



# UKRAINE

## TECHNICAL ASSISTANCE REPORT—REPORT ON RESIDENTIAL PROPERTY PRICE INDEX CAPACITY DEVELOPMENT MISSION

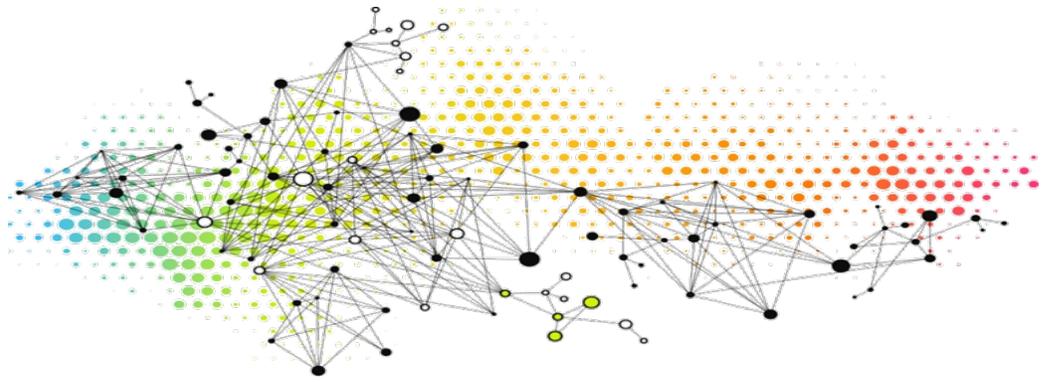
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## REPORT ON RESIDENTIAL PROPERTY PRICE INDEX CAPACITY DEVELOPMENT MISSION (JUNE 18–22, 2018)

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## Glossary

CPI	Consumer Price Index
JVI	Joint Vienna Institute
MOU	Memorandum of Understanding
OOH	Owner Occupied Housing
RPPI	Residential Property Price Index
SEIC	State Enterprise Information Center
SSSU	State Statistics Service of Ukraine
TA	Technical Assistance

## SUMMARY OF MISSION OUTCOMES AND PRIORITY RECOMMENDATIONS

- 1. A technical assistance (TA) mission was conducted during June 18–22, 2018 to support the State Statistics Service of Ukraine (SSSU) in improving the residential property price indexes (RPPI) for Ukraine.** This was the second of a series of SECO2 RPPI-funded TA missions to take place until mid-2019 that will assist in building staff capacity for further development of the RPPI. RPPIs have been identified as critical ingredients for financial stability policy analysis. The indexes are used by policy makers as an input into design of macroprudential policies, that is, those policies aim to reduce systemic risks arising from “excessive” financial procyclicality (such as asset bubbles). RPPIs are also used by policy makers to inform monetary policy and inflation targeting.
- 2. In line with the recommendations from the previous mission, and ahead of schedule, an experimental overall national RPPI has been compiled.** The authorities have used administrative data on the size of properties registered, combined with a survey covering the construction of new homes, to estimate the relative sizes of primary and secondary markets. The estimated weights remain susceptible to outliers, in particular, errors in the size registered. The SSSU should continue to work on addressing these errors.
- 3. It was agreed that a number of other improvements to the existing methodology can be implemented.** Within the current methodology, the stratification design will be modified, with construction material to be dropped, significantly reducing the number of strata with zero or few returns each quarter. A standardized procedure for imputation where there are no returns in a stratum will be introduced. This is in addition to the existing procedures, where survey returns are reviewed to identify outliers that could affect results.
- 4. To further improve the RPPIs in the medium term, the underlying methodology will switch from stratification to hedonic methods.** As a result of discussions during the mission, it was agreed that, given the constraints of the existing survey, hedonic methods represent the best option for reliable RPPIs, particularly, if data sources are improved in the future. The authorities remain enthusiastic about switching from the current stratification method to a hedonic regression method, and, therefore, building staff capacity in this area is a priority. Intensive training on the hedonic method and its relation to the existing methods was provided to the authorities during the mission. Additionally, three staff members will participate in the RPPI training seminar to be held at the Joint Vienna Institute (JVI) during August 2018. Work on developing an experimental hedonic model will be undertaken in 2019.
- 5. A switch to comprehensive administrative data will require cooperation of stakeholders elsewhere in the policy system.** Existing survey data underpinning the RPPIs are limited, as responses are not legally mandatory. In line with best practice elsewhere, the use of survey data should be replaced by comprehensive administrative data. However, while the

authorities can now access information in the registry of property transactions maintained by the State Enterprise Information Center (SEIC), entry of transaction price is not required in the registry, and often the recorded price is the assessed value, rather than the market price. If administrative data are to be used, this will require cooperation of other stakeholders, including the Ministry of Justice (the SEIC's parent department), so that information recorded in the registry is suitable for use in the compilation of RPPIs.

**6. Until administrative data become available, the use of online listings data represents an alternative data source.** Given the complexities involved in changing the registry of transactions, the authorities have agreed to explore alternative sources of data. These include an improved survey, possibly with a legal requirement for the respondent to complete. A simpler alternative, and one increasingly adopted in other countries facing similar issues, is the use of online listings data. An examination of the main real estate website in the Ukraine had structured information on over 160,000 apartments, in June 2018. At the very least, once the authorities are familiar with hedonic methods, these data would offer a chance to validate trends observed in survey data.

**7. A seminar for stakeholders, will be held by mid-2019, in coordination with SECO.** The seminar will explain to stakeholders both the importance of reliable RPPIs and the requirement for comprehensive and accurate administrative data to support the compilation of RPPIs.

**8. To support progress in the above work areas, the mission recommended a detailed one-year action plan with the following priority recommendations carrying particular weight to make headway in improving the RPPI.**

**Table 1. Priority Recommendations**

Target Date	Priority Recommendation	Responsible Institutions
September 2018	<i>Ensure staff are appropriately trained in the methods required for RPPI compilation, in line with international standards.</i>	SSSU
February 2019	<i>Secure access to online databases of real estate listings, to validate existing indices and enable alternative RPPIs to be compiled.</i>	SSSU
March 2019	<i>Improve weights underpinning national RPPI.</i>	SSSU

**9. Further details on the priority recommendations and the related actions/milestones can be found in the action plan under *Detailed Technical Assessment and Recommendations*.**

## DETAILED TECHNICAL ASSESSMENT AND RECOMMENDATIONS

10. The action plan shown below reflects the plans for the further development of an RPPI for Ukraine.

Priority	Action/Milestone	Target Completion Date
<b>Outcome: Data are compiled and disseminated using the coverage and scope of the latest manual/guide.</b>		
H	Coverage and scope are expanded to include more residential properties.	April 2019
<b>Outcome: Data are compiled and disseminated using the coverage and scope of the latest manual/guide.</b>		
H	A national unified index has been compiled and/or disseminated.	April 2019
<b>Outcome: Source data are adequate for the compilation of price statistics.</b>		
H	Improvements to source data used for compiling the RPPI are made; weights data are available.	April 2019
<b>Outcome: Staff capacity increased through training, especially on developing source data, compilation methods, and dissemination.</b>		
H	Three staff are trained on RPPI compilation according to methodological standards.	April 2019

### A. Introduction

11. A technical assistance (TA) mission was conducted during June 18–22, 2018 to assist the State Statistics Service of Ukraine (SSSU) to further develop of Residential Property Price Indexes (RPPIs) for Ukraine. This was the second of a series of TA missions to the State Statistics Service of Ukraine (SSSU), to be conducted under the auspices of the SECO2 RPPI project funded by the government of Switzerland.

12. The authorities are strongly committed to enhancing the existing RPPIs. A plan was agreed in 2017 to guide the work on improving the existing compilation methodology and securing better source data during the project. The SSSU has made significant progress since then, including the development of an experimental single overall national index and improvements to the property-mix stratification design. The current mission discussed a range of issues, including choice of average price measure, index weighting design, imputation techniques, the treatment of outliers, the development of an improved survey, and accessing online property listings.

**13. Following the June 2017 mission, the SSSU has compiled, but not yet published, an experimental overall national RPPI.** In line with recommendations of that mission, the authorities have estimated weights for the primary and secondary market and used those to calculate a single national RPPI. Under their preferred specification, where 2017: Q4 is the index reference period (2017: Q4=100), the national RPPI for 2018Q1 was 101.0 (the primary market was 102.0 and the secondary market 100.7). As explained below, refinements will be made to this national index before publication.

## B. Hedonic Methods

**14. The authorities confirmed their desire to switch from the existing property-mix adjustment by stratification method to a more sophisticated hedonic approach.** This represents the optimal way to generate reliable RPPIs from existing data sources and prepares the way to deal with more comprehensive data sources in the future.

**15. Detailed hands-on training was provided on the development of hedonic methods (both the imputation and rolling-window time dummy approaches) and their relationship to existing methods.** Two estimates of the national quarterly change in residential property prices were compiled for 2018: Q1 as part of the training. These estimates are shown in Table 2. Both methods of hedonic RPPI compilation used—imputation (HI) and rolling-window time dummy (RWTD)—suggest that prices were lower in 2018: Q1 than in 2017: Q4, the opposite finding of the existing method of compilation. This highlights the possibility that volatility from low transaction numbers and/or existing imputation methods for missing strata (see below) are biasing the measure of residential property price trends. However, a more comprehensive comparison of the different methods is required over a longer time series.

**Table 2. 2018: Q1 RPPI Index Levels, by Method of Compilation**

	2017: Q4	2018: Q1	% change
Existing: Overall	100.0	101.0	1.0%
Existing: Primary	100.0	102.0	2.0%
Existing: Secondary	100.0	100.7	0.7%
HI: Overall	100.0	99.1	-0.9%
RWTD: Overall	100.0	97.1	-2.9%
RWTD: Primary	100.0	98.2	-1.8%
RWTD: Secondary	100.0	97.0	-3.0%

**16. Experimental hedonic indexes will be developed ahead of the next mission.** In order to prepare for the development of RPPIs based on new methods and/or data, after the mission, the authorities will prepare experimental RPPIs using the existing survey and different hedonic methods, including rolling-window time dummies, imputation, and the characteristics approach.

**Recommended Actions:**

- Produce experimental RPPIs, based on hedonic methods, ahead of the final mission.
- Improve Existing RPPIs.

**17. While a switch to hedonic methods is agreed, it is understood that this will take time.** The mission and the authorities agreed that the target will be to transition the methodology, underpinning the compilation of RPPIs, from stratification to hedonics by 2020. As this will require increased staff capacity, in the interim, a number of improvements to the existing stratification methodology to be implemented in the short term were agreed.

**18. The existing methodology, based on survey data and granular stratification, generates too many empty or unreliable strata.** Currently, there are 300 strata: 1-, 2- and 3-roomed apartments, of both brick and concrete, for each size, for primary (newly built) and secondary markets, for each of 25 oblasts (regions). Both the 2017: Q4 and 2018: Q1 surveys generated roughly 850 responses in the primary market and 325 in the secondary market. In 2018: Q1, 124 strata (41 percent) contained no returns, 48 in the primary market and 76 in the secondary market. A further 52 strata (17 percent) contained just one observation.

**Table 3. Extent of Missing Strata, Proposed Revised Stratification  
2018: Q1 Dataset**

Oblast	Primary market	Secondary market
5	All sizes present	All sizes present
7	1+2 room missing	2-room missing
12	2-room missing	All sizes present
14	All sizes missing	All sizes present
18	All sizes missing	All sizes present
21	3-room missing	3-room missing
23	1-room missing	All sizes present
26	All sizes present	All sizes missing
32	All sizes present	All sizes missing
35	All sizes present	All sizes present
44	All sizes missing	All sizes present
46	All sizes present	1-room missing
48	All sizes present	1-room missing
51	All sizes present	All sizes present
53	All sizes present	3-room missing
56	All sizes present	2+3 room missing
59	3-room missing	All sizes present
61	All sizes present	1-room missing
63	All sizes present	All sizes present
65	All sizes present	2+3 room missing
68	3-room missing	All sizes present
71	All sizes present	All sizes present
73	All sizes present	All sizes missing
74	All sizes present	3-room missing
80	1-room missing	All sizes present

**19. The lowest level of stratification, construction material, will be dropped and revised indexes compiled.**

It was agreed that the current mix-adjustment by stratification design is overly granular, and that the lowest level strata (construction material) will be dropped and pilot revised indexes compiled. Removal of construction material, as a dimension of stratification, will halve the number of strata to 150. This will significantly reduce the instances of empty strata in each period. For example, in 2018: Q1, with revised stratification, there would be 37 (not 124) missing strata; further details for 2018: Q1 under the proposed revised stratification are set out in Table 3.

**20. Imputation will remain important with survey data, and the process for imputation was clarified.**

Where a stratum has no transactions, the weighted average change for other room sizes, within the same segment-region combination, is used to impute the change in the missing stratum. For example, if within the primary market, within one oblast (region), there are no returns for three-roomed apartments, the weighted average change in prices for one- and two-roomed apartments is applied to three-roomed apartments, in order to calculate the segment-region change.

**21. With small sample sizes for individual strata, the treatment of outliers is critical.**

Currently, average prices are taken from all strata where there is a nonzero number of transactions, that is, there is no cut-off for small sample sizes in individual strata. In order to ensure that outliers—either errors or extreme observations—do not excessively affect RPPIs, a two-fold strategy for management of outliers is adopted. Given the small survey size, it is possible for national and local authorities to remove outliers manually, based on their expertise relating to individual markets. In addition, the index compilation software checks for outliers. For this reason, outliers are currently not a concern.

**22. Significant progress was made 2017 on the estimation of weights, such that a provisional national RPPI is now calculated.**

As noted in the report of the June 2017 mission, no one source—administrative or otherwise—provides the value-based weights needed to use consistent weights for all strata (primary/secondary, each oblast, room size, and construction material). Until such weights are available, the authorities have combined the best available sources to generate regional and national RPPIs. Specifically, for the primary market, weighting is based on square meters constructed, using data from the official Construction Survey for the preceding year. For the secondary market, the weighting for construction material and room number is based on value, using data from the previous year's survey (including data on price per square meter). To weight regions (oblasts), totals in monetary terms are taken from the Registry for the preceding year. Lastly, for the relative weighting of primary and secondary markets, to compile the single national RPPI, the weights are based on average price/m<sup>2</sup> (as per regional RPPIs) multiplied by total square meters, using the construction survey for the primary market and the total from the registry, minus construction survey totals, for the secondary market.

**23. Ahead of the publication of the national RPPI, the authorities will improve the estimation of relative weights.**

It is suspected that the 79 percent share for the secondary

market is potentially overstated, due to errors made when entering floor area in the deeds in the Registry. Ahead of publication, and in addition to other improvements, the authorities will work with their counterparts in the SEIC to strengthen the calculated weights based on square meterage. The authorities will also ensure a like-for-like price comparison for first-quarter data, as weights are updated each year to reflect previous-year weights.

**24. The mission recommended the use of the arithmetic mean as the measure of central tendency ahead of the switch to hedonic methods.** Existing RPPIs are based on geometric means. As part of the mission, detailed training was undertaken with authorities on the equivalence of arithmetic stratification and hedonic methods. For this reason, it is recommended that, particularly with reduced stratification and subject to an investigation of the volatility of resulting indexes, RPPIs move from geometric to arithmetic means at the lowest level of stratification (the region-room-segment combination).

***Recommended Actions:***

- Revise the weighting underpinning regional and national RPPIs, as information on the relative weights improves.
- Remove construction material as a level of stratification in the current set of RPPIs, leaving 25 regions, 2 segments and 3 room numbers as the dimensions of stratification.
- Move from geometric to arithmetic means, ahead of a switch to hedonic methods.

## C. Improving Data Sources

**25. The authorities raised concerns about the response rate to the existing survey.** The existing survey response rate is roughly one third. Some developers in the primary market refuse to complete the survey, on the basis of legal arguments. In the secondary market, some respondents claim that they are only agents for rental properties (included in the same code in the national accounts), and thus, they have no returns to make. The sample also loses respondents due to natural attrition, but is refreshed each year for this reason. If significantly greater sampling of the population of developers and agents (and notaries) is not possible, one option to explore is making the survey legally mandatory, but this would not be a decision for the SSSU alone.

**26. Assuming the survey method continues, it is proposed to overhaul the questionnaire post-mission.** The current structure of the survey is somewhat cumbersome for respondents and does not lend itself easily to constructing a dataset for hedonic or other forms of analysis. Instead, it is proposed that, rather than a questionnaire structured by segment and room size, use is made of an open template, with rows for each transaction and columns for each principal attribute. In addition, by use of online survey techniques, it is proposed that certain criteria be made mandatory and others optional, to allow examination of whether currently omitted criteria are important in the reliable estimation of property price trends. A suggested format for the revised survey is given in Table 4, together with hypothetical responses.

Table 4. Proposed Revised Survey, with Hypothetical Responses

Response	Mandatory						Not mandatory				
	Size (m2)	Price/m2	Newly built	Rooms	Material	Oblast	Construction era	Floor	City	District	
1	32.0	8750	0	1	1	5	1990s	7			
2	34.0	16320	0	1	2	5	1970s	3	From		
3	50.0	16350	1	2	1	5		8	drop		
4	50.0	14006	1	2	1	5		2	down		
5	48.0	15150	0	2	2	5	1960s	9	lists		
6	65.0	14750	0	3	1	5	1960s	3			
7	60.0	13500	1	3	2	5		4			

**27. The availability of accurate and comprehensive administrative data depends on a significant overhaul of the registry of transactions.** Currently, while all transactions of real estate are entered into the registry, it is not mandatory to enter price when registering a transaction, nor is the number of rooms entered. In addition, prices that are entered may be simply assessed values, rather than the true market prices. These three elements would need to be addressed before the registry could be used as a data source for an improved RPPI. Such changes would involve other policymakers, in particular, the Ministry of Justice but also, given the additional resources required, the Ministry of Finance, and perhaps other government departments.

**28. In order to increase the likelihood of such changes, a seminar outlining the importance of accurate RPPIs should be hosted before the next mission.** Given the complexity of changing the registry, the importance of accurate RPPIs should be underscored with the relevant parties. RPPIs are used by policy makers as an input into the design of macroprudential policies, that is, those policies aiming to reduce systemic risks arising from “excessive” financial procyclicality (such as asset bubbles). RPPIs are also used by policy makers to inform monetary policy and inflation targeting. This will be done through a stakeholder workshop, involving the authorities and supported by the Fund. Key participants should include the Ministry for Finance, the Ministry of Justice and the National Bank of Ukraine, as well as other users of the RPPI data in the policymaking system in Ukraine.

**29. Given the constraints in securing the required administrative data, it would be prudent for the authorities to plan on using online data.** A leading classifieds website in Ukraine, olx.ua, has significant data that could be used to calculate reliable RPPIs. An investigation during the mission revealed that there were 425,000 real estate ads on olx.ua in June 2018, of which 160,000 were for apartments for sale. The typical listing included the living and kitchen areas (in m2), the floor of the apartment and total number of floors, and the number of rooms, as well as the exact location. In addition, listings included details on utilities, heating, the number of bathrooms, whether it is furnished, and other features (such as balconies) and nearby amenities. As in other countries, this type of dataset is amenable to hedonic analysis and

produces reliable estimates of trends in residential property prices. The online dataset could be accessed either through a Memorandum of Understanding (MOU) with the website or else using existing expertise for web-scraping to gather the dataset internally within the authorities.

**Recommended Actions:**

- The SSSU should seek to agree a MOU with olx.ua regarding sharing of data for the purposes of monitoring trends in the real estate sector and, thus, contributing to the financial stability of Ukraine.
- In the event that a MOU is not possible, the SSSU explore the possibility of implementing web crawlers, to gather data from the sites on an ongoing basis.

#### D. Officials Met During the Mission

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