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The thesis investigates interesting, original and relevant topics in real estate. Models and derivations are well done, showing a lot of originality in the way they are devised, even if there are many ad hoc assumptions.

However, there are too many typos and spelling mistakes.

In general, the introduction should not be a review of literature. It is indeed important to highlight the novelties of the paper relatively to past literature, but I feel that, especially in paper A and B, the introduction is too long. The literature could be discussed in a new section or when introducing the model.

A. Welfare effects of housing price appreciation in the economy with binding credit constraints

This paper is very interesting, and well derived. However, because of its completeness, I prefer paper B since it is derived in a general equilibrium context. But still, this paper brings forth interesting results on the links between housing price appreciation and welfare. It could be a good analysis of what happened during the sub-prime crisis in the US, by modeling a sudden decrease in house prices and low interest rates.

The author should give a clear definition of an individual that is credit constrained. In this paper's context, I understand that it only means that there is a binding credit constraint added in the maximization problem. But the concept of credit constraint is also used in other field of economics, with a different definition (such as the question of SME and banking relationships). He should also be clear on the difference between credit constraint and binding constraint.

For instance, in p. 3, 65% of owner occupied housing is mortgage-financed does not seem like a proof of the importance of credit constraints. If I could pay a house in cash, I might still prefer to take a loan at a low interest rate and invest the cash in some higher yield alternative investment.

Moreover, by law, individuals are required to pay a certain percentage of the house value as a down payment. Hence, m is always less than 1. Suppose that this minimum requirement is 10%. Then, a credit constrained individual is also one having $m < 0.9$.

In the section with endogenous prices, the author systematically compares the constrained and the unconstrained model. But in the section with exogenous prices, only the constrained model is derived and the reader is referred to Bajari et al. for the unconstrained model. Would it be possible to print (or derive from his model) the Bajari et al. equation also?

p. 2: “the necessity to buy a larger house in the future”. In reality, this should be seen as adding value to the house, by enlarging it or by making some renovations. In reality, the size of a house does not necessarily grow with age (on the contrary).

p. 5: what is a “judicial taste”?

When discussing the review of literature, the author should sometimes give the intuition of the results (or explain the working of the model). For example, in p. 5, second para., why should a negative supply-side shock decrease welfare? This result seems intuitive, but is it? Other example: p. 1: Why Campbell and Cocco (2005) have different results than Li and Yao (2004) for young homeowners? Give a small explanation of the results of these two papers.

x_t and s_t are flows, while b_t and h_t are stocks.

Are the transaction costs implied in the model necessary? We can also think that there are transaction costs for buying the composite good. Without loss of generality, these transaction costs could be retrieved in the derivations. They do not seem to change the results, except in the final computations. They are even abstracted in p. 24.

In the first version of the model, houses do not depreciate, while bonds depreciate with the inflation. Hence, the model could be simplified by taking only nominal interest rates.

p. 9: “Combining the above equations”: which ones?

p. 9: give briefly the intuition why the expression is unambiguously lower than in Bajari et al. I guess that it is because there is no m in Bajari...

p. 10. first para, last line: what is the benchmark paper? Bajari et al. ?

Margin clause and Kiyotaki-Moore constraint: which one is more realistic for the US case?

p. 13, first para: “several empirical papers have demonstrated...” Where are the citations?

Equation (17): ρ is the AR(1) coefficient?

Equation (18): the author does not show that the equation is negative. Are there conditions under which the negative effect of increase in house prices outweighs the positive effect of relaxing the credit constraint?

Footnote 4 + assumption that all households are net borrowers are a bit far-fetched. This is the reason why I prefer the general equilibrium model.

p.14: in total welfare, the direct effect of a price increase (each unit of real estate cost more) vanishes since the welfare lost by those households that buy real estate is equal to the welfare gain of those households that sell real estate, when the stock of house is kept constant, right?

p.15, second para. Start this paragraph by saying that now you will quantify the result of (19). Also, mention that you will study the US case, since you take parameters coming from US case. You could also put the quantification into the US specific context.

p. 15: second para: “(look in the introduction) “ should be replaced by “as explained before in the introduction”.

p. 15: would it be possible to discuss the assumptions about the value of the parameters? I understand that for γ and ω , the parameters are justified by Li and Yao (2004). Can you give briefly the logic? What about β ?

p. 22: why start the welfare analysis by looking at the effect of an increase in n ? Are there other sources of supply shocks in the model?

p. 23: justification for ω should be given here, not latter.

p. 23: the result without credit constraint is given by equation (31), not (32). Also, (32) is the same as (30).

p. 23: I do not see what is the 5-th term in equation (32). Maybe you could identify each term using braces under the equation and denote them by numbers or letters, or define the equations with more brackets to identify more easily each term.

p. 23-24: give an intuition for the results obtained for the welfare loss. In the model without credit constraints, I guess that it is just the negative direct effect on housing consumption from an increase in prices due to an increase in n ? But what about with credit constraints?

p. 23: equation (39) is for consumption, not housing... See equation (38). Similarly, p. 24, equation (39) is for consumption.

p. 24: where is equation (33)? It is equations (30) and (31) that should be compared...

p.24 and 25: the results for the discount rate come from which equations? Can you give an intuition of the difference between both discount rates?

p. 25: why is the interest rate higher in the economy with binding credit constraints?

p. 25: why set beta at 0.96?

p. 26: “looking at the steady state allocations in the appendix”: which equations exactly? Similarly, p. 28, “using the steady state derived in the appendix”: which equations exactly?

p. 29: “the income effect usually dominates the substitution effect”. Is this a standard result for the housing market? Citations?

p. 28: can you interpret further equations (33) and (34)? For example, describe all the channels by which an increase in income affects welfare. Again, you could use braces under the equations to identify the terms.

p. 29: Change in the interest rate: this issue is very interesting notwithstanding what actually happened in the USA. There is a link to be made with the effects of monetary policy on welfare through the housing market... But note that there could be a correlation between the evolution of interest rate and income growth...

p. 30: can you interpret equations (35) and (36)? For example, describe all the channels by which an increase in interest rates affects welfare.

p. 32: I am not convinced by the assumption that younger households are credit constrained. Older individuals might be richer, but they are also more likely to buy bigger or more expensive houses. In proportion, the ratio of borrowing to wealth should be similar.

p. 32; last line. This assumption holds if the model is complete. There is no information on building permit costs? Indeed, the computed change in permit costs of 58.8% seems implausible.

I do not think that it is necessary to try to compute the exact cumulative welfare effects for the USA. The model is interesting by itself. What matters here is the working of the model: what happens to welfare if the different parameters of the model change? It is OK to take parameters coming from the US case, as an illustration. But, for instance, the author could check the effect of a change in building permit costs for different values, given the US statistics for the other parameters. Similarly, it would be interesting to compute the welfare change for different parameter values, given the others. For instance, what will happen when interest rates will increase again?

p. 33: “elasticities with respect to income changes are quite high”. What is the intuition?

B. Welfare effects of housing price changes in the general equilibrium setting

This paper is very interesting. Because the model is derived in a general equilibrium setting, I prefer this paper to the previous one. The calibrations at the end of the paper, and their explanations, are very interesting not because of the particular numbers obtained, but because they show the working of the model. I think that an improved version of this paper should be the author's job market paper.

But unfortunately, it is not well written in English. There are many spelling mistakes and typos. The syntax is not always appropriate.

This is a paper with a lot of large equations, with many parameters. Hence, they are sometimes hard to interpret by just looking at them. No reader will try to solve the entire model. Therefore, if the author intends to submit this work to a journal, he should consider creating an appendix containing most of the derivations. But in the main text, he should discuss and give the intuition of the main equations that drive the model. The model is interesting beyond the calibration. Similarly to my comments about the previous paper, the US case should be computed as an illustration. But more generally, the author should investigate a change of welfare for different values of the parameters.

In addition, the reader can easily get lost with all the symbols. The author could help the reader by referring to the different equations not only by numbers, but also by their name or concept (budget constraint, price equilibrium, profit-maximizing quantity, etc.) when possible.

p. 1: prices really decreased by 100%?

p.2: how can households loose from the decrease in interest rates?

p. 3. last sentence: what is the difference between the direct general equilibrium effect and the first effect considered in Tsharkyan (2007) in a few words?

p. 5: Cobb-Douglas function: where N =labor and K =capital...

p. 5: explain the equation for z and, at p. 7, the equation for η .

p. 5: equations (1) and (2): where r = rental price of capital, and w =wage.

What is the numeraire here? The consumption good?

p. 6: for the residential good production, bricks and concrete can be considered as intermediate goods...

In fact, I do not quite understand the difference between residential goods and housing units... So, bricks, concrete and permits are intermediate goods entering the production

of residential goods, which are intermediate goods entering the production of housing units (with land)? Why so many levels? Why not merge these two sectors by directly adding land to the production function of residential goods?

The assumption of different rates of time preference between constrained and unconstrained households seems a bit ad hoc. Normally, the equilibrium interest rate is set so that the demand for funds equates the supply of funds, given initial wealth.

If $m=1$, then the household is unconstrained? Again, a formal definition of credit constraints is needed here...

p. 8: why make m a stochastic variable? This is an over parameterization... The author can simply change the value of m in the calibration section. So, the value of m depends on the availability of credit? Is this supposed to be an exogenous variable?

p. 9, equation (9), the value function does not depend on c ?

p. 10: so, K is the stock of capital, and in is the flow of capital?

p. 10, last line. Capital is not denoted by h ...

p. 12: first equation after section 3: this inequality comes from which equations? If the intertemporal MRS is higher than the real rate of return of bonds, this means that the constrained households would like to borrow more...

Binding credit constraint means $b=mqh$ with strict equality?

p. 15: alpha is not missing in equation (37)?

p. 16, the definition of ϕ corresponds to the allocation between manufacturing and services.

p. 16: why is it that p_m has a negative effect on k ?

p. 21: tildes are for variables in log? The loglinearization should definitively be put in an appendix.

p. 24: it would be nice to have a table defining each parameter for the calibration, the assumption about their value, and the source of the assumption. The assumptions about the value of m are based on what?

p. 24: what is a Dynare toolbox?

p. 24, last line: the sentence in parenthesis should not be in parenthesis, but it should be stated at the very beginning of this section to be clear.

p. 25: how is calculated the change in lifetime expected utility? This change was precisely derived in the previous paper...

p. 25, first para, last line: what is the difference between this result and the previous sentence?

p. 25: what are the effects of the increase in borrowing (first para, for constrained households)?

p. 25: In this page, the author shows the working of his model. But it would be nice to also see this from the equations...

C. The effect of mortgage origination fees on the housing price dynamics

This is an interesting and original topic that has not been investigated by the past literature. I appreciate the justification of the paper in the introduction. The effects of fees are indeed a good object of study.

Introduction: again, it seems that the introduction is also a detailed review of literature. The introduction should only show that the previous literature has not analysed the subject of fees.

p. 3: about the paper of Jud and Winkler (2002); how can the fixed-effect capture changes in metropolitan-specific construction cost, since it is a fixed-effect? The equation is in a growth format?

p. 5: why this emphasis on the lagged effect of mortgage fees? I think that in the abstract and in the introduction, it is sufficient to only mention that mortgage fees have an effect on prices.

The fact that the variations in mortgage fees are caused mainly by exogenous factors is well justified in the text and interesting. And it is important to minimize endogeneity problems (which will be statistically rejected anyways). Good point.

In the Monthly Interest Rate Survey, what is the exact sample size for each year?

p. 7: relationship between fees and interest rates. Why not simply compute the correlation in time? Show the graphs of both series to visually inspect the situation.

p. 11-12: the effect of the removal of branching restrictions. This could eventually be tested. First, find the existence of a break (structural change, change in the trend or in the level) in the series. Second, this break should coincide with the date of the change in branching restrictions.

p. 13: demand equation. Real wealth could also be measured by the size of other investment markets (government bond market for instance).

p. 13: supply equation. There is an opportunity cost of supplying housing.

p. 14: “log-arithmetic transformation is applied to all variables...”. Would read better as: “all variables are taken in logs, except those defined in percentages (mortgage fees, unemployment rate and user costs).”

p. 14: Im-Pesaran-Shin test. There are two reasons for testing for stationarity. First, to test the assumption that a series evolves in a stationary way (the PPP hypothesis for instance), this assumption coming from a theoretical belief. Then, the panel test is useful. A single series might not be stationary because of some idiosyncratic factors, but in panel, the evidence on the other series brings more robust results. Second, to avoid the spurious regression problem. If two series have a unit-root, the regression of one series on the other might be spurious. The problem is that even if the panel test rejects the unit-root, two single series might still have individually a unit-root and the result will still be spurious. Hence, in this case, I prefer to use the individual ADF unit-root test. In any way, the author is interested in the evolution in time. Hence, the equation is taken in first-difference and this usually gives stationary variables.

p. 14: note that the first-difference operator usually subtracts out the fixed effects. These might thus appear as being insignificant.

p. 14: the CC variable and real wealth variable are computed at the national level. Then, there will be no big difference between these variables and a simple time trend or some period dummies. In general, since the panel is at the MSA level, it is always problematic to have many variables at the national level.

p. 14: again, the fixed-effect is fixed by definition. I do not understand then the subscript t in $\Delta M_{j,t}$.

p. 15: last sentence of first para.: short-run effect. This is indeed important to mention this to avoid any discussion on cointegration...

p. 15: robust estimation. About the footnote: it is not necessary to explain which command in STATA has been used. Just mention the type of robust variance estimator that is used by STATA. About the clustering by MSA: can the author explain this point?

p. 16: in the CPI statistics, is there a category that could proxy the growth in construction costs?

p. 17: the equation defining user costs: in econometric terms, this is equal to:

$$C = \beta_1 i + \beta_2 i \tau^y + \beta_3 \tau^p + \beta_4 \tau^p \tau^y + \beta_5 \delta \quad \text{with the assumption that } \beta_i = \beta \text{ for } i=1, \dots, 5.$$

Then, instead of creating a single index, one could also add to the econometric model the interest rate, the property tax, the income tax and the depreciation rate separately, assuming $\beta_i \neq \beta_j$. Moreover, can the author put some time and MSA index in the

equation for each parameter? The depreciation rate is constant in time, but not the interest rate...

p. 17: Emrath (2002) and Harding et al (2004) are not cited in the bibliography.

p. 17: the author takes the state property taxes from Emrath (2002). But where does Emrath (2002) take these statistics from? Does he estimate figures? Constructs figures?

p. 29: table 3. After the name of the variables in the left column, indicate the index (it, or only i or only t), just to be clear. Show R-squares. Put stars besides the coefficient to indicate significance in the usual way (*=10%, **=5%, ***=1%). Indicate F-test for joint significance of year dummies and MSA dummies. It is also interesting to print the results of year dummies and MSA dummies to see if particular years or MSA stand out.

p. 18: indicate at the beginning that specification (2) includes year dummies.

p. 18: instead of writing "and t statistic is 2.59", it would read better as: "and significant at the 1% level".

p. 18 "and the statistical significance in specification with year dummies is included". There is a word missing somewhere in this sentence.

p. 18: Show some statistics indicating that interest rates do not vary much across MSA... Then, the non-significance of interest rates could come from the addition of the fixed effects.

Model with lagged variables: why only 1 lag? How to choose those variables that should be lagged? Why not use criteria such as Akaike? Why not put both values at time t and t-1? Which model is better: with or without lagged variables?

Where are the results with variables in two-year moving average? Is it the variables in level that are averaged or the variables in first-difference?

p. 20: "supply side factors were more significant". Use another word for "significant" to avoid confusion with statistical significance.

p. 20: as a robustness check, it is OK to check for endogeneity. But the story is not very plausible. I do not believe that fees will evolve according to demand. Competition is the main driver here explaining the level of fees. Moreover, this relationship between demand and fees can be tested (correlation, regression, visual inspection in a graph, etc.). In addition, the exogeneity story is very plausible and endogeneity between fees and demand is rejected.

p. 20: endogeneity test: why not use the concept of Granger causality?

p. 20: do not mention Wooldridge. This is a reference book.

p. 21: the main instrument is a simple dummy variable. This means that the regression involves a constant and a change of this constant for the year when the branching restrictions are removed. This is not much in a regression. I would like to see the R2 of this regression (Table 5). The R2 should be very low. Then, the instruments are very weak. By the way, the inclusion of these dummy variables in the fees equation is the same as testing for a structural change at the year when the branching restrictions are removed.

p. 21: why put lagged variables in the fees equation? Why are these exogenous variables?

D. Rent de-regulation, tenure choice, real estate price expectations, and consumption

The investigation of the effects of de-regulation in the Czech Republic is very relevant, especially since this market represents a nice natural experiment. But, I find that this paper is the weakest of all four papers. The study on tenure choice is interesting, but the empirical model is not justified by the literature.

Moreover, the section on price expectations brings no real contribution. As long as there is a difference between rents of regulated apartments and unregulated ones (which is not shown in the paper by the way), and that the government has a target for regulated rents and their appreciation, it is trivial that prices are expected to increase more rapidly for regulated apartment than for unregulated ones.

However, this paper has important policy implications. These should be discussed more at length. This is the main interest of the paper.

In this paper, the word “than” is often mixed up with “then”.

Data: the sample size is unclear. So, there are three periods (three two-year panels, 05-06, 06-07 and 07-08) and 3300 households? Then this is not a panel, because with three periods, it is not enough to estimate a fixed effect.

p. 1: I do not see the usefulness of the discussion about other similar databanks.

p. 2: the explanation starting on the 7th line (“An increase in the rental costs...”) should be said at the very beginning when tenure choice is discussed (p.1 line 11 for instance).

p. 2, last line of 2th para: discuss more fully what the policy implications are. This is the main justification of the paper.

I am OK with the assumption that the legal system can be considered as being constant. But in a transition country, this assumption can be discussed...

p. 3: I do not see why a AR(1) process corresponds to a unit root testing.

The introduction goes into too many technical details that are difficult to understand before reading the full methodology.

p. 3: last line of first para: is this a result or an assumption?

p. 3: does this paper really investigate the collapsing bubble in the Czech Republic? From the introduction, it is difficult to identify the exact objective of the paper (objectives seem to go in different directions) when in fact, the author will later show that there is a link between tenure choice, prices and consumption. This link should be explained at the very beginning.

p. 4: “rent regulation welfare improvements”. Something is wrong with this sentence. The welfare improvements come from where?

p. 6: what is the intuition behind the result of Li and Yao (2005)?

p. 6: “one of the few exceptions is a study...”. Exception in which sense?

p. 6: “whether households with mortgages are more financially vulnerable than renters or owners”. This is trivial, no?

p. 6: why is it that the study finds it difficult to explain tenure choice?

Is it possible to buy regulated apartments? Why should someone do this?

Section 2.4: the author should cite his own papers on the subject!

p. 9: the regulated apartments can or cannot be passed on to family members? It is unclear reading the sentence...

I do not see how regulated apartments have created a shortage. Does it mean that some people living in regulated apartments would have moved in a house or in some other city if not regulated? But at the same time, in a transition country, there are important investments in real estate along with the existing stock of regulated apartments, no? What prevented the construction of new unregulated apartments?

p. 9: can we have some evidence about the increase of rents in the Czech Republic?

p. 9: “regulated apartments were given to original owners”. Previous owners or tenants went where? Were they compensated for?

p. 9: why did the government attempted to re-instate the regulation? Is there a rational for this? Only political issues?

p. 9: P is the average price?

p. 10: what is the “old methodology” concerning the survey?

p.11 : I do not see how can there be 6 two-year panels of data between 2005 and 2008...
The description of the sample is unclear.

p. 11: the discussion on data is difficult to follow without having seen the models...

p. 12: why is it that income is higher for households in regulated apartments?

p. 12: what is the Czech Trade Bank?

p. 12: line 20: “We can see that the price has increased”. We can see this from Figure 1?

p. 12: “the regulated rents appreciated much faster than market rents”. Can we have some statistics about this? A graph?

p. 13: second line of section 5: does the author really consider the probability of owners staying an owner?

p. 13: the survey follows a given household or dwelling? If a household moves, the survey will follow it? How can the survey people know where they have moved?

p. 13: equation (3): in the panel, there are more than one period. So, how to interpret $t+1$?

P13: if the author could have all the RHS variables for both groups, the logit could have been estimated for both groups at the same time. Then a dummy variable for the unregulated households could have been added to the regression.

Tenure choice model: all the variables used in the model have been also used by previous literature? It would be nice to mention this.

p. 14: why age squared?

p. 14: how are the geographical locations defined? Are there location fixed effects?

p. 14: the legally given regulated rent appreciation could have an ambiguous effect on tenure choice. On the one hand, it is true that an increase in rents will push renters to become owners. But the appreciation is based on prices. If prices increase, this decreases the probability of being owners...

Table 3: I do not understand how we get the number of observations per regression. If we can follow 80% of the households throughout time, why not estimate the model for all years?

p. 15, first sentence: this result is only true for regulated apartments...

p. 15. Where are the results for the choice of owners staying owners? Why should higher prices affect the decision of owners? They have already bought the dwelling...

p. 15. Where are the probit results? What regression is the best, probit or logit?

Section 6. At first, introduce again what you are going to do in this section.

p. 16, the expression for the inter-temporal marginal rate of substitution comes from where? It is sufficient to mention the inter-temporal marginal rate of substitution, without any expression. And similarly with the next sentence: just mention that preferences are risk neutral.

p. 16: k corresponds to what? And I do not understand the reason why k is set to 4 in p. 17.

p. 16: sales tax and real estate agent fees: these are average figures for the Czech Republic?

p. 16: I do not understand how you adjust the interest rate for given years...

p. 17, line 6: if d represents the down payment, it should not have t as a subscript.

p. 17: prices follow an AR(1) process. I am OK with this assumption, but can you justify it?

p. 17: if $t=2006$, k is equal to?

p. 19: I understand the concept of present value for owners who buy a dwelling. But how to interpret the present value of renters?

Table 4: are the differences between switch and no switch significant? The probability shown in Table 4 stands for what?

p. 19, last line: why are these numbers reasonable?

p. 20, 4th line: "greater than before", Before what?

p. 20: consumption equation. This equation comes from where? Literature? Economic model?

p. 20: I do not see where the sample selection bias could come from in this setting...

p. 20: there are not enough periods to estimate a fixed effect efficiently.

p. 20 equation (23): consumption was not in the tenure choice model of section 5. Why do we need to separate the effects of income and consumption here and not before? I do not understand why equation (23) is so different from the model in section 5. Why is the family structure endogenous???

p. 21: I do not understand why using the interest rate makes it difficult to calculate the growth rate. A 1% percentage point increase in the interest rate (not taken in logs) should have some percentage point effect on growth... By taking mortgage payments, there is a level effect that depends on prices, a variable that also appears in equation (23).

p. 21: third line: "While we do have this information..." What information?

p. 21: why take the first difference?

p. 21: I do not understand what is MRA. If you have market rents, why not use them?

p. 21: justify the assumption on $\delta_4=0$ and $\delta_5=0$

p. 21: can we see the results for the first regressions of the 2SLS? Are these instruments good ones?

p. 21: what are the expected coefficient signs for each variable?

p. 21. second line of last para: "Appreciating real estate results in a ..." What variables are we talking about?

p. 22: the negative α_2 . How can we test this assumption? Non-linear estimations?