identified and labeled as the reference group. For households in the reference group, total quantities consumed of all food items (vector Z_r) were calculated to define the reference poverty food bundle. Next, using calories-per-food-item information, the associated total calories of the reference bundle Z_r were calculated (called k_r).
c) The value of the reference bundle Z_r was determined by the cost of purchasing the items belonging to the bundle in each region. That is, for each region, unit values were calculated for each food item and each household. The regional average unit value would then be applied to each item to obtain its representative value in the region. Adding the representative value of each item in the bundle within each region provided the value of the reference bundle.
d) The region-specific cost per calorie of the consumption bundle Z_r is obtained by dividing the region-specific value of the reference bundle by the total calories in the bundle (k_r).
e) The final household-specific food poverty line ($Foodline$) is obtained by multiplying each household's caloric requirements by the region-specific per-calorie cost.

Step 2. Estimate the non-food poverty line using an application of Engel's law

a) A region-specific Engel regression is run with all households in the region as observations. The dependent variable of the regression is the households' food shares of expenditures,[17] while the independent variables included the logarithm of the ratio of total household expenditures and the food poverty line, the square of this logarithm, the logarithm of household size and its square, the share of children, adult males and adult females.
b) For each household, the share of food expenditure for households whose total expenditure is equivalent to the food poverty line was estimated. That is, using the Engel regression's estimates

[16] These steps are a compilation from information obtained in El-Laithy et al. (2003), World Bank (2002, 2007a 2007b, 2010).
[17] Food expenditures include both food to consume at home as well as food purchased away from home.

(i.e. coefficients), a prediction was obtained (call it $\widehat{fs}$) for each household under the assumption that total expenditure was equal to the food poverty line.

c) Finally, the total poverty line associated with each household was obtained by applying the following formula: $Povline = \left(2 - \widehat{fh}\right)Foodline$.

This approach yields household- and region-specific poverty lines, also called *lower* poverty lines. Households were classified as poor whenever the household's total consumption expenditure was below the estimated poverty line. Finally, the national poverty rates were estimated as the share of the population living in households whose total consumption expenditure was below its corresponding poverty line.

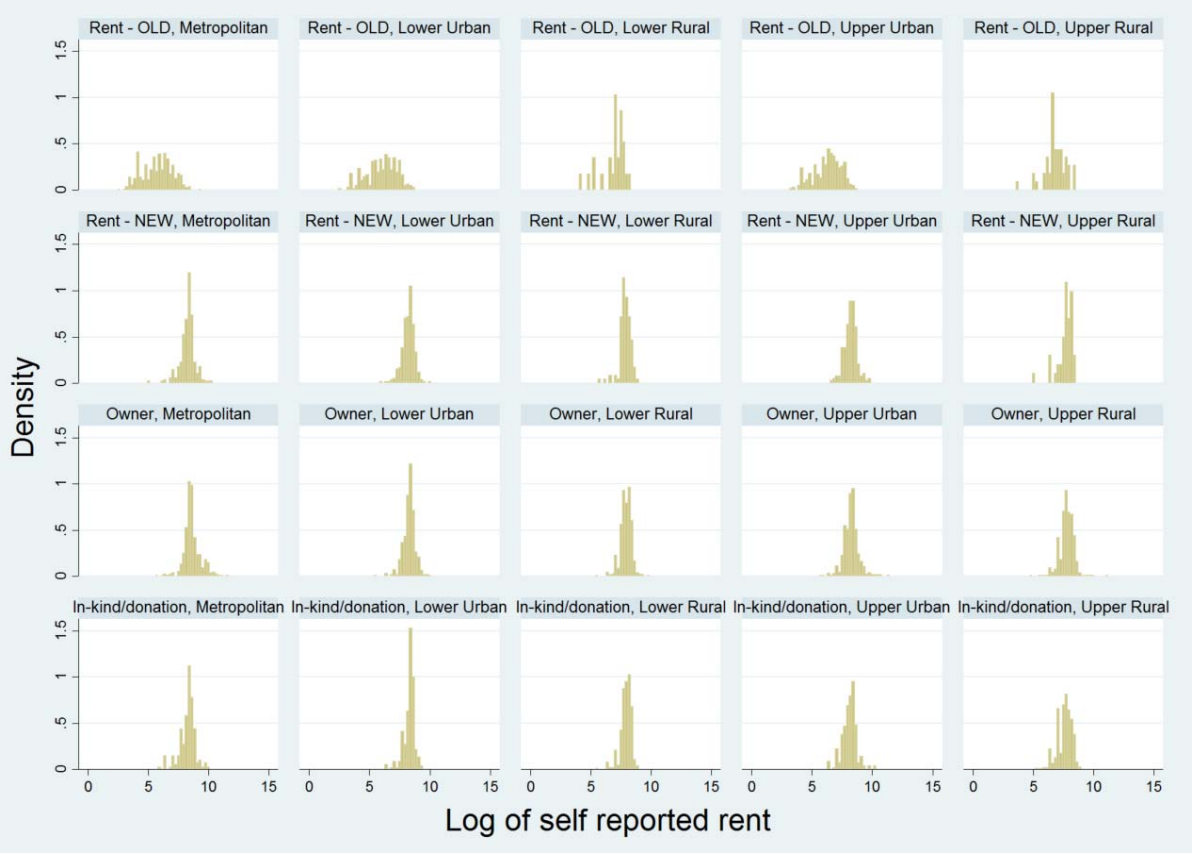
Appendix II. Additional tables and graphs

Table A1. Ordinary Least Squares regression of Hedonic Model

	Log of rent paid
Household size	0.008
	(4.18)**
Housing: apartment, villa	0.175
	(8.19)**
Housing: country house	0.112
	(5.15)**
Number of rooms	0.126
	(9.14)**
Number of rooms sq.	-0.006
	(4.84)**
Area in m2	0.006
	(15.17)**
Area in m2 sq.	-0.000
	(9.57)**
Has tap water in the house	0.068
	(5.80)**
Sewage- connected to public network	0.123
	(8.60)**
Sewage- connected to local network	0.030
	(1.84)
Sewage- connected to trench/private network	-0.013
	(1.04)
Dwelling has brick/cement walls	0.100
	(6.70)**
Dwelling has cement ceiling	0.126
	(10.06)**
Dwelling has ordinary tile floor	-0.217
	(4.20)**
Dwelling has ceramic-tiles floor	-0.034
	(0.65)
Dwelling has concrete floor	-0.329
	(6.37)**
Dwelling has soil floor	-0.370
	(6.98)**
Constant	7.221
	(111.64)**
R^2	0.54
N	12,945

Source: Own calculations using the HEICS 2012/13 data. ** 1% level of significance * 5% level of significance. Notes: The Border Rural region is not included in the regression as there are very few observations on *Old law* renters. Regression include New Law tenants, owners and in-kind recipients. T-statistic in parentheses; Fixed effects for region, owners, owner* region, in-kind dweller, in-kind dwellers* region included.

Figure A1: Distribution of log of self-reported rent across regions and ownership status



Source: HIECS, 2012/13