



TECHNICAL ASSISTANCE REPORT

THE PHILIPPINES

Report on the Residential Property Price
Index Mission (January 22–26, 2024)

APRIL 2024

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Acronyms

AONCR Areas Outside the National Capital Region

BSP Bangko Sentral ng Pilipinas

CPPI Commercial Property Price Index

DES Department of Economic Statistics

NCR National Capital Region

RPPI Residential Property Price Index

RREPI Residential Real Estate Price Index

TA Technical Assistance

Summary of Mission Outcomes and Priority Recommendations

- 1. A technical assistance (TA) mission was conducted from January 22–26, 2024, to assist the Bangko Sentral ng Pilipinas (BSP) with the development of hedonic methods for their property price statistics.** The mission's primary focus was the Residential Property Price Index (RPPI). The mission completed the following tasks: (i) assisted the BSP to apply hedonic methods for the compilation of the RPPI using the existing loan information, (ii) provided practical training to staff, (iii) helped devise a strategy for dissemination of the revised results, and (iv) made recommendations on accessing and using more comprehensive administrative data sources for the compilation of property price statistics.
- 2. The authorities are strongly committed to making improvements to the published Residential Real Estate Price Index (RREPI) for the Philippines.** Reliable property price indices and other indicators of real estate markets are essential for the assessment of developments and risks in property markets and understanding the linkages between property markets and financial soundness, as well as to IMF surveillance.
- 3. The BSP currently publish a quarterly RREPI.** Given that a basic stratification type approach is used to compile the indices, the methods should be updated to ensure compatibility with international statistical standards. The BSP should apply hedonic methods for accurate quality adjustment of the price indices.¹ The mission worked with the staff in the Department of Economic Statistics (DES) to develop procedures for the application of these methods.
- 4. The information on residential property loans collected by the BSP is a good quality data set with a large number of observations.** Due to the continued efforts of the BSP to apply additional validation as part of the quarterly reporting template, it is noticeable that the data quality improves over time. The loan data also contains the required property characteristics for the compilation of quality-adjusted prices using the hedonic approach. These include housing type (condominium, duplex, townhouse, etc.), property type (new, pre-owned, foreclosed), location (island, region, municipality, etc.), floor area, lot size, number of bedrooms, number of floors and effective age of the property.
- 5. The BSP should use the time dummy hedonic method with a four-quarter window length to compile quality-adjusted indices.** The use of the hedonic approach will require changes to the method used for outlier detection. It was recommended to replace the existing method that uses the interquartile range in favor of Cook's Distance, a regression-based approach. It will also be necessary to transfer the data processing to a suitable statistical software package. The mission developed initial R scripts that the BSP can refine and develop further.
- 6. The authorities should decide on the stratification to be used for the RPPI.** There was extensive discussion during the mission on an appropriate stratification for the property loan data, with various options being assessed. This is an important decision as the strata are used both for the compilation and dissemination of the indices. The authorities should invite feedback from users and

¹ The hedonic regression method recognizes that the price of heterogeneous goods, such as residential property, can be described by their attributes or characteristics e.g., location and size of a property. The technique can be used to estimate the marginal contribution or shadow price for these characteristics. Once the regression model has been specified, there are a number of ways to use the model to estimate a constant quality price index e.g., time dummy hedonic method.

stakeholders to the extent possible. To ensure that stable indices can be compiled, each stratum should contain sufficient observations each quarter.

7. The BSP should specify the regression model for each stratum. The mission demonstrated model specification for two test strata: (i) condominiums in the NCR and (ii) houses in AONCR. Experimental quality-adjusted indices were calculated, and these were compared with the published RREPI. For the condominiums in the NCR, the hedonic index displayed less volatility than the RREPI.

8. The published RREPI should be revised as soon as possible. The agreed workplan outlined in Table 2 envisages publishing the updated price indices by December 2024. The BSP should communicate with users and stakeholders during the process of revising the RREPI. This will include providing users with advance notice of the revision and meeting with them to request feedback. The BSP should draft communication documents, both technical and non-technical, that will clearly explain the reasons and extent of the revisions to the data. For harmonization with other countries, the authorities should consider changing the name of the indicator from the RREPI to the RPPI. In addition, a detailed methodological document should be drafted and published on the authorities' website.

TABLE 1. Priority Recommendations

Target Date	Priority Recommendation	Responsible Institution
Feb-2024	Decide on the stratification to be used for the RPPI.	BSP
Jul-2024	Calculate the sub-indices and aggregate to higher level indices, including national RPPI, using annual weights.	BSP
Dec-2024	Publish the revised RPPI.	BSP

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.

Section I. Detailed Technical Assessment and Recommendations

TABLE 2. RPPI Workplan for the Philippines, 2024–2025

Priority	Action/Milestone	Target Completion Date
Topic: Data sources for the RPPI		
H	The BSP should use the loan data to compile the RPPI in the short to medium term.	Feb-2024
M	The authorities should devise a longer-term strategy to broaden the coverage of the residential property market by identifying new data sources, e.g., listings data from websites or administrative data.	Jun-2025
Topic: Compilation methods for the RPPI		
H	Decide on the stratification to be used for the RPPI.	Feb-2024
H	Use the time dummy hedonic method with a four-quarter window length to compile quality-adjusted indices.	Mar-2024

Priority	Action/Milestone	Target Completion Date
H	Specify the regression model for each stratum and apply robustness checks to the results of the regressions.	May-2024
H	Apply Cook's Distance for outlier detection.	Jun-2024
H	Calculate the sub-indices and aggregate to higher level indices, including national RPPI, using annual weights.	Jul-2024
H	Transfer the processing from Excel to R and set up monthly procedures and internal documents.	Aug-2024
Topic: Dissemination		
M	Consult with users / stakeholders on the revisions to the published RREPI.	Sep-2024
H	Re-design the press release with a new structure of graphs and tables.	Sep-2024
H	Prepare communication documents, both technical and non-technical, for users.	Sep-2024
H	Obtain approval from the BSP Monetary Board.	Oct-2024
H	Run the Q3 2024 data using the hedonic methods and prepare the final publication on the BSP website.	Nov-2024
M	Provide advance notice to users of the upcoming revisions to the RREPI.	Nov-2024
H	Publish the revised RPPI.	Dec-2024

A. INTRODUCTION

10. A TA mission was conducted from January 22–26, 2024, to assist the authorities in the Philippines to develop hedonic methods for the compilation of the RPPI. The mission was conducted under the auspices of the Data for Decisions (D4D) Trust Fund. A pre-mission meeting was held on December 5, 2023 (US Eastern Standard Time), attended by officials from the mission team and the BSP. The objectives for the mission were discussed and agreed. An agenda was drafted and circulated in advance.

11. A team of six staff from the BSP Department of Economic Statistics (DES) attended the meetings each day. Senior management at the BSP, the IMF Resident Representative for the Philippines and staff from the BSP attended the concluding presentation on the last day of the mission. There was a strong commitment from all participants to make improvements in the methods used to compile the RPPI for the Philippines.

12. The BSP currently publish a quarterly Residential Real Estate Price Index (RREPI). Sub-indices are published for different house types in the National Capital Region (NCR) and Areas Outside the National Capital Region (AONCR). The BSP currently use a basic type of stratification approach to compile the RREPI, however, the methods should be updated to ensure compatibility with international statistical standards. The BSP should apply hedonic methods for accurate quality adjustment of the price indices. The mission worked with the staff in the BSP to develop procedures for the application of hedonic methods. By the conclusion of the mission, experimental price indices were developed for condominiums in the NCR and houses in AONCR. These two segments represent approximately 86percent of the residential property market based on bank loans.

13. A workplan on the next steps was discussed and agreed during the mission. The workplan is outlined in detail in Table 2. While the team in BSP that compile property price statistics are also responsible for other topical areas, there was a willingness by management to re-assign work to ensure the workplan is progressed on schedule.

14. There was a focus on increasing the capacity and knowledge of the authorities.

The mission provided practical training on the application of hedonic methods for compiling the RPPI. The mission will continue to support the authorities as required while the agreed workplan is being implemented.

A. DATA SOURCES

15. The information on residential property loans collected by the BSP are a good quality data set with large number of observations. The BSP circular 892,² issued in November 2015, makes it mandatory for all universal/commercial banks and thrift banks to submit the Bank Quarterly Report on Residential Real Estate Loans (RRELs). Due to the continued efforts of the BSP to apply additional validation in the quarterly data collection template, it is noticeable that the quality improves over the years. For example, a user's manual for respondents was launched in 2019 and additional checks on specific variables were introduced in 2022. The BSP also collects loan information for commercial property, however, the mission's primary focus was on residential property.

16. While the first data collection took place during the first quarter of 2014, the BSP should compile price indices from 2016. As the reporting template only became mandatory in late 2015, a smaller sample of commercial banks provided data during the first two years. The average number of quarterly observations in 2014 was 4,800,³ increasing to 6,700 in 2015 and 9,800 in 2016. The average number of quarterly observations over the period from 2016 to 2023 was 9,700. The lowest number of quarterly observations at 3,900 occurred during the onset of the Covid19 pandemic in Q2 2020. See Appendix 1 for a graph on the number of observations over the period 2014 to 2023.

17. The loan data contains the required property characteristics for the compilation of quality-adjusted prices using the hedonic approach. These house type (condominium, duplex, townhouse, etc.), property type (new, pre-owned, foreclosed), location (island, region, municipality, etc.), floor area, lot size, number of bedrooms, number of floors and effective age of the property. The template collects both appraised value and acquisition cost for each property. Acquisition cost is the most suitable price measure for the RPPI. The banks report acquisition cost denominated in Philippine peso (PHP), regardless of the denomination of the transaction. On the reporting template, acquisition cost is defined as the contract price or the actual selling price agreed upon between purchaser and seller at the time the contract was signed, or deposit made.

18. The coverage of the loan data is limited to the part of the residential property market financed by loans from the universal/commercial banks and thrift banks. The segments of the market not covered by the sample include: (i) cash purchases, (ii) transactions financed by loans from developers, and (iii) transactions financed by the Home Development Mutual Fund (HDMF). While the loan data should be used to compile the price indices in the short to medium term, the BSP should devise

² <https://www.bsp.gov.ph/SitePages/Regulations/RegulationDisp.aspx?ItemId=3465>.

³ The number of observations were calculated after initial data cleaning (e.g., removing observations with no price information) but before outlier detection.

a longer-term strategy to close this data gap by identifying new data sources, e.g., listings data from websites or administrative data. During the mission in 2022, detailed work was completed to identify potential administrative data sources. That work was documented in the previous technical assistance report published on the IMF website.⁴

19. The Real Property Information System (RPIS) is a new database on market values of real properties in the Philippines. The RPIS is an initiative under the Land Governance Reform Project of the Department of Finance Bureau of Local Government Finance (DoF-BLGF) and will be developed through the collaboration of different government institutions. The BSP may be able to use this centralized database for better coverage of the residential property market. A Memorandum of Agreement (MOA) was signed during May 2023 by involved agencies for the first phase of the project. The BSP, who will become involved in the project during the second phase, should communicate with the main stakeholders to ensure the database meets their requirements for property price statistics.

Recommended Actions:

- The BSP should use the loan data to compile the RPPI in the short to medium term.
- The authorities should devise a longer-term strategy to broaden the coverage of the residential property market by identifying new data sources, e.g., listings data from websites or administrative data.

B. COMPILATION METHODS

20. The mission in 2022 evaluated the existing stratification approach to ensure it adheres to international compilation standards and best practices. It was recommended to make a number of improvements to the method, which include (i) the use of a more detailed stratification for the NCR and AONCR (by island group) through aggregation of elementary indices at the district (in the NCR) or city/municipality (in the AONCR) level, (ii) applying the weights at a lower level in the aggregation structure, (iii) the use of acquisition costs instead of appraisal values as the measure of price, (iv) imputation of data for strata with no transactions in a particular quarter, and (v) the use of annually updated fixed weights based on the share of the total transaction value. The BSP updated their compilation procedures based on these recommendations; however, the published RREPI continues to use the older methodology.

21. The BSP should use the time dummy hedonic method with a four-quarter window length to compile quality-adjusted indices. While most of the recommendations from the previous mission remain applicable, the current mission recommends replacing the stratification approach with a regression-based method for quality adjustment i.e., time dummy hedonic approach. The main difference between the methods is that the hedonic approach allows for quality adjustment within the strata, as well as across the strata. The use of the hedonic approach will necessitate changes to the way stratification is applied to the data and the method used for outlier detection.

22. A suitable statistical software package should be used for the application of hedonic methods for the RPPI. The mission developed initial R scripts that the BSP can refine and develop further. All existing processes carried out in MS Excel and Stata should be transferred to R. This includes data cleaning and filtering, outlier detection, index calculation and aggregation to higher-level indices.

⁴ <https://www.imf.org/en/Publications/CR/Issues/2023/01/23/Philippines-Technical-Assistance-Report-Property-Price-Index-Mission-528509>.

23. Data inspection was performed by visualizing key characteristics in the dataset.

To provide information on the quality of the loan dataset and to gain insights into the relationship between characteristics, data visualization plots (histograms, scatter plots, etc.) and descriptive statistics (e.g., mean and median price per region) were produced during the mission. This is an important step to provide information on appropriate variables that should be included in the regression model.

24. Non-market transactions should be excluded from the loan dataset. A lower threshold for acquisition cost was set to exclude non-market transactions and data entry errors from the dataset. The BSP should test different thresholds to identify the most appropriate threshold for each stratum. Rather than set a single threshold, it may be appropriate to set a higher threshold for strata with higher priced properties and a lower threshold for strata with lower priced properties.

25. Some property characteristics should be merged into homogenous groups. Due to the low number of transactions per quarter for some categories in (i) location, (ii) property type, (iii) number of bedrooms, and (iv) number of floors, these characteristics should be grouped into similar groups. It is recommended to group them according to meaningful categories and groupings that prevail common price segments. For example, location categories were devised by combining cities/municipalities in the NCR with similar price levels.

26. The authorities should decide on the stratification to be used for the RPPI. There was extensive discussion during the mission on an appropriate stratification for the property loan data, with various options being assessed. This is an important decision as the strata are used both for the compilation and dissemination of the indices. The authorities should invite feedback from users and stakeholders to the extent possible. To ensure that stable indices can be compiled, the strata should contain sufficient observations each quarter.

27. The authorities should use Cook's Distance for outlier detection. The existing methodology uses the interquartile range by quarter and strata to identify outliers. However, with the introduction of hedonic methods, it was recommended to use Cook's Distance. The regression-based method identifies outliers with greater precision and, therefore, preserves the sample to the extent possible. It should be applied by running a regression model including all relevant characteristics for calculating Cook's Distance of each observation, and then rerunning the regression model excluding the observations displaying a high Cook's Distance value. The suggested threshold for outlier determination is four divided by the number of observations used in the regression. It is recommended to apply the outlier detection separately for each stratum and each rolling window, i.e., four quarters of data.

28. The BSP should specify the regression model for each stratum. The mission demonstrated model specification for two test strata: (i) condominiums in the NCR and (ii) houses in AONCR. Different model specifications were tested, and the resulting indices compared. The preferred model for condominiums in the NCR uses the log price as the dependent variable and is regressed on the following characteristics: (i) log of floor area, (ii) location, (iii) number of bedrooms, and (iv) new v pre-owned v foreclosed. The lot area was added to the regression model for houses in AONCR. The models for the remaining strata can be specified using a similar approach. Further investigation should be carried out on the quality of the data for number of bedrooms, i.e., zero bedrooms may indicate a missing value rather than a property with zero bedrooms for bank submissions before 2022. The method for calculating the price index from the coefficients on the time dummies was also demonstrated.

29. Robustness checks should be applied to the results of the regressions. The results of the regression should be analyzed to ensure the estimated coefficients or shadow prices are plausible in

terms of their sign and magnitude. In addition, stability checks on the coefficients for each rolling window and each stratum should be carried out. The authorities should also analyze the regression residuals to ensure the data are not displaying any specific trends.

30. The sub-indices (i.e., strata indices) should be aggregated using weights to higher-level indices including the national RPPI. The BSP should use annually updated fixed weights. The weight reference period should be the previous calendar year, e.g., when calculating the indices for the four quarters of 2023, the weight reference period should be 2022. The weights are calculated by summing the acquisition cost for the transactions in a given stratum and dividing by the total acquisition cost for the transactions in all strata during the weight reference period.

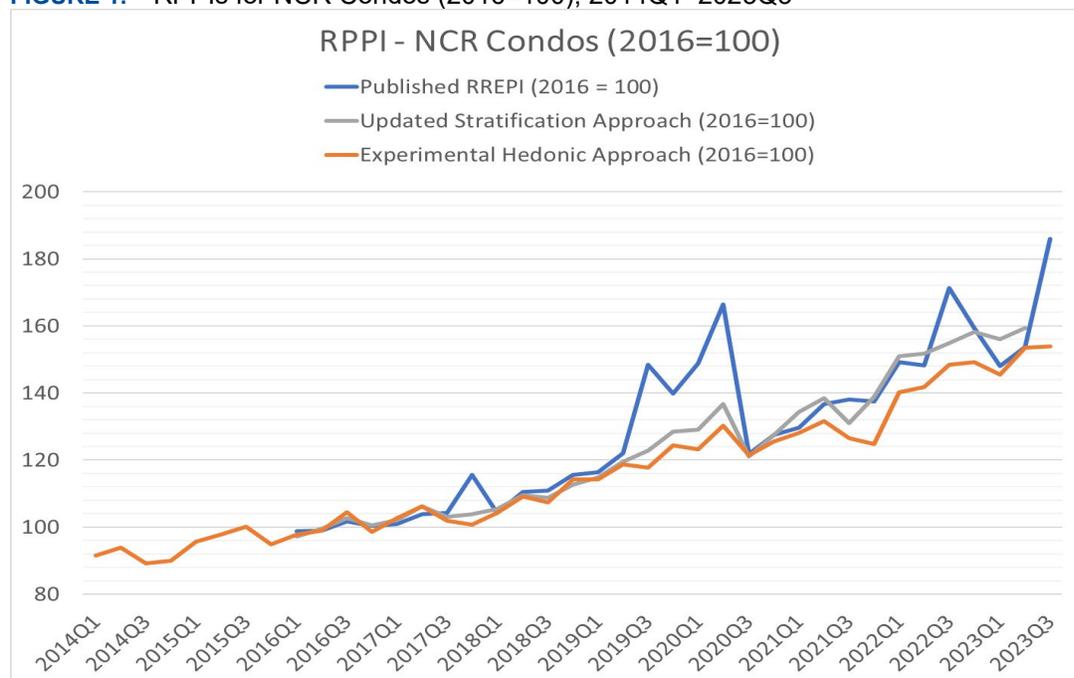
31. Experimental quality-adjusted hedonic indices for two strata were compiled during the mission. Figure 1 shows the index for condominiums in the NCR calculated using hedonic methods. Due to time constraints, the index was calculated in a single regression rather than a four-quarter rolling window. The indices were also compiled using data from Q1 2014, whereas as previously mentioned, the BSP should use the loan data from 2016 onwards. Figure 1 also shows the published RREPI and the index computed using the updated stratification method after the recommendations from the 2022 mission were implemented. Both the hedonic index and the index using the updated stratification approach display less volatility than the published RREPI. The mission recommended using the hedonic approach since this method applies more detailed quality adjustment within the strata. Figure 2 shows the hedonic indices for both the condominiums in the NCR and houses in AONCR. These two strata account for about 86 percent of the overall weight of the national RPPI.

32. The BSP should complete the calculation of the sub-indices using hedonic methods and aggregate the results to the national RPPI. Intermediate higher-level indices can also be calculated as appropriate, e.g., national index for condominiums. The resulting hedonic indices can be compared with the currently published indices and the indices calculated using the updated stratification approach.

Recommended Actions:

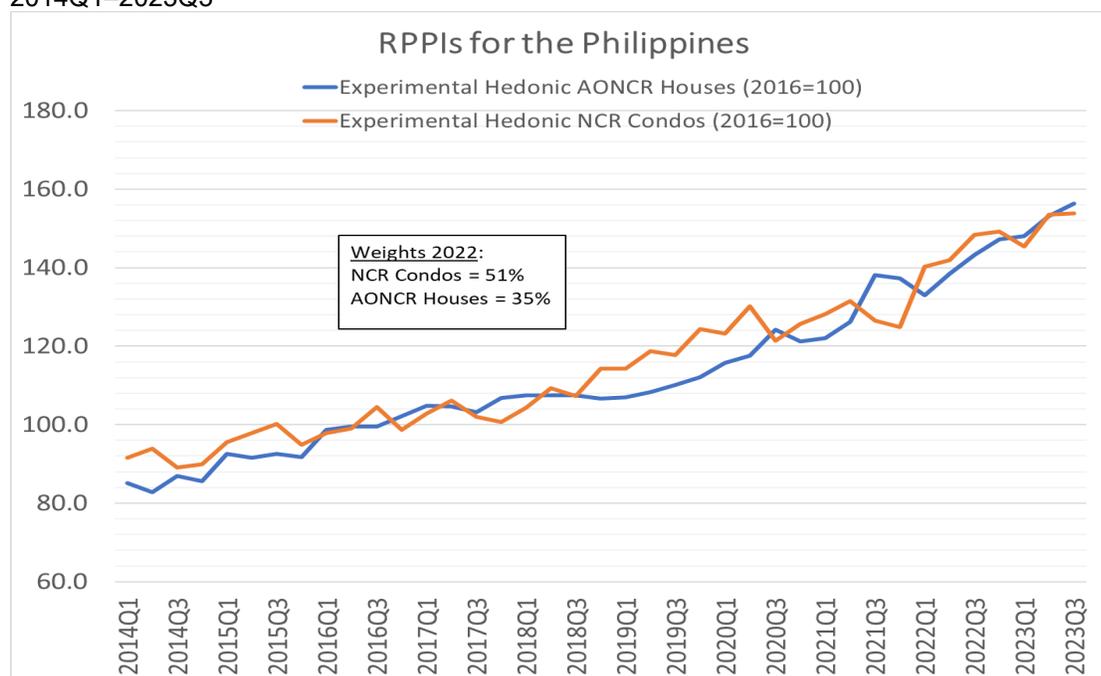
- The BSP should use the time dummy hedonic method with a four-quarter window length to compile quality-adjusted indices.
- A suitable statistical software package should be used for the application of hedonic methods for the RPPI.
- Non-market transactions should be excluded from the loan dataset.
- Some property characteristics should be merged into homogenous groups.
- The authorities should decide on the stratification to be used for the RPPI.
- The authorities should use Cook's Distance for outlier detection.
- The BSP should specify the regression model for each stratum.
- Robustness checks should be applied to the results of the regressions.
- The sub-indices (i.e., strata indices) should be aggregated using weights to higher-level indices including the national RPPI.
- The BSP should complete the calculation of the sub-indices using hedonic methods and aggregate the results to the national RPPI.

FIGURE 1. RPPIs for NCR Condos (2016=100), 2014Q1–2023Q3



Note: The price index using the updated stratification approach, which is not yet published, was developed after the 2022 TA mission.

FIGURE 2. Experimental RPPIs for NCR Condos and AONCR Houses (2016=100), 2014Q1–2023Q3



C. COMMERCIAL PROPERTY

33. The BSP should complete further analysis of the coverage of the loan data for commercial property before computing the price indices. While the mission primarily dealt with residential property, there was also some discussion on commercial property. It was explained that transactions for

commercial property are often not financed through loans from banks. The larger and more important commercial property transactions are likely purchased and financed via special purpose vehicles (SPVs) and real estate investment trusts (REITs). This raises questions about representativity of the loan information. Therefore, it would be important to analyze the sample of transactions collected by the BSP to better understand the coverage of the data. The authorities should meet with real estate experts and industry stakeholders involved in commercial property transactions to get more information on the operation of the market.

34. In theory, the same hedonic methods for quality adjustment can also be applied to commercial property. However, the authorities should be cognizant of the increased complexity to calculating a price index for commercial property compared to residential property. There are fewer observations for commercial property as the transactions are less frequent. In addition, the heterogenous nature of the transactions means that quality adjustment can be difficult, which can lead to quite volatile and potentially biased price indices. The data requirements to apply hedonic methods for commercial property are greater than residential property. It is likely that it is insufficient to adjust for the size and location of the properties only, additional characteristics will also need to be collected, e.g., prime versus non-prime, information on existing tenancy, age of the building, building material, etc. Local experts would be able to provide information on the most important characteristics for valuing commercial property in the Philippines.

35. For commercial property, the existing data collection template captures the appraisal cost of the land only. The full appraisal value or acquisition cost of the property is not collected. This information would be insufficient for a Commercial Property Price Index (CPPI). Therefore, the data collection form should be amended to collect this information.

36. The dissemination of the revised RREPI should be prioritized ahead of the development of price indices for commercial property. Due to the additional complexity of compiling price indices for commercial property and the significant resources required for this work, it would be preferable to complete the revision for the RREPI before committing to a detailed workplan to develop price indices for commercial property.

Recommended Actions:

- The BSP should complete further analysis of the coverage of the loan data for commercial property before computing the price indices.
- The authorities should meet with real estate experts and industry stakeholders to get more information on the operation of the market.
- The data collection template should be amended to collect additional variables, such as full appraisal value and/or acquisition cost of the properties and more detailed characteristic information.

D. DISSEMINATION

37. The published RREPI should be revised as soon as possible. The workplan envisages publishing the updated price indices, computed following the hedonic approach, by December 2024. The published RREPI displays significant volatility, and the application of hedonic methods will ensure compatibility with international standards. The existing published indices have a number of weaknesses including (i) the use of appraisal values rather than acquisition costs, (ii) varying weights from quarter-to-quarter and (iii) limited quality adjustment.

38. The BSP should communicate with users and stakeholders during the process of revising the RREPI. This will include providing users with advance notice of the revision and meeting with them to request feedback. In addition, the BSP should draft communication documents, both technical and non-technical, that will clearly explain the reasons and extent of the revisions to the data. For harmonization with other countries, the authorities should consider changing the name of the indicator from the RREPI to the RPPI. This would provide a strong signal to users that there was a significant change in the methodological approach. The quarterly press release, which includes a commentary on the trends in the price indices, will also need to be re-designed with a new structure of charts and tables.

39. A detailed methodological document should be drafted and published on the authorities' website. A methodological document is an important step for ensuring transparency and providing detailed information for users on the steps for data compilation. For example, the document should include information on the data source, coverage of the index, data quality and cleaning, outlier detection, stratification, weighting information, and methods for index compilation and aggregation.

Recommended Actions:

- The published RREPI should be revised as soon as possible.
- The BSP should communicate with users and stakeholders during the process of revising the RREPI.
- A detailed methodological document should be drafted and published on the authorities' website.

E. OFFICIALS MET DURING THE MISSION

Name	Position	Organization
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Mr. Christian Kenneth R. Collado	Research Analyst II, Department of Economic Statistics	BSP
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Appendices

APPENDIX A. NO. OF OBSERVATIONS, PROPERTY LOANS, 2014Q1 TO 2023Q3



Note: The number of observations were calculated after initial data cleaning (e.g., removing observations with no price information) but before outlier detection.