

Advisor's Report on Dissertation Thesis

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| Author: | Olha Khymych |
| Advisor: | Milan Ščasný Ph.D. (IES) |
| Title of the Thesis: | Residential energy consumption in Ukraine: Does energy price matter for energy savings? |
| Type of Defense: | DEFENSE |
| Date of Pre-Defense | April 26, 2023 |

Olha Khymych's thesis consists of three nicely well-linked chapters that deal with residential energy demand in Uzhorod, Ukraine, using the data from several waves of an original survey she personally carried out. The first chapter analyses the own price elasticity of residential electricity demand when households faced an extreme increase in electricity prices (2013-2016). This research has been published in the top journal *The Energy Journal* (Q2, AIS=1.015). The second chapter aimed at the estimation of own price elasticity of residential natural gas demand, again when households were exposed to extreme increases in NG price in Ukraine. This study has been published in the top economic policy journal *Energy Policy* (98th percentile, AIS=1.538). Both of these articles, co-authored by Professor Anna Alberini and myself, were presented in numerous scientific conferences and also published as working papers.

The third chapter looks closer at energy efficiency measures which households adopted in their dwellings. It describes these measures by type and their costs and examines which households invested in them. This part of the thesis is less sophisticated than the previous two chapters; still, it is a very useful piece of research considering the literature from this location is very scarce. In my opinion, describing the investment costs by the type of measure and looking closely at the frequency and timing of the investment – several measures were invested in steps, rather than at once, within a 3-years time window – presents the most valuable result of the third study. The version included for the Final Defense has improved considerably, considering all the comments raised by the reviewers before the Pre-Defense. I acknowledge a few comments have not been possible to incorporate fully because of the different objectives and focus of the survey which provided the data (it primarily aimed at analysing electricity and NG demand rather than motives and barriers of energy efficiency investment). This is also the reason why the presented analysis is a bit limited with respect which controls and which models can be included. I note that a part of the questions raised during the Pre-Defense refer to Olha's previous (unpublished) analysis "*The Elusive Effects of Residential Energy Efficiency Improvements*" (USAEE Working Paper No. 19-397; <http://dx.doi.org/10.2139/ssrn.3373720>), which looked closely at the effect of thermal insulation on gas use (resulting in no significant effect after properly controlling for the fixed effects). This result may be either due to small sample size or step-by-step adoption of energy efficiency measures.

Overall, I consider the presented research package an excellent dissertation outcome.

Olha has been also very active in research community – she has presented the research outcomes at numerous scientific conferences, she has been involved in the PRIMUS project (REGEC) and GACR EXPRO funded project (FE3M), moreover her research was granted from Charles University's Grant Agency. Olha also spent a considerable part of her PhD studies on research visits abroad ("secondment"), including University of Maryland, USA (Jan-May 2018) and University of Auckland's Energy Center (February-July 2020). Results from this research have received an attention from international organisations, for instance, World Bank.

a) *Can you recognize an original contribution of the author?*

The presented research aimed at consumers' response to energy price changes that were extreme. During the period 2013–2016, electricity and gas prices increased dramatically —by several hundred per cent in nominal terms— partly as a consequence of the deteriorating relationship and eventual conflict with Russia, which cancelled

deliveries to Ukraine, and also because to help the utilities cover their costs from selling energy that had been highly subsidised. Unlike other parts of Ukraine, the Zakarpatska region completed disconnecting dwellings from district heating in 2012, resulting in everyone had installed and had been using their own separate heating systems. All of these changes meant a great research opportunity. Olha brought this idea on the table and was very active in coordinating the data collection during several years that was not at all easy.

This research is also unique with respect to the data and the research focus. The presented analysis heavily relies on the dwelling-specific monthly energy billing data, as provided by residential customers, which include very detailed information about electricity and natural gas consumption and expenditures, and benefits (tariff's discount) and (lump/sum) energy-subsidies for every month during long time period (2013-2017). Moreover, data on energy-efficient home retrofits, including their costs, were gathered for these dwellings. All of these data came from an original survey that was conducted in Uzhhorod—the capital of Zakarpatska region in Ukraine—and that was carried out by, and under her ordination. To improve sampling strategy and data quality, three linked waves of data collection were carried out in 2016, 2017, and 2019.

Although the literature on residential energy demand is enormous, there is still limited knowledge about consumer responsiveness within such extreme conditions as the one that happened during the 2010s in Ukraine. This dissertation has contributed significantly to covering this gap.

b) Is the thesis based on relevant references?

Yes, the thesis refers to the literature that is relevant and the key to its research parts.

c) Is the thesis defendable at your home institution or another respected institution where you gave lectures?

Yes, it does – two articles have already been published in two top-field journals; the last may be published in an energy efficiency-related journal after minor revisions | editing. In my opinion, this thesis can be defended at the IES and also at the *Prague University of Economics and Business* and *Faculty of Economics at Warsaw University*, where I am also affiliated. This thesis might also be defendable at *The Energy Center at the University of Auckland*, where the preliminary work was presented and discussed with my presence during her secondment.

d) Do the results of the thesis allow their publication in a respected economic journal?

Yes, no doubt – two articles have already been published in high-rated top-field journals: *Energy Journal* and *Energy Policy*. The third manuscript on the energy efficiency investment has the potential to be published in an energy efficiency-related journal, after a minor editing.

e) Are there any additional major comments on what should be improved?

I have no further comments.

f) What is your overall assessment of the thesis? (a) I recommend the thesis for defense without substantial changes, (b) the thesis can be defended after revision indicated in my comments, (c) not-defendable in this form.

I recommend this thesis for defense without substantial changes.

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| Date: | 12 December 2023 |
| Advisor's Signature | |
| Advisor's Affiliation | Milan Ščasný Ph.D. (IES) |