The sources and effects of rental market underdevelopment in Central Europe. The results of a survey and DSGE model simulations.[☆]

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Abstract

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1. Introduction

The role of housing for macroeconomic stability can not be overstated. According to Leamer (2007) fluctuations in the housing market activity are the core cause of the business cycle, whereas the data on residential investment can be successfully used as an early warning sign of an oncoming recession. In the context of European monetary integration, the high importance of the housing market, which was well described before the launching the euro by Maclennan et al. (1998), has manifested in the form of substantial imbalances and painful adjustment in Spain and Ireland (Conefrey and Gerald, 2010). There are also numerous analyses on the importance of the housing market structure and its dynamics for the transmission of macroeconomic disturbances to the economy, which follow the seminar paper of Iacoviello (2005).

Even though the literature on the role of the housing market in the economy is extensive, the number of studies analyzing the role of the rental market for macroeconomic stability is relatively scarce. Only a handful of papers focus on the relationship between rental market characteristics and the dynamics of the housing sector. Arce and Lopez-Salido (2011) build a theoretical model to show that the availability of rental housing reduces the risk of a house price bubble. In the same vain Rubio (2014) builds a theoretical DSGE model to explore the interaction between housing tenure and monetary policy and shows that a larger size of the rental market makes the monetary policy more stabilizing. This result is confirmed by an empirical study by Cuerpo et al. (2014), who indicate that private rental market regulations, in particular different aspects of rent controls and tenant-landlord regulations, influence the response of house prices to economic and demographic disturbances. Similarly, Czerniak and Rubaszek (2016) find that the size of the rental market has a significant impact on house prices fluctuations and the variability in the construction sector activity in the euro area economies. Finally, a number of studies find that an increase in the availability of rental housing leads to higher population mobility, hence to more efficient allocation of the labor force (Barcelo, 2006; Caldera-Sanchez and Andrews, 2011).

In this context a low share of the private rental market observed in most Central European countries, including Poland, might be considered as a serious structural weakness, and raises two important questions. The first one relates to reasons behind rental market underdevelopment. The literature provides some answers. At a macro level, it has been already shown that the different homeownership rates across European countries can be attributed to the efficiency of institutions, fiscal policies as well as cultural or educational factors (Earley, 2004; Mora-Sanguinetti, 2010).

At a micro level, it has been found that households' tenure choices in European countries are significantly affected by marital status, income, age as well as nationality, where the latter factor can be attributed to cultural or institutional differences (Bazyl, 2009). As for the relative importance of various reasons to own or rent, it is worthy to mention about the study of Ben-Shahar (2007), who indicates that psychological factors are often more important in explaining tenure choices than the economic ones. The second question is what can be done to increase the size of the rental market? This kind of analyses are usually conducted with the help of a theoretical, general equilibrium models. For instance, Gervais (2002) uses a life-cycle model to how changes in taxation affects the housing tenure decision. Contrary, Ortega et al. (2011) build a DSGE model with the rental market to analyze the effects of housing market reforms in Spain. The main finding is that eliminating a subsidy to house purchases or introducing subsidies to rental payments as well as increasing the efficiency in the production of housing rental services raise the share of the rental market.

The contribution of this article is twofold. First, we conduct an original survey among a representative group of 1005 Poles, which allows us to better understand the attitudes of Poles towards various housing tenure choices. In particular, we are able to estimate to what extend the reluctance of Poles towards renting is of economic or psychological nature, similarly to what was done by Ben-Shahar (2007) for ISraeli student. Second, we modify the DSGE model with the rental market proposed by Ortega et al. (2011) and calibrate it to the Polish data. This allows us to conduct several simulations, which are helpful in assessing the effects of potential reforms aimed at developing the rental market. We complement the description of survey results and model simulations with discussion on how to improve the functioning of the rental market in Poland.

The rest of the paper is organized as follows. In Section 2 we describe the history of rental market development in Poland. Section 3 presents the results of the survey. In Section 4 we present the DSGE model and the result of simulations. The last section concludes and provides some interpretation of the results in the form of policy recommendations.

2. Rental market development in Poland

The size of the private rental market in Poland is relatively small compared to other EU countries. According to Eurostat data, in 2014 the share of owners without and with mortgage stood at 72.7% and 10.8%, respectively, which gives the homeownership rate at 83.5%. The share of public and private rental amounted to 12.2% and merely 4.3%, respectively. This points to a serious

underdevelopment of the private rental market compared to the Western EU countries, such as Germany (39.6 %), France (19.3 %) or Italy (14.3 %). At the same time, the size of the private rental market was comparable to other countries in Central and Eastern Europe, except the Czech Republic (Figure 1). Figure 1 also shows that the share of the private rental market is much more developed in the German-speaking countries than in the Anglo-Saxon or Southern European ones. According Elsinga and Hoekstra (2005) this can be explained by institutional and cultural factors. For example, in the Anglo-Saxon countries possessing a house is usually associated with a sense of security, autonomy, personal identity and is considered to be a sign of economic success. As a result a subjective utility from living in a dwelling that is owned is much higher than from living in the same dwelling that is rented. This individual preference is explained by Saunders (1990) in terms of people's possessive instinct and the desire to mark out own territory. The individual preference for homeownership in many countries is reinforced by the housing policy that is based on the assumption that a high proportion of owners has a positive impact on economic and social development. This kind of policy, in the form of fiscal incentives for owners combined with strong protection of tenants at the expense of landlords, stands behind relatively high homeownership rates in the Southern European countries (Mora-Sanguinetti, 2010). In the case of the German-speaking countries the situation is different. The preference for ownership, both at individual and country level, is not so strong as in other places in Europe. At an individual level, a sense of security is provided by a developed social system and high protection of tenants, under which evictions or excessive rents increases are limited. At a country level, fiscal support and good legislation encourage institutional investors to locate funds in the rental housing. As a result, the private rental market is relatively well developed and rent prices are affordable, which allows people to choose more freely on the timing of entering the ownership.

In the case of Poland, as well as other Central European countries, a high proportion of owners and a marginal share of the rental market can be justified by a number of factors. As indicated by Augustyniak et al. (2013) for Poland and Lux and Sunega (2014) for the countries of the region, a very important factor was the transfer of public rental housing into private hands, which took the form of a massive sale to sitting tenants. They could buy occupied apartments at a very discounted price. For Poland this is well illustrated by the Eurostat data, according to which the share of public rental decreased from 34.9% in 2007 to just 12.3% in 2014 (Figure 2). The second factor is related to changes in the mortgage market, in particular a steady decrease of inflation and nominal

interest rates, which in the 1990s often stood at two digit levels, combined with better access to FX denominated loans, especially in Swiss franks. The changes in the financial sector, but also a variety of programs promoting house purchase on credit[1] led to an increase in the proportion of owners with a mortgage (from 2.9% in 2007 to 10.8% in 2014, Figure 2). Third, ineffective regulations are another factor behind the low rental share in Poland and other countries of the region. For example, the excessive protection of "bad" tenants combined with no support for the landlords is increasing the risk of investment in rental housing. This, in turn, is reflected in higher rents and lower supply of houses to let. Another example is the lack of clear regulations related to rent control, which increases the risk of rent increases, hence theoretically should reduce the demand of households for long-term rent in line with the theoretical model of Sinai and Souleles (2005). The lack of consistent housing policy to develop the rental market is nicely summarised by Priemus and Mandic (2000), who claim that in the countries of the region both private and public rental market at the beginning of the twenty-first century was "no man's land". In the case of the private rental market, one could observe the lack of institutional investors specializing in professional rental services. The authors indicate that the private rental market was *de facto* the extension of the ownership, in which the offer is dominated by dwellings uninhabited by the owner (ie. inherited), not "buy-to-let" dwellings.

An open question is about the individual reasons behind low share of the rental market in Poland, as well as in other countries of the region. It is possible that solely financial factors are important, namely that owning is just cheaper option to satisfy housing needs than renting. The alternative is that badly regulated relations between the landlord and the tenant might lead to a situation in which living in a dwelling that is rented is providing much lower utility than living in the same dwelling that is owned. It is also possible that there are strong cultural and psychological factors, which causes that only owning can provide true satisfaction from housing services. The discussion on individual motives that stand behind owning and renting, which is crucial to understand the root causes of rental market underdevelopment, is the subject of the next section of this article.

[1] In Poland there were two such programs. Within the first program, *Rodzina na Swoim* (Family on its Own), the government was subsidising up to 50% of mortgage interest payments for the first eight years after the purchase of an apartment. In 2014 *Rodzina na Swoim* was modified into *Mieszkanie dla Młodych* (Apartment for the Young), in which the government was subsidising downpayment for young families, where the subsidy amounted up to 30% of an apartment value.

3. The survey

In this section we present the results of the unique survey among a representative group of 1,005 Poles. The survey was conducted between 9 and 13 June 2016 within a regular Omnibus CAPI survey by IPSOS Sp. z o.o. The exact content of the survey, which consists of 31 questions, as well as the distributions of answers are discussed in details in Rubaszek and Czerniak (2017). The individual data as well as the survey in online version is available at the webpage of the author.[2] Here we present the selected results, which we consider to be crucial in the context of discussion on the individual reasons behind rental market underdevelopment.

We start with the answers to the question about the tenure status of the occupied dwelling. They indicate that the distribution of households in the survey is broadly comparable to the Eurostat data. In particular, the share of tenants at market price amounts to 5.2%, for tenants at reduced price it is 14.2%, whereas the respective figures for ownership with and without mortgage are 7.8% and 61.6%, respectively. The remaining 11.2% are usually young respondents that live with their parents. An analysis of private market tenants indicates that they are usually unmarried and young (up to 30 years), don't have children, inhabit relatively small dwellings (for over half of respondents the surface was smaller than 45 sq. meters) that are located in one of the biggest cities in Poland. The duration of their residence in the currently occupied dwelling is rather short (for almost three quarters of respondents it is less than 5 years) and they plan to change the address in the short-term horizon (almost half of respondents plan to move within five years). This description fits well students or people who just started their professional careers, for whom renting is a temporary form of satisfying housing needs. It is worth noting that only 11 private market tenants declared that they live with a partner and have at least one child. Out of these respondents, six persons rent because they cannot afford to buy a property, three persons do not want to take a mortgage, one person found an attractive offer and only one person rents because his job requires high mobility. The above characteristics indicate that the private rental market is not treated as a serious alternative to ownership.

To check whether Poles really prefer ownership to renting we have asked three direct questions about potential tenure choice. The distribution of answers is presented in Table 1. The first question was about the preferred tenure choice in case of moving ($TenPref1$). The answers for

[2]The survey was conducted in Polish. The translation into English is available upon request from the authors.

homeowners without mortgage were very skewed towards owning: only 9.0% them indicated renting and 66.9% ownership. Interestingly, among owners with a mortgage the preference for renting was nearly twice larger and amounted to 16.6%, which may be explained by higher awareness about financial disadvantages of servicing a mortgage. The largest percentage of respondents indicating renting as the preferred choice was among the tenants, both private (44.2%) and pubic (42.0%). For all respondents, however, the fraction of people choosing renting (17.3%) was three times lower than those that pointed to owning (58.5%). This result is important in the context of discussions on the policies aimed at the development of the rental market, which should take into account both increasing the supply of as well as stimulating demand for rental housing. As indicated by Coolen et al. (2002), for the latter it is important to create conditions in which property owners are considering renting as an acceptable alternative in case of moving.

In the next question respondents could choose between renting and buying a dwelling on credit ($TenPref2$). Since buying a dwelling on credit is more expensive than if its purchase is financed from savings, it was expected that the percentage of people who would choose owning will be lower than in the case of question $TenPref1$. And indeed, for the entire sample 52.6% of respondents indicated purchasing with a mortgage against 29.7% of people pointing to renting. What is more important, for people aged up to 35 years, i.e. in the age of forming a household, the respective shares were very close to the total sample and amounted to 54.1% and 31.6%. These results indicate that there is a non-negligible group of people who would potentially be interested in renting a dwelling rather than taking a mortgage. In other words, there exists sizeable demand for rental housing.

In the last question we have asked the respondents to answer whether they agree with the following statement ($TenPref3$): *Buying a dwelling is financially better than renting it because after repaying the mortgage you are left with a dwelling and after paying rents you are left with nothing.* After Ben-Shahar (2007) we call this statement as *flawed economic reasoning* because the evaluation of relative financial attractiveness of the two tenure forms should be based on the comparison of the present value of rent payments to the present value of the payments on mortgage loan instalments less the value of the property after the repayment of the loan. It turns out that as many as 78.0% of respondents agree with this statement, while only 10.9% respondents are of different opinion. For tenants the respective shares are less tilted towards ownership, but still amount to 63.5% (agree) and 13.5% (don't agree). It should be pointed out that similar results were

obtained by Ben-Shahar (2007) in a survey among Israeli students (85% of respondents agreed with the statement). Our interpretation is that financial considerations about the relative advantages of both housing tenure options are strongly affected by non-financial factors.

Given that the tenure choice is strongly affected by non-financial factors, it can be claimed that households derive greater utility from living in owned rather than rented dwellings. This hypothesis for selected EU countries is confirmed by two empirical studies based on individual data from Eurostat's European Community Household Survey (Elsinga and Hoekstra, 2005; Diaz-Serrano, 2009). Both articles show that the tenure status significantly affect the answers to the question: *How satisfied are you with your housing situation?*. To explore the relative importance of financial and non-financial factors on tenure choices by Poles, in the survey we have asked a series of questions related to economic and psychological reasons to own or rent. As regards the former, basing on the literature, we have focused on the four following factors (Henderson and Ioannides, 1983; Bourassa, 1995; Sinai and Souleles, 2005):

E1. The relative cost of renting and servicing mortgage

E2. The risk of house prices or rents fluctuations

E3. Transaction costs

E4. Taxes and fiscal incentives

Then, taking into account the results of Coolen et al. (2002) and, above all, Ben-Shahar (2007), we selected the following psychological factors:

P1. Social status

P2. A sense of freedom and independence

P3. Comfort

P4. Peace of mind

P5. The well-being

P6. Attachment to the housing unit

P7. Family

P8. Happiness

The results in Table 2 clearly show that Poles prefer owning to renting both due to psychological and economic reasons. The distribution of answers to question $E1$ shows that 64.0% of respondents

think that servicing a mortgage is cheaper than paying a rent, whereas 12.6% is of the opposite opinion. Moreover, answers to $E@$ demonstrate that for a dominant part of respondents (65.6%) the risk of rent changes is higher that the risk of house prices fluctuations. This means that for most Poles renting is considered to be less attractive financially than owning. As regards the eight psychological factors, the distribution of answers is broadly similar for all of them: about 70% of respondents prefer owning and about 10% of them indicate renting, whereas about 20% has no opinion. These shares would indicate that psychological factors are even more important for tenure decision than the economic ones. The result that is worthy to emphasise is that for question $P7$ the shares are the most tilted towards owning, which indicates that Poles do not consider rented dwellings to be a good place for a family.

To assess the relative strength of economic and psychological factors on tenure preferences among Poles we have conducted a series of logit regressions in which the dependent variable was a dummy indicating that a given household would choose renting rather than owning. The classification was done on the basis of answers to questions $TenPref1$, $TenPref2$ and $TenPref3$. For convenience, below we describe when we assign the unity value for the dependent variable:

TenPref1: A person prefers renting in case of moving.

TenPref2: A person prefers renting to mortgage in case of no funds to buy a dwelling.

TenPref3: A person do not agree with the *flawed economic reasoning* sentence.

The explanatory variables of our interest are the answers to economic and psychological questions, which have described above. Given that the answers were highly correlated, to avoid multicollinearity problem, we applied the principal component analysis. In particular, we took the first factor for $E1$-$E4$ ($EconFact$) and $P1$-$P8$ questions ($PsychFact$). Next, taking into account the discussion by Ben-Shahar (2007), who states that our economic beliefs are strongly influenced by psychological ones, to measure the true impact of economic beliefs on tenure preferences, we took the residuals from the regression of $EconFact$ on $PsychFact$. Finally, the both factors were standardised so that the estimates of the parameters could be compared. As regards control variables, following the studies by Bourassa (1995); Coolen et al. (2002); Andrews and Sanchez (2011), we have included demographic characteristics (age, marital status, a variable that indicates whether an individual arrived from another city), income (given the low quality of income data in our database, we used

the level of education to describe the financial position of a household), the size of the town of a household's residence as well as the current tenure status.

The results of the three logit regressions are presented in Table 3. They show that both economic and psychological factors are significant for tenure preferences in all regressions. As regards their relative importance, the results vary with the choice of the dependent variable. For $TenPref1$ the estimates for $EconFact$ and $PsychFact$ parameters are broadly comparable and amount to 0.522 and 0.596, respectively. This means that the intended housing tenure choice in case of moving is to the same extent determined by economic and psychological considerations. If the question is changed into whether to rent or buy with a mortgage ($TenPref2$), financial considerations become more important. The estimate of the parameter standing at $EconFact$ doubles and amounts to 1.122, whereas the parameter at $PsychFactor$ is almost unchanged and stand to 0.664. This should not be surprising as buying a dwelling on credit is more expensive than if the purchase is financed from owned funds, hence economic advantage of owning becomes less pronounced. Contrary, in the third regression psychological factors clearly dominate the economic ones: the estimates of the respective parameters are 1.333 and 0.589, respectively. This confirms that the *economic wisdom* we often believe in are not based on thorough calculations but rather on our psychological beliefs. This also applies to the housing tenure choices in Poland. Finally, while describing the results of the logit models, it can be noted that their fit, as measured by pseudo R^2, count R^2 or AUROC, is satisfactory.

At the end, we have asked a series questions that could help to assess which factors are the main hindrance to the rental market development. The upper panel of Table 4 analyses the barriers to demand for rental housing. It shows that among factors that are considered to decrease the comfort of being a tenant the most important ones are related to how the rental market is organised and regulated. In the former case, more than half of respondents agrees that tenants are excessively constrained in arranging the interior of the rented apartment and landlords are inspecting housing units too often. This lack of professionalism among individual landlords obviously decreases satisfaction from living in a rented apartment as compared to owning it. In the latter case, also more than half of Poles agrees that inefficient regulations related to rent control and tenant protection are decreasing the comfort of renting. It should be noted that regulations protecting tenants against the risk of rent increase or unexpected eviction are of crucial importance for developing the market for households that plan long-term rental. Finally, the level of rents and the offer of dwellings for

rental also turned out to be important, albeit to a lower extent than the previous factors. The lower panel of Table 4 analyses the barriers to the supply of rental housing. It demonstrates that the main factor that decrease the attractiveness of investment in houses to let is related to the low culture of tenants. This, combined with high protection of "bad" tenants against eviction, causes that the risk of investing in rental housing in Poland is high. This, in turn, leads to lower supply and higher level of rents on the private market.

To sum up, the results of the survey lead to the following conclusions. Poles strongly prefer owning to renting. This can be explained by both, economic and psychological factors. As regards the former, the level of rents is high in comparison to the cost of owning. This is due to the "bad tenant" risk of investing in rental housing as well as fiscal policy that is tilted towards owning (this will be discussed in the next section). On top of that, the financial attractiveness of renting is further diminished by false economic reasoning, for instance that paying rent is a waste of money. In the case of psychological factors, many Poles do not consider rental housing as a serious alternative to owning in case of a long-term stay, especially if the household is a family with children. This might be partly explained by inefficient regulations as well as low professionalism of landlords, which decrease satisfaction from living in rented dwellings.

4. A model

In this section we propose a model that will be used in the next section to asses the effects of changes in the organisation of the housing rental market. To be more precise, we evaluate the impact of three reforms:

i. Decreasing the impact of "bad tenant" risk on the level of rents.
ii. Removing fiscal incentives to own.
iii. Increasing the professionalism of landlords, hence eliminating psychological disadvantages of renting.

on the size of the rental market as well as the dynamics of key macrovaraibles, including those that describe the dynamics of the housing sector.

The proposed model is based on the framework of Iacoviello (2005), whereas the description of the rental market is closely related to the recent works by Ortega et al. (2011) and Rubio (2014). The main structure of the model is as follows.

1. There are two types of consumers: savers and borrowers, which differ in their discount factors.
2. Borrowers face collateral constraints when applying for a mortgage.
3. There are two production sectors: the construction and the consumption goods sector.
4. Housing can be purchased or rented.
5. Savers are the landlords in the economy and provide rental services to borrowers.
6. There are fiscal incentives to house purchases and to rentals, in the form of subsidies and taxes.

A more elaborated description, with optimisation problems is presented below.

4.1. Savers

Savers maximize their utility from consumption $C_{s,t}$, housing services $H_{s,t}$ and working hours $N_{s,t}$:

$$\max E_0 \sum_{t=0}^{\infty} \beta_s^t \left(\log C_{s,t} + j \log H_{s,t} - \frac{(N_{s,t})^{1+\eta}}{1+\eta} \right), \tag{1}$$

where $\beta_s \in (0,1)$ is the discount factor and E_0 the expectation operator. $1/\eta > 0$ is the labor supply elasticity and $j > 0$ constitutes the relative weight of housing in the utility function. $N_{s,t}$ is a composite of labor supply to the consumption ($N_{cs,t}$) and housing sector ($N_{hs,t}$),

$$N_{s,t} = \left[\omega_l^{1/\varepsilon_l} \left(N_{cs,t}\right)^{(1+\varepsilon_l)/\varepsilon_l} + (1-\omega_l)^{1/\varepsilon_l} \left(N_{hs,t}\right)^{(1+\varepsilon_l)/\varepsilon_l} \right]^{\varepsilon_l/(1+\varepsilon_l)}, \tag{2}$$

where ω_l is a weight parameter and ε_l the elasticity of substitution between both labor types.

The budget constraint is:

$$\begin{aligned} C_{s,t} + b_{s,t} + q_{h,t} \left[(1-\tau_h) \left(H_{s,t} - (1-\delta_h) H_{s,t-1} \right) + \left(H_{z,t} - (1-\delta_z) H_{z,t-1} \right) \right] \leq \\ \frac{R_{t-1} b_{s,t-1}}{\pi_t} + w_{cs,t} N_{cs,t} + w_{hs,t} N_{hs,t} + q_{z,t} H_{z,t} + S_t + T_t, \end{aligned} \tag{3}$$

where $q_{h,t}$ is the real housing price, $w_{cs,t}$ and $w_{hs,t}$ denote real wages, whereas $N_{cs,t}$ and $N_{hs,t}$ are labor supply in the consumption and the housing sectors, respectively. Savers can purchase or sell houses either to live in ($H_{s,t}$) or to rent it $H_{z,t}$ at price $q_{z,t}$. δ_h and δ_z are the depreciation rates for owner-occupied and rented dwellings, respectively. They might differ due to the "bad tenant" risk,

which was discussed in the previous section. We allow for the existence of tax incentives to own, in particular a subsidy τ_h. Next, the level of savings is given by $b_{s,t}$ and the risk free interest rate by R_{t-1}. π_t is the inflation rate at period t. Finally, S_t are the profits of firms and T_t a lump-sum government transfer.

The first-order conditions for this optimization problem are as follows.

$$\frac{1}{C_{s,t}} = \beta_s E_t \left(\frac{R_t}{C_{s,t+1}\pi_{t+1}} \right) \tag{4}$$

$$\frac{j}{H_{s,t}} = (1-\tau_h) \left[\frac{q_{h,t}}{C_{s,t}} - \beta_s (1-\delta_h) E_t \left(\frac{q_{t+1}}{C_{s,t+1}} \right) \right] \tag{5}$$

$$\frac{q_{h,t}}{C_{s,t}} = \frac{q_{z,t}}{C_{s,t}} + \beta_s (1-\delta_z) E_t \frac{q_{h,t+1}}{C_{s,t+1}} \tag{6}$$

$$\frac{w_{cs,t}}{C_{s,t}} = (N_{s,t})^{\eta} \omega_l^{1/\varepsilon_l} \left(\frac{N_{cs,t}}{N_{s,t}} \right)^{1/\varepsilon_l} \tag{7}$$

$$\frac{w_{hs,t}}{C_{s,t}} = (N_{s,t})^{\eta} (1-\omega_l)^{1/\varepsilon_l} \left(\frac{N_{hs,t}}{N_{s,t}} \right)^{1/\varepsilon_l} \tag{8}$$

Equation (4) is the standard Euler equation for consumption. Equations (5) and (6) represents the intertemporal condition for housing purchased to own and let, respectively. In these equations benefits of purchasing a housing unit equate the alternative costs of forgone consumption. Finally, equations (7) and (8) describe the labor-supply conditions for consumption goods and housing sector.

4.2. Borrowers

Borrowers solve a similar optimisation problem as savers:

$$\max E_0 \sum_{t=0}^{\infty} \beta_b^t \left(\log C_{b,t} + j \log \widetilde{H}_{b,t} - \frac{(N_{b,t})^{1+\eta}}{1+\eta} \right), \tag{9}$$

where $\beta_b < \beta_s$ is the discount factor, and

$$N_{b,t} = \left[\omega_l^{1/\varepsilon_l} (N_{cb,t})^{(1+\varepsilon_l)/\varepsilon_l} + (1-\omega_l)^{1/\varepsilon_l} (N_{hb,t})^{(1+\varepsilon_l)/\varepsilon_l} \right]^{\varepsilon_l/(1+\varepsilon_l)}. \tag{10}$$

The key in the optimisation problems of savers and borrowers is that $\tilde{H}_{b,t}$ is a composite of owned housing purchased with a mortgage ($H_{b,t}$) and rental housing ($H_{z,t}$):

$$\tilde{H}_{b,t} = \left[\omega_h^{1/\varepsilon_h} \left(H_{b,t}\right)^{(\varepsilon_h-1)/\varepsilon_h} + \left(1-\omega_h\right)^{1/\varepsilon_h} \left(H_{z,t}\right)^{(\varepsilon_h-1)/\varepsilon_h}\right]^{\varepsilon_h/(\varepsilon_h-1)}, \tag{11}$$

The parameter ω_h is very important in our analysis, as it approximates the preference for owning a house (purchased on credit) versus the rental housing. In turn, ε_h describes the elasticity of substitution between preferences for owner-occupied housing and rental. In this way, borrowers derive utility from the two types of housing. It should be emphasized that that this does not literally mean that each borrower lives simultaneously in their own house and in a rented house. Instead, the interpretation is that there exists a large representative borrower-type household with a continuum of members, some of whom live in owner-occupied houses, the rest of whom live in rented houses. This composite index in the equation thus represents the aggregate preferences of all household members with respect to each kind of housing service.

The budget constraint and the collateral constraint for the borrowers are as follows:

$$\begin{aligned} C_{b,t} + \frac{R_{t-1}b_{b,t-1}}{\pi_t} + q_{h,t}\left(1-\tau_h\right)\left(H_{b,t} - \left(1-\delta_h\right)H_{b,t-1}\right) + q_{z,t}\left(1-\tau_z\right)H_{z,t} = \\ = b_{b,t} + w_{cb,t}N_{cb,t} + w_{hb,t}N_{hb,t} \end{aligned} \tag{12}$$

$$b_{b,t} \leq E_t\left(\frac{1}{R_t} k q_{h,t+1} H_{b,t} \pi_{t+1}\right) \tag{13}$$

where $b_{b,t}$ represents the level of debt and k is a maximum loan-to-value ratio. The first-order conditions of this maximization problem are:

$$\frac{1}{C_{b,t}} = \beta_b E_t\left(\frac{R_t}{C_{b,t+1}\pi_{t+1}}\right) + \lambda_t, \tag{14}$$

$$\frac{j}{\tilde{H}_{b,t}}\left(\frac{\omega_h \tilde{H}_{b,t}}{H_{b,t}}\right)^{1/\varepsilon_h} = \left(1-\tau_h\right)\left(\frac{q_{h,t}}{C_{b,t}} - \beta_b\left(1-\delta_h\right)E_t\frac{q_{h,t+1}}{C_{b,t+1}}\right) - \lambda_t k E_t q_{h,t+1}\frac{\pi_{t+1}}{R_t}, \tag{15}$$

$$\frac{j}{\tilde{H}_{b,t}}\left(\frac{(1-\omega_h)\,\tilde{H}_{b,t}}{H_{z,t}}\right)^{1/\varepsilon_h}=(1-\tau_z)\,\frac{q_{z,t}}{C_{b,t}} \tag{16}$$

$$\frac{w_{cb,t}}{C_{b,t}}=(N_{b,t})^{\eta}\,\omega_l^{1/\varepsilon_l}\left(\frac{N_{cb,t}}{N_{b,t}}\right)^{1/\varepsilon_l}, \tag{17}$$

$$\frac{w_{hb,t}}{C_{b,t}}=(N_{b,t})^{\eta}\,(1-\omega_l)^{1/\varepsilon_l}\left(\frac{N_{hb,t}}{N_{b,t}}\right)^{1/\varepsilon_l}, \tag{18}$$

where λ_t is the Lagrange multiplier of the collateral constraint. The above conditions can be interpreted analogously to those for the savers. The most important difference is in demand equation for owned and rented housing (15 and 16), which mow equates the marginal utility from housing services (and the marginal value of housing as collateral in the case of (15)) with the alternative cost of forgone consumption.

4.3. Firms

The intermediate,consumption goods market is monopolistically competitive. Individual firm production function is:

$$Y_t(z)=A_t\left(N_{cs,t}(z)\right)^{\gamma}\left(N_{cb,t}(z)\right)^{(1-\gamma)}, \tag{19}$$

with $\gamma\in[0,1]$ measuring the relative size of each group in terms of labor. A_t represents technology, which is an autoregressive process $\log A_t=\rho_A\log A_{t-1}+u_t$ with normally distributed shocks. The symmetry across firms allows avoiding index z and re-writing the above equation in the form of the aggregate production function for consumption goods.:

$$Y_t=A_tN_{cs,t}^{\gamma}N_{cb,t}^{(1-\gamma)},. \tag{20}$$

The intermediate housing investment goods market is also assumed to be monopolistically competitive and subject to the same technology shock A_t. The aggregate production function for housing investment is therefore:

$$IH_t=A_tN_{hs,t}^{\gamma}N_{hb,t}^{(1-\gamma)}, \tag{21}$$

Intermediate goods producers maximize profits:

$$\max_{N_{cs,t},N_{hs,t},N_{cb,t},N_{hb,t}} \frac{Y_t}{X_t} + q_{h,t}IH_t - w_{cs,t}N_{cs,t} - w_{hs,t}N_{hs,t} - w_{cb,t}N_{cb,t} - w_{hb,t}N_{hb,t}, \tag{22}$$

where X_t is the markup that is equal to the inverse of real marginal costs. The first-order conditions are the following:

$$w_{cs,t} = \frac{1}{X_t}\gamma\frac{Y_t}{N_{cs,t}}, \tag{23}$$

$$w_{cb,t} = \frac{1}{X_t}(1-\gamma)\frac{Y_t}{N_{cb,t}}, \tag{24}$$

$$w_{hs,t} = \gamma\frac{q_{h,t}IH_t}{N_{hs,t}}, \tag{25}$$

$$w_{hb,t} = (1-\gamma)\frac{q_{h,t}IH_t}{N_{hb,t}}, \tag{26}$$

The price-setting problem for the intermediate-goods producers is a standard Calvo-Yun case. They sell goods at price $P_t(z)$. They can re-optimize the price with $1-\theta$ probability in each period. The optimal reset price $P_t^{OPT}(z)$ solves:

$$\sum_{k=0}^{\infty}(\theta\beta)^k E_t\left\{\Lambda_{t,k}\left[\frac{P_t^{OPT}(z)}{P_{t+k}} - \frac{\varepsilon/(\varepsilon-1)}{X_{t+k}}\right]Y_{t+k}^{OPT}(z)\right\} = 0. \tag{27}$$

The aggregate price level is thereofre:

$$P_t = \left[\theta P_{t-1}^{1-\varepsilon} + (1-\theta)\left(P_t^{OPT}\right)^{1-\varepsilon}\right]^{1/(1-\varepsilon)}. \tag{28}$$

By combining (27) and (28) and log-linearizing, we can obtain the standard forward-looking Phillips curve.

4.4. Monetary authority and equilibrium conditions

The central bank sets interest rates according to a Taylor rule:

$$R_t = (R_{t-1})^{\rho} \left[\pi_t^{(1+\phi_\pi)} \left(\frac{Y_t}{Y_{t-1}} \right)^{\phi_y} R \right]^{(1-\rho)} \varepsilon_{R,t}, \tag{29}$$

where $0 \leq \rho \leq 1$ is the parameter associated with interest rate smoothing. $\phi_\pi > 0$, $\phi_y > 0$ measure the interest rate response to inflation and output, respectively. R is the steady-state value of the interest rate. $\varepsilon_{R,t}$ is a white noise shock with 0 average and σ_ε^2 variance.

The equilibrium condition for the consumption goods and housing investment markets are:

$$Y_t = C_{s,t} + C_{b,t} \tag{30}$$

$$IH_t \equiv (H_{s,t} - (1-\delta_h) H_{s,t-1}) + (H_{b,t} - (1-\delta_h) H_{b,t-1}) + (H_{z,t} - (1-\delta_z) H_{z,t-1}). \tag{31}$$

Finally, the equilibrium government budget constraint is:

$$T_t = \tau_z q_{z,t} H_{z,t} + \tau_h q_{h,t} \left[(H_{s,t} - (1-\delta_h) H_{s,t-1}) + (H_{b,t} - (1-\delta_h) H_{b,t-1}) \right]. \tag{32}$$

5. Reforming the rental market

Calibrating the model

We calibrate a subset of parameters to match a number of features of the Polish economy. Firts of all, the weight parameters in the CES baskets of housing services ω_h is set 2/3 on the basis of answers to the $TenPref2$ question from the survey (Table 1). The parameters describing the labor market were fixed at $\omega_l = 0.14$ and $j = 0.06$ so that the share of labor in the construction sector stood at 7.6%. The value of j parameter, together with depreciation rates at $\delta_z = 1\%$ and $\delta_h = 0.75\%$ quarterly, were additionally fixing the residential investment to GDP ratio at 3.3%, close to the 2007-2015 avarage from the OECD data. The discount factor β_s was set to 0.995 so that, taking into account the value of δ_z, the ratio of quarterly rents q_z were equal to 1.5% of house value, in line with the National Bank of Poland data presented in quarterly reports "Information

on home prices and the situation in the housing and commercial real estate market in Poland". As regards parameters describing regulation, we set the LTV parameter m to 0.8, in line with the current restrictions related to the maximum LTV, and took into account that landlords have to pay 8.5% turnover taxes ($\tau_z = -0.085$). Finally, give all the above parameters, we have set the share of savers to be $\gamma = 2/3$, so that the share of the rental market stood at 6.8%, in line with the survey data (if we exclude public rental). The above choice implies that the share of owners with a mortgage is 17.2%, much more than in the survey (10.4% if we exclude public rental). We have decided that this share share is higher than what is observed in the data as the mortgage markets in POland was almost non-existent before 2004, hence it is difficult to claim that the current share is the steady-state value.

The remaining parameters are set to standard values in the literature. For borrowers, we use a slightly lower discount factor than the one of the savers, in line with the literature on DSGE models with housing and financial frictions. Following Horvath (2000), we set the elasticity of substitution between labor types, ε_l, to one. For the elasticity of substitution between services from home ownership and renting, ε_h, we follows Ortega et al. (2011) and take the value of 2 in order to make households more sensitive to the relative price of houses and rents than would be the case under lower values. The value for the elasticity of substitution among final goods, $\varepsilon_p = 6$, implies a markup of 20% in the steady state, a value commonly found in the literature. The probability of not changing prices, θ, is set to 0.75, implying that prices change every four quarters on average. The coefficients in the Taylor Rule are set to 0.9 for the lagged interest rate and 0.5 for inflation and output, respectively, as proposed in the seminal paper by Taylor. The values for the above parameters are reported in Table 5. The resulting model steady-state ratios, compared to their data counterparts, are presented in Table 6. It shows that the model reproduces the average proportion of residential investment over GDP, 3.4% (3.3% in the data) , as well as the weight of employment in construction over total employment (7.7% in the model, 7.6% in the data). The rental share in the model is 6.9% (consistent with the 6.8 %, found in the survey), whereas the share of housing with mortgages is 17.2% in the model, above the number found in the data (10.4%) due to reasons discussed above.

Impulse-responses to a monetary shock

In order to assess some of the dynamic properties of the model, here we present figure 3, which shows impulse responses to a one standard deviation shock to the nominal interest rate.[3] Following the monetary policy tightening, GDP, inflation and real house prices all go down, as expected. The increase in the cost of mortgages leads borrowers to substitute away heavily from house purchases and increase their demand for rented houses. This is reinforced by two effects. First, rental rates go down, which in turn is due to the fact that landlords expect a quick recovery in real house prices following the shock. Second, the fall in real house prices reduces the collateral value of housing, thus limiting borrowers' access to credit and further reducing their demand for mortgaged housing. The increase in residential investment is driven by the strong increase in the demand for rented houses.

Steady state analysis

In this section, we use the DSGE model previously described to evaluate the effects on the main macroeconomic variables of interest of introducing some sets or reforms in the rental market. In particular, we focus on the quantitative effects on removing fiscal incentives to own, what we call the "neutral fiscal policy" scenario, increasing the protection of landlords, and lowering the disutility of renting. In terms of the model, this would correspond to setting taxes equal to zero, lowering the depreciation of rental services, and lowering the preference parameter of owner-occupied housing, respectively. We display the consequences of these reforms on steady-state values and on the dynamics of the model.

5.1. Effects on the Steady State

In order to assess the long-run impact of the proposed measures, we compute the steady state effects of the alternative policy scenarios. The results for the key variables and ratios are displayed in Table 7. Specifically, in the second column of the table we present the results for fiscal policy reform that removes all subsidies and taxes. The third column displays the steady-state values associated with better protecting the landlords against the "bad tenant" risk, which is proxied by a reduction of δ_z to the level of $delta_h$. In the fourth column, we present the effects of professionalizing

[3] In figure 3, the nominal interest rate and inflation are shown in absolute deviations from steady state and in annualized terms; all other variables are shown in percentage deviation from steady state.

rental services, which is represented by lowering the disutility of renting through shifting the weight ω_h in the housing CES aggregator. The fifth column presents the combined effect of the above three reforms.

We can observe that the first reform, moving to a neutral fiscal policy with no subsidies on housing markets has relatively small effects on the overall economic activity although it contributes to increasing the housing rental share. This measure implies a reallocation of the available housing stock from the ownership to the rental segment of the market. In particular, the rental share in the housing market increases to 7.7%. On the contrary, borrowers reduce their holdings of mortgaged houses, such that the share of mortgaged houses in the total housing stock falls. The effects of the second reform, which is increasing the protection of landlords against bad tenants, are quite similar, in the sense that the overall economic activity is not affected much and the largest effect is the reallocation of the housing stock from the ownership to the rental segment. Finally, an increase in the household preference for renting has also similar effects to the other two measures. It increases the size of the rental market and lowers the amount of houses that are purchased with a mortgage. This measure brings the strongest effects, although it is more difficult to implement because it implies changing preferences or cultural factors. The last column displays the combined effects of all three reforms. Since they have effects that go in the same direction, we see that the housing rental share would increase from a value of 6.8% to 15%, which is a sizable increase. These measures would contribute to enhance the size of the rental markets in Poland.

6. Conclusions and policy recommendations

The share of the rental housing market in Central European countries, including Poland, is very low. This might be explained by the fact that, as described by Priemus and Mandic (2000), the rental market is "no man's land". In this paper we have explored the reasons behind this state of affair using individual data from the unique survey that was conducted in June 2016 among the representative sample of 1005 Poles. We have found that private tenants are usually young, unmarried persons with low income, who can not afford to buy a dwelling. The rental market is treated a short-term, temporary solution, and not as a vital alternative to ownership for a longer stay. The results of the survey has also allowed us to confirm the thesis that the preferences of Poles are strongly tilted towards owning. The results of logit regressions, as well as the distribution of answers to selected questions, indicate that these preferences are strongly influenced by economic

and psychological beliefs. Poles perceive ownership not only as a cheaper form of satisfying housing needs, but also as the only way to provide a safe place for the family and to really "fell at home". The survey also allows us to identify the most important barriers to demand for and supply of rental housing. Among the former, inefficient institutions and the lack of professional renting services turned out to be the most important. In the case of the latter, the low culture of tenants combined with their high protection seems to dominate.

Given the above diagnosis, in the second part of our study we have proposed a DSGE model with rental housing and collateral constraints and calibrated it to the Polish data. Next, we have used the model to quantify the effects of three reforms of the rental market: (i.) removing the "bad tenant effect" on the level of rents, (ii.) equalising fiscal incentives for different types of housing tenure, and (iii.) improving the standard of rental services leading to a shift in housing tenure preferences. All three reforms lead to an increase in the share of the rental market. Our computations indicate that introducing the three reforms would shift the rental share from 6.8% to 15.0%. Moreover, we show that reforming the rental market is also beneficial for macroeconomic stability [extend this part].

The above results justify why developing the rental market in Central European countries should be considered as a top priority for housing policy. Moreover, based on the results of the study we may formulate a number of recommendations for housing policy. First of all, lowering the relative cost of renting in comparison to owning seems to be one of the key factors. This could be achieved by introducing smart regulations protecting landlords against "bad" tenants, which would limit the risk associated with investing in rental housing that is included in the level of rents. Eliminating fiscal measures promoting ownership would also help. Second, stimulating the professionalization of renting services would contribute to changing psychological attitudes towards renting. This could be achieved by encouraging professional investors that specialise in managing and building rental housing, but also by supporting associations of individual landlords or rental management companies. Third, smart regulations that protect "good" tenants against the risk of large rent increases or unexpected eviction would increase the sense of security and stability of the rent contract. This would reduce one of the most important barrier to demand for rental houses: the belief that renting is not a stable form to meet housing needs. Finally, it is worth mentioning that the decision about buying a dwelling is often based on the "false economic reasoning". This might lead to the conclusion that education or information campaign about advantages and disadvantages

of different forms of housing tenure could contribute to the increase in demand for rental as well as better housing choices of households.

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Table 1: Tenure preferences by tenure status
(% shares of answers for households with a given tenure status).

	tenant		**owner**		**total**
	private	public	mortgage	no mtg.	
TenPref1. Preferred tenure choice in case of moving to a new dwelling					
renting	44.2	42.0	16.6	9.0	17.3
buying	34.6	28.0	74.4	66.9	58.6
don't know	21.2	30.0	9.0	24.1	24.1
TenPref2. Preferred tenure choice in case of no own funds to buy a dwelling					
renting	50.0	61.5	19.2	21.6	29.7
buying with mortgage	38.5	25.2	78.2	55.6	52.6
don't know	11.5	13.3	2.6	22.8	17.7
TenPref3. Flawed economic reasoning					
agree	63.5	69.2	89.7	80.8	78.1
don't agree	13.5	18.9	7.7	8.2	10.9
no opinion	23.1	11.9	2.6	11.0	11.0

Note: The question that we call *flawed economic reasoning* is as follows: *Buying a dwelling is financially better than renting it because after repaying the mortgage you are left with a dwelling and after paying rents you are left with nothing.*
Source: The results of the survey.

Table 2: Economic and psychological factors influencing housing tenure preferences.

	owning	no opinion	renting
Economic factors			
E1. Mortgage / rental costs	64.0	23.4	12.6
E2. Risk of house price / rent fluctuations	65.6	22.8	11.6
E3. Transaction costs	62.1	26.1	11.8
E4. Taxes	61.0	25.3	13.7
Psychological factors			
P1. Social status	70.8	19.5	9.7
P2. Freedom and independence	71.1	16.5	12.3
P3. Comfort	71.6	17.0	11.3
P4. Peace of mind	70.9	17.8	11.2
P5. Well-being	71.5	17.9	10.5
P6. Attachment to dwelling	70.1	18.5	11.3
P7. Family	72.6	18.0	9.4
P8. Happiness	68.8	21.1	10.1

Source: The results of the survey.

Table 3: Determinants of tenure preferences in a logit model).

	TenPref1	TenPref2	TenPref3
Psychological and economic factors			
Psychological	0.522***	0.664***	1.333***
Economic	0.596***	1.122***	0.589***
Demographic factors			
age	-0.023***	0.004	0.006
kids	-0.070	0.084	0.060
migration	0.431***	-0.087	0.404
Town size			
large	-0.213	-0.345	-0.285
medium	-0.355	-0.270	-0.325
Marital status			
single	0.035	0.206	0.548
divorced	0.674*	0.123	-0.055
widow	0.774**	-0.100	0.519
Education			
medium	-0.047	-0.166	-0.072
high	-0.109	0.174	-0.162
Current tenure status			
private tenant	0.884**	0.493	-1.137**
public rental	1.140***	1.243***	-0.396
owner	-0.569*	-0.340	-0.715**
mortgage	0.163	-0.332	-0.741
Nobs	1005	1005	1005
Pseudo R^2	0.196	0.238	0.263
Count R^2 (Cramer method)	0.735	0.735	0.765
Count R^2(Threshold at 0.5)	0.85	0.802	0.896
AUROC	0.795	0.811	0.856

Source: Calculations on the basis of the results of the survey.

Table 4: The reasons of rental market underdevelopment in Poland

	Agree	No opinion	Don't Agree
Factors decreasing the comfort of being a tenant			
Tenants are too much constrained in arranging apartment	56.8	30.2	12.9
Landlords are inspecting the apartment too often	53.3	34.4	12.2
Tenants are not well protected against rent increases	56.2	31.0	12.7
Tenants are not well protected against eviction	56.7	31.1	12.1
Rents are too high in comparison to mortgage installment	53.9	33.3	12.7
The offer of dwellings to rent is too scarce to meet preferences	46.8	35.9	17.3
Factors decreasing the attractiveness of investing in rental housing			
Low culture tenants	62.6	28.9	8.6
Excessive rent control	50.3	37.2	12.4
Excessive protection of tenants against eviction	40.3	43.6	16.1
Low rate of return	39.4	47.3	13.3
Low demand	44.0	41.6	14.4

Source: Calculations on the basis of the results of the survey.

Table 5: Calibration of the DSGE model

Parameter	**Value**	**Description**
β_s	0.995	Discount factor of savers
β_b	0.985	Discount factor of borrowers
j	0.06	Relative weight on utility from housing services
ω_l	0.14	Weight parameter in labor services aggregator
ω_h	2/3	Weight parameter in housing services aggregator
ε_l	1	Elasticity of substitution between labor types
ε_h	2	Elasticity of subst btw. home ownership and rent
η	1	Inverse elasticity of labor supply
ε_p	6	Elasticity of substitution among final goods
γ	2/3	Savers labor-income share
δ_h	0.75%	Depreciation rate of the housing stock
δ_z	1.00%	Depreciation rate of the rental stock
m	0.8	Makimum LTV ratio
θ	0.75	Calvo parameter
τ_h	0	Subsidy rate house purchases for owner occupation
τ_z	-0.085	Subsidy rate on rent payments (here taxes)
ϕ_R	0.9	Coefficient on lagged nominal interest rate in Taylor rule
ϕ_Π	0.5	Coefficient on inflation in the Taylor rule
ϕ_Y	0.5	Coefficient on output in the Taylor rule

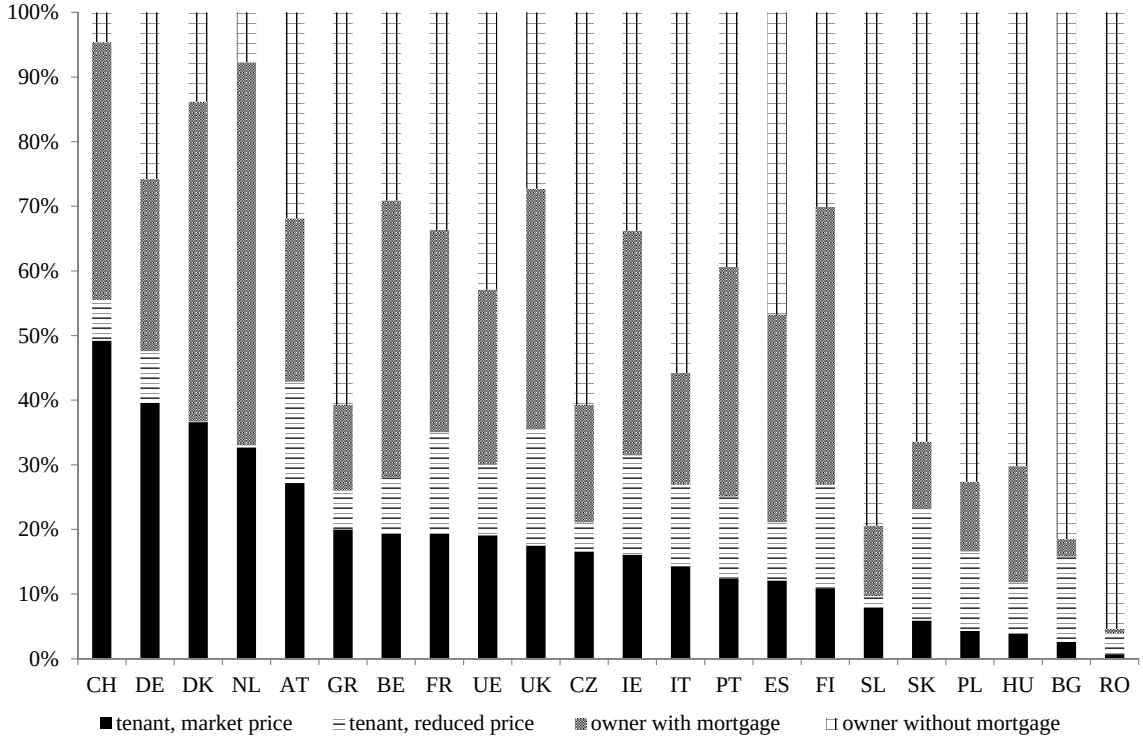
Table 6: Steady State Ratios

	Data	**Model**	**Data Sources**
Housing rental Share, H_z/H	0.069	0.068	Survey data
Share of housing w/ mortgage, H_b/H	0.104	0.172	Survey data
Rent over housing price, q_z/q_h	0.015	0.015	National Bank of Poland, 2007-2015
Residential investment / GDP, $q_h IH/GDP$	0.033	0.034	OECD, 2007-2015
Construction labor share, $L_{h/}(L_c + L_h)$	0.076	0.077	OECD, 2007-2015

Table 7: Steady-state effects of rental market reforms

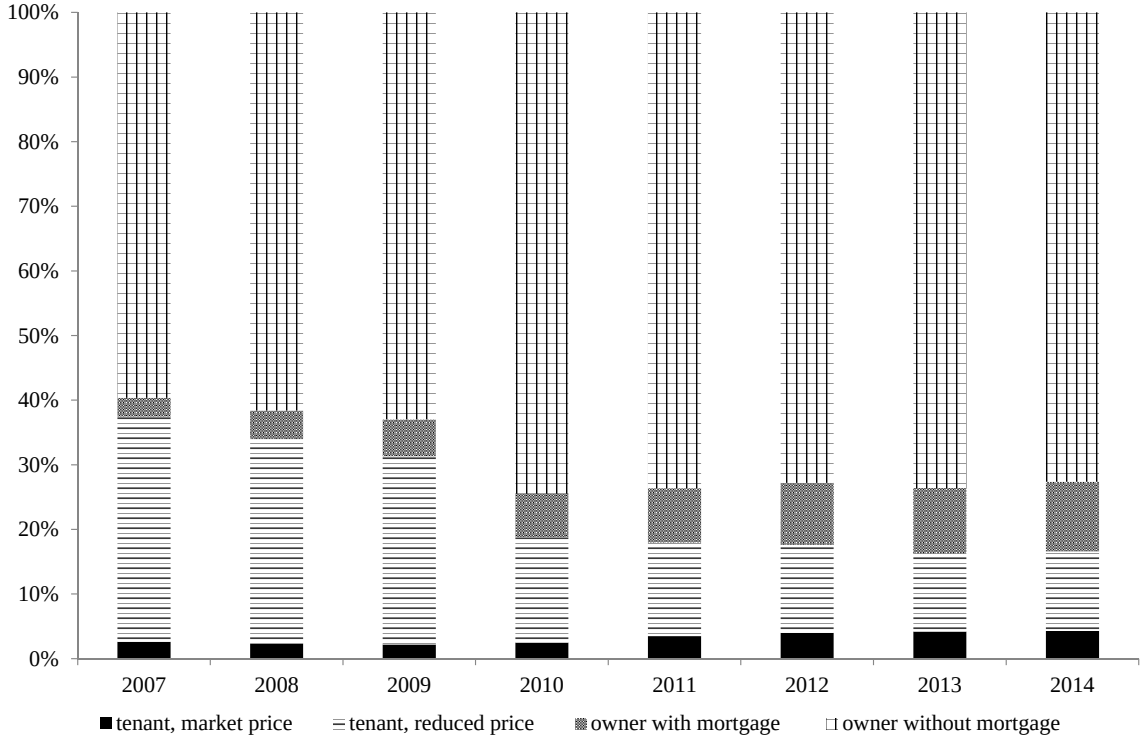
	Benchmark	Neutral taxes $\tau_z = 0$	Lower bad tenant risk $\delta_z = 0.75\%$	Professional rental services $\omega_h = 0.5$	Combined
Housing rental Share	0.068	0.077	0.091	0.104	0.150
Share of housing w/ mortgage	0.172	0.167	0.160	0.132	0.113
Rent over housing price	0.015	0.015	0.0125	0.015	0.0125
Residential investment / GDP	0.034	0.034	0.034	0.034	0.034
Construction labor share	0.077	0.077	0.076	0.077	0.077

Figure 1: The structure of housing tenure status in European countries in 2014.



Source: Eurostat.

Figure 2: The structure of housing tenure status in Poland over 2007-2014.



Source: Eurostat.

Figure 3: Impulse responses to a monetary policy shock.