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DISCUSSION DOCUMENT

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Residential Property Price Index

Report for October 2022

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INTRODUCTION

Statistics South Africa (Stats SA) has developed a residential property price index (RPPI) in partnership with the South African Reserve Bank (SARB) and with the support of the International Monetary Fund (IMF). The data are released in the form of experimental statistics for the purposes of stakeholder evaluation and feedback. Records of property transactions registered with the Office of the Chief Registrar of Deeds (Deeds office) are the source data for the index. The RPPI is compiled using internationally accepted methods as outlined in the *Handbook on Residential Property Price Indices* (Eurostat, 2013) and the *Residential Property Price Index Practical Compilation Guide* (IMF, 2020). The indices are calculated using a rolling window time dummy hedonic regression model.

This report contains an overview of the RPPI compilation methods and the key findings for October 2022. In order to provide some context to the results, this report also presents selected key findings from January 2010 to October 2022. Further information on the methodology can be found in the detailed sources and methods document, soon to be available on the Stats SA website. The RPPI discussion document and time series data will be published monthly within five months of the reference period.

1. Definition and uses of the RPPI

RPPIs aim to measure the changes in the price of residential properties such as houses, townhouses and flats purchased by households. Both new and existing dwellings are covered, independently of their final use and their previous owners. Only market prices are considered including the price of the land on which residential buildings are located (OECD, 2022). RPPIs' importance increased following the global financial crisis and they are used:

- as a macro-economic indicator of economic growth;
- in monetary policy and inflation targeting;
- as an input into estimating the value of housing as a component of wealth;
- as a financial stability or soundness indicator to measure risk exposure;
- as a deflator in the national accounts;
- as an input into an individual's decision making on whether to buy (or sell) a residential property; and
- to make inter-area and international comparisons (IMF, 2020).

2. Development of the South African RPPI

In 2018, an IMF team assessed the feasibility of compiling an RPPI for South Africa and concluded the most suitable source of data would be the property transaction records maintained by the Deeds office. However, conflicting legislation and the high cost of obtaining the complete dataset prevented direct access to this information. In 2020, the SARB entered into a contract with a third party provider to secure access to the Deeds office data for Stats SA to develop the RPPI.

From 2021, Stats SA, with the support of the IMF and the SARB, worked through the development stages of the RPPI from assessing the quality of the data, to refining editing rules, constructing an appropriate index estimation model, and finalising weighting structures and dissemination formats. The following sections discuss the sources and methods used to compile the indices.

3. Data sources and editing process

The Deeds office data is an administrative record of all property transactions in South Africa. Among other things, it includes information about the price of the property, the type of property, the type of buyer and seller, and a unique property identifier code. On average, there is a four month lag between the time a transaction is completed and the time it is recorded by the Deeds office. While both dates are included in the data, the transaction date is the one relevant to the RPPI.

There are many transactions in the Deeds office data that are not relevant for the purpose of the RPPI. Some transactions are out of scope, such as the sale of farms, vacant land or commercial property while others are erroneous entries or non-market transactions such as the sale of the property to a family member for a nominal fee. There are also many duplicate records due to the partial sale of a property or where a property is sold to joint buyers.

A number of criteria have been established to ensure that the data used in the compilation of the RPPI is both relevant and reliable. Specifically, the RPPI includes transactions where the buyer is an individual, and the seller is an individual, company, estate, foundation or body corporate. Only free standing houses or sectional title properties (e.g. flats, townhouses or other houses in a gated complex) are included. Price and size are used as initial cut offs to remove abnormal transactions and further outliers are identified and removed using two statistical techniques. Firstly, cluster analysis groups

transactions with similar prices and any falling outside the cluster boundaries are removed. When the model is re-run, Cook's distance identifies any transactions having an undue influence on the model, and these are also removed.

4. Method of compiling the RPPI

The challenge in compiling any price index is to capture only pure price changes – that is, to separate changes in price due to market dynamics from changes in price caused by shifts in the characteristics of the products being transacted over time. Typically, in measures of inflation such as the consumer and producer price indices, this is done by comparing the prices of exactly the same products using a matched model method.

However, in the case of residential properties, price is determined by many different characteristics such as the location, the size of the property, the land it occupies and the type of building, with the result that no two properties are exactly identical. In addition, only a small proportion of the housing stock will be transacted in any given period. The combination of these factors means that the matched model approach cannot be used for the RPPIs. As a result, RPPIs are typically computed using a hedonic regression method which estimates shadow prices based on the characteristics of properties (such as size and location) to ensure that qualities are held fixed when measuring price changes from one period to the next. The result is an index representing pure price changes for a consistent set of characteristics.

The South African RPPI uses a rolling window time dummy hedonic regression model to compute the index. The model estimates a hedonic model that includes the data of 12 months (the window), with time dummies included for each month. The 12-month window has the advantage of keeping the coefficients relatively up-to-date and so takes account of changes in price determinants as market conditions change.

The model controls for location, type of property (free standing or sectional title) and the size of the property, which are all available in the data source. Suburbs within each municipality provide the location variable. In cases where there are multiple suburbs with the same name (e.g. Bryanston Ext 1, Ext 2, etc.), these are grouped together. The model includes an interaction term between size and type of dwelling.

Price indices are derived from the estimated coefficients on the time dummies. Each month the model is moved forward one period and re-estimated. The overall price index is constructed by chaining together the price indices from these rolling windows. The resulting indices typically show a high level of volatility. In order to provide a more meaningful interpretation of changes in the index, a smoothing algorithm (a Henderson filter) is applied.

5. Weights and structure

Stats SA publishes the RPPI at two levels of detail. Firstly, RPPIs for each province are aggregated to the 'national' RPPI. Secondly, the RPPIs for each of the eight metropolitan municipalities are aggregated to the 'all metropolitan areas' RPPI. Elementary indices are calculated for each metropolitan area and for the larger municipalities in each province. The hedonic model performs better if there are a large number of transactions available. Because there are fewer transactions each month for the non-metropolitan municipalities, their indices are not published.

The total sales value for any year can be calculated from the Deeds office data and this is used to aggregate the indices from the elementary level upwards. Aggregated indices for each year are weighted according to the total sales value of two years prior. For example, the results for 2022 are weighted based on the sales value of 2020, the results for 2021 are weighted based on the sales values of 2019, and so on. Weights will be updated annually with effect from the January RPPI each year. Table A shows the coverage and weights (2020) of the 'national' and 'all metropolitan areas' RPPIs.

Table A – RPPI coverage and weights (2020)

Province and municipality	National RPPI	All metropolitan areas RPPI
	Weight	
Western Cape	29,00	
City of Cape Town	23,72	28,21
Drakenstein	1,29	
Overstrand	1,06	
Mossel Bay	1,12	
Saldanha Bay	0,78	
George	1,03	
Eastern Cape	5,23	
Buffalo City	1,75	2,09
Nelson Mandela Bay	3,48	4,13
Northern Cape	0,90	
Sol Plaatje	0,90	
Free State	2,68	
Mangaung	2,27	
Matjhabeng	0,41	
KwaZulu-Natal	11,62	
eThekweni	8,88	10,56
KwaDukuza	1,72	
Msunduzi	1,02	
North West	2,52	
City of Matlosana	0,77	
Rustenburg	1,75	
Gauteng	44,00	
City of Johannesburg	20,09	23,89
City of Tshwane	13,50	16,05
Ekurhuleni	10,41	12,37
Mpumalanga	2,72	
City of Mbombela	1,55	
Emalahleni	1,17	
Limpopo	1,33	
Polokwane	1,33	

Table B provides the RPPI weights from 2008 to 2020. Gauteng has the largest share of sales throughout the period, followed by Western Cape and KwaZulu-Natal. Some shifts are evident when comparing the 2008 and 2020 weights:

- Gauteng and Northern Cape remained constant at approximately 44% and 0,9% respectively;
- Western Cape increased from 25,1% to 29,0%; and
- The remaining provinces decreased, especially KwaZulu-Natal which reduced its share from 12,9% in 2008 to 11,6% in 2020.

Table B – RPPI weights for 2008 to 2020

Province	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Western Cape	25,10	26,43	25,10	24,06	24,85	25,89	28,16	29,83	33,15	33,51	30,11	28,62	29,00
Eastern Cape	5,41	5,01	4,89	4,84	4,52	4,61	4,52	4,36	4,48	4,70	4,96	5,07	5,23
Northern Cape	0,88	0,79	0,88	0,87	0,98	0,90	0,83	0,65	0,64	0,69	0,74	0,79	0,90
Free State	2,98	2,77	2,76	2,86	2,74	2,63	2,38	2,28	2,16	2,23	2,40	2,62	2,68
KwaZulu-Natal	12,88	13,26	12,68	12,56	12,63	12,18	11,73	11,94	11,66	11,24	11,98	11,85	11,62
North West	2,88	2,66	2,71	2,75	2,59	2,57	2,28	2,21	1,88	1,95	2,04	2,26	2,52
Gauteng	44,78	44,67	46,41	47,35	46,91	46,57	45,89	44,89	42,43	42,10	43,90	44,76	44,00
Mpumalanga	3,51	3,18	3,35	3,41	3,44	3,37	3,05	2,71	2,49	2,37	2,65	2,72	2,72
Limpopo	1,58	1,23	1,22	1,30	1,34	1,28	1,16	1,13	1,11	1,21	1,22	1,31	1,33

6. Revisions

The Deeds office data is continuously updated and therefore Stats SA allows for revisions of the indices. The RPPIs for the latest 12 months will be considered preliminary and this time frame is aligned with the 12-month rolling window period of the regression model. For example, in the October 2022 RPPI statistical release, the RPPIs for November 2021 to October 2022 are preliminary. When the RPPI for November 2022 is published, only the RPPIs for November 2021 to October 2022 will be revised.

7. Publication schedule

The RPPI will be published monthly within five months of the reference period as on average, there is a four month lag between the time a transaction is completed and the time it is recorded by the Deeds office. Stats SA receives the Deeds office data towards the end of a month and requires approximately two weeks to edit the data, compute the indices and prepare the statistical release. It will be published on the second Thursday of the month.

8. Further work

The statistics published in this discussion document are labelled experimental with the aim of inviting comment on the methodology and the scope of information provided. Stats SA is working to secure direct access to the data from the Deeds office, and until that time the publication of the RPPI is dependent on the continued financial support of the SARB.

As the composition and pricing of the property market is largely determined by location, Stats SA is working on making RPPIs for selected lower level geographic areas available. Provision of further analytical indices may also be considered, for example for different property types, price bands or new and existing homes. Analysis will be conducted to assess and report the extent of revisions.

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KEY FINDINGS AS AT OCTOBER 2022

Annual national residential property price inflation was 5,4% in October 2022, up from 5,3% in September 2022. The residential property price index (RPPI) increased by 0,5% month-on-month in October 2022.

The main contributors to the 5,4% annual national inflation rate were Western Cape and Gauteng.

Western Cape increased by 6,8% year-on-year, and contributed 2,0 percentage points.

Gauteng increased by 3,7% year-on-year, and contributed 1,6 percentage points.

The RPPI for all metropolitan areas increased by 4,8% between October 2021 and October 2022. The main contributors to the 4,8% annual inflation rate for metropolitan areas were City of Cape Town and Ekurhuleni.

City of Cape Town increased by 5,4% year-on-year, and contributed 1,5 percentage points.

Ekurhuleni increased by 7,0% year-on-year, and contributed 0,9 of a percentage point.

DETAILED RESULTS

Table 1 - Residential property price index: national and provincial indices

Province	Weight	Index (Dec 2020=100)			Percentage change	
		Oct 2021	Sep 2022	Oct 2022	Oct 2022 vs. Sep 2022	Oct 2022 vs. Oct 2021
National	100,00	105,4	110,5	111,1	0,5	5,4
Western Cape	29,00	106,6	112,9	113,9	0,9	6,8
Eastern Cape	5,23	103,6	109,5	109,8	0,3	6,0
Northern Cape	0,90	99,3	104,7	105,0	0,3	5,7
Free State	2,68	107,1	113,5	114,2	0,6	6,6
KwaZulu-Natal	11,62	104,9	110,5	111,0	0,5	5,8
North West	2,52	107,0	112,8	113,1	0,3	5,7
Gauteng	44,00	104,8	108,4	108,7	0,3	3,7
Mpumalanga	2,72	102,1	109,3	109,8	0,5	7,5
Limpopo	1,33	107,5	119,4	120,1	0,6	11,7

Figure 1.1 - Contributions to the monthly percentage change in the national RPPI

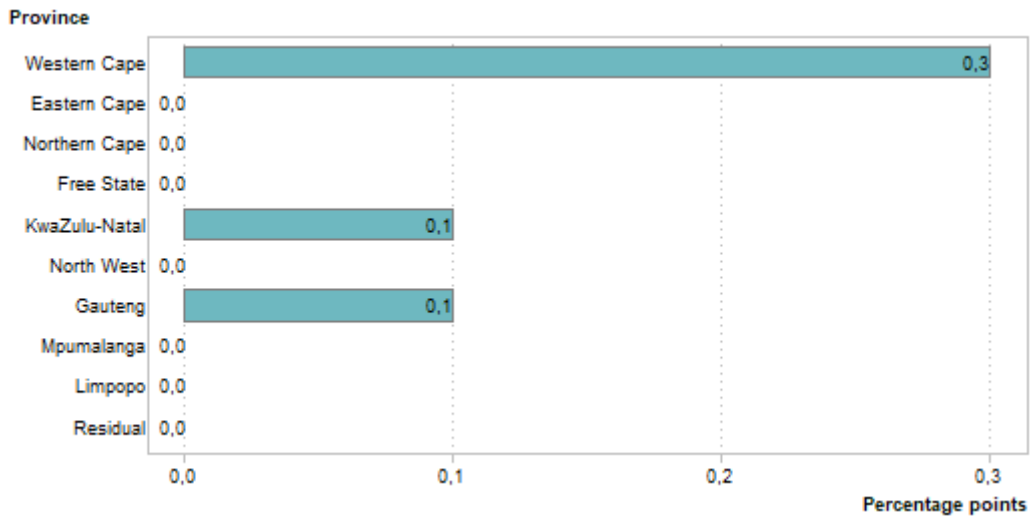


Figure 1.2 - Contributions to the annual percentage change in the national RPPI

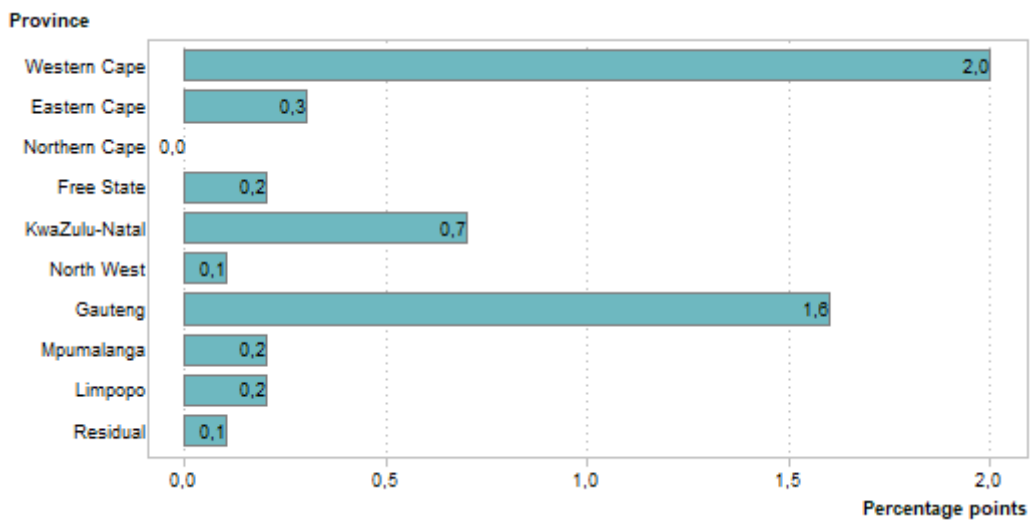


Table 2 - RPPI national indices and annual percentage changes

Table 2.1 - RPPI national index numbers (Dec 2020=100)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average ¹
2017	82,3	82,8	83,3	83,8	84,3	84,8	85,2	85,7	86,3	86,9	87,5	88,0	85,1
2018	88,5	88,8	89,0	89,2	89,5	89,8	90,2	90,5	90,8	91,0	91,1	91,2	90,0
2019	91,4	91,6	91,9	92,1	92,2	92,2	92,2	92,2	92,2	92,4	92,6	92,9	92,2
2020	93,2	93,5	94,0	94,6	95,4	96,3	97,2	97,9	98,5	98,9	99,4	100,0	96,6
2021	100,7	101,4	102,1	102,6	103,1	103,6	104,0	104,4	104,9	105,4	105,9	106,4	103,7
2022	106,8	107,3	107,7	108,0	108,4	108,8	109,3	109,9	110,5	111,1

Table 2.2 - RPPI national year-on-year rates

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average ¹
2017	5,8	5,9	6,0	6,2	6,4	6,7	6,6	6,7	6,9	7,2	7,4	7,4	6,6
2018	7,5	7,2	6,8	6,4	6,2	5,9	5,9	5,6	5,2	4,7	4,1	3,6	5,8
2019	3,3	3,2	3,3	3,3	3,0	2,7	2,2	1,9	1,5	1,5	1,6	1,9	2,4
2020	2,0	2,1	2,3	2,7	3,5	4,4	5,4	6,2	6,8	7,0	7,3	7,6	4,8
2021	8,0	8,4	8,6	8,5	8,1	7,6	7,0	6,6	6,5	6,6	6,5	6,4	7,3
2022	6,1	5,8	5,5	5,3	5,1	5,0	5,1	5,3	5,3	5,4

¹ Annual average.

Figure 2 - RPPI national index numbers and year-on-year rates

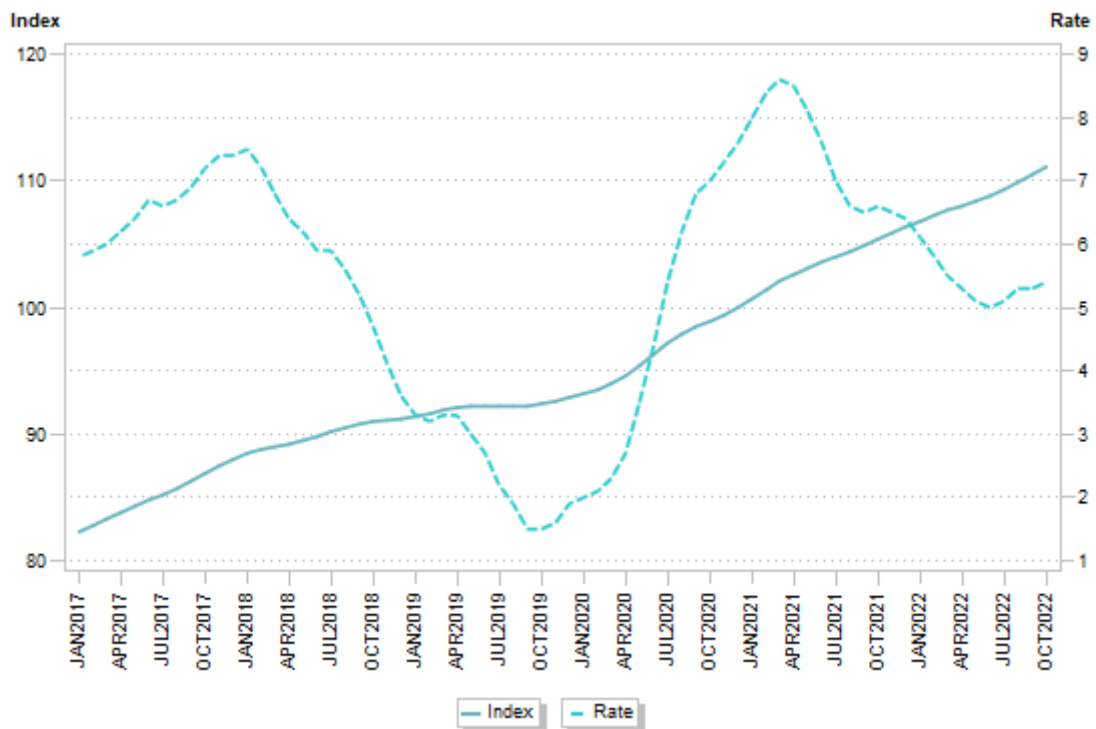


Table 3 - Metropolitan areas indices and annual percentage changes

Metropolitan area	Weight	Index (Dec 2020=100)			Percentage change	
		Oct 2021	Sep 2022	Oct 2022	Oct 2022 vs. Sep 2022	Oct 2022 vs. Oct 2021
All metropolitan areas	100,00	105,1	109,5	110,1	0,5	4,8
City of Cape Town	28,21	105,9	110,6	111,6	0,9	5,4
Buffalo City	2,09	100,1	109,7	109,9	0,2	9,8
Nelson Mandela Bay	4,13	105,5	109,5	109,8	0,3	4,1
Mangaung	2,70	105,7	113,2	114,0	0,7	7,9
eThekweni	10,56	104,8	110,5	111,1	0,5	6,0
Ekurhuleni	12,37	105,3	112,0	112,7	0,6	7,0
City of Johannesburg	23,89	102,9	104,8	105,0	0,2	2,0
City of Tshwane	16,05	107,2	110,7	111,0	0,3	3,5

Figure 3.1 - Contributions to the monthly percentage change in the RPPI for all metropolitan areas

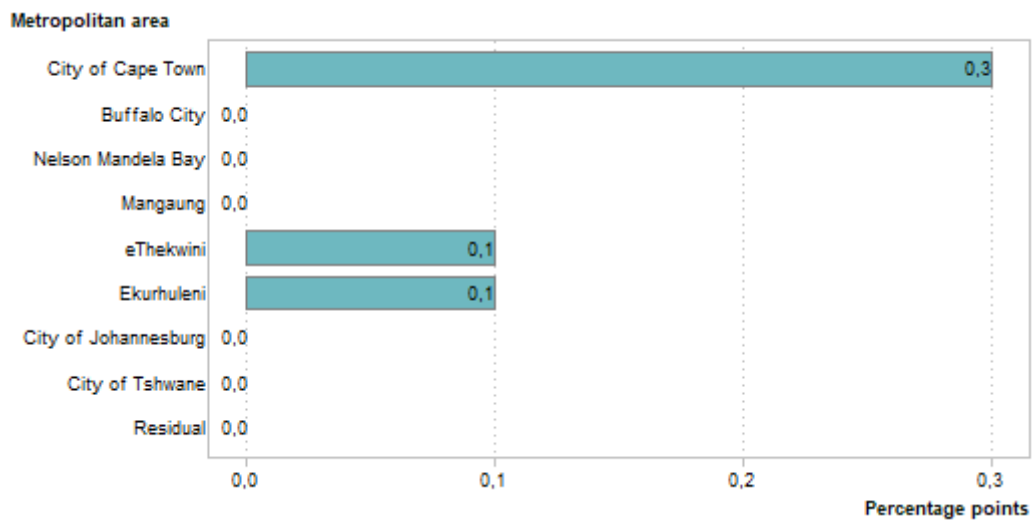
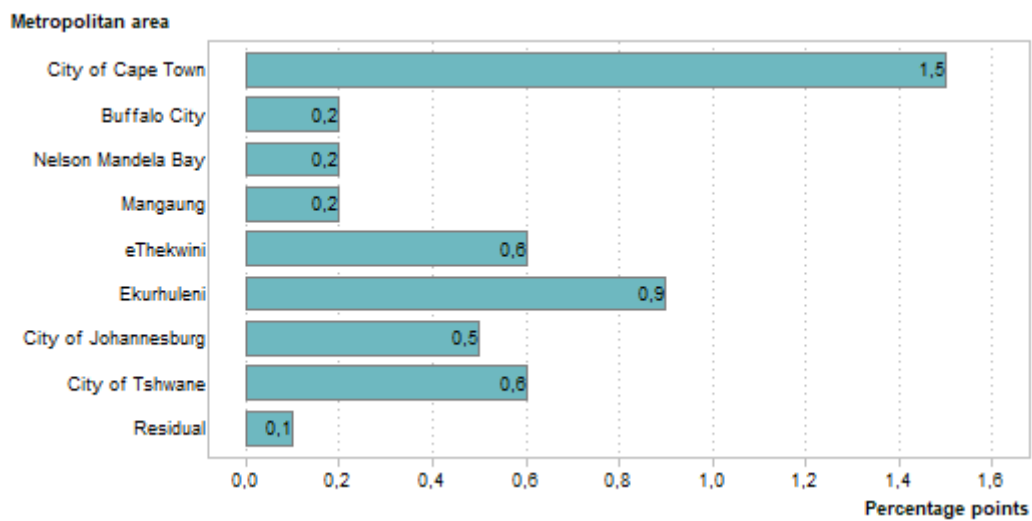


Figure 3.2 - Contributions to the annual percentage change in the RPPI for all metropolitan areas



KEY FINDINGS FOR JANUARY 2010 TO OCTOBER 2022

The national RPPI increased by 97,3% between January 2010 and October 2022 (see Figure 4 and Table 4). Residential property prices in the Western Cape grew by 137,0% over this period, faster than any other province. Northern Cape registered the second highest growth rate (103,3%), followed by KwaZulu-Natal (92,8%) and Mpumalanga (84,9%). The province with the lowest growth rate over this period was North West (34,1%).

Figure 4 – National and provincial RPPI¹

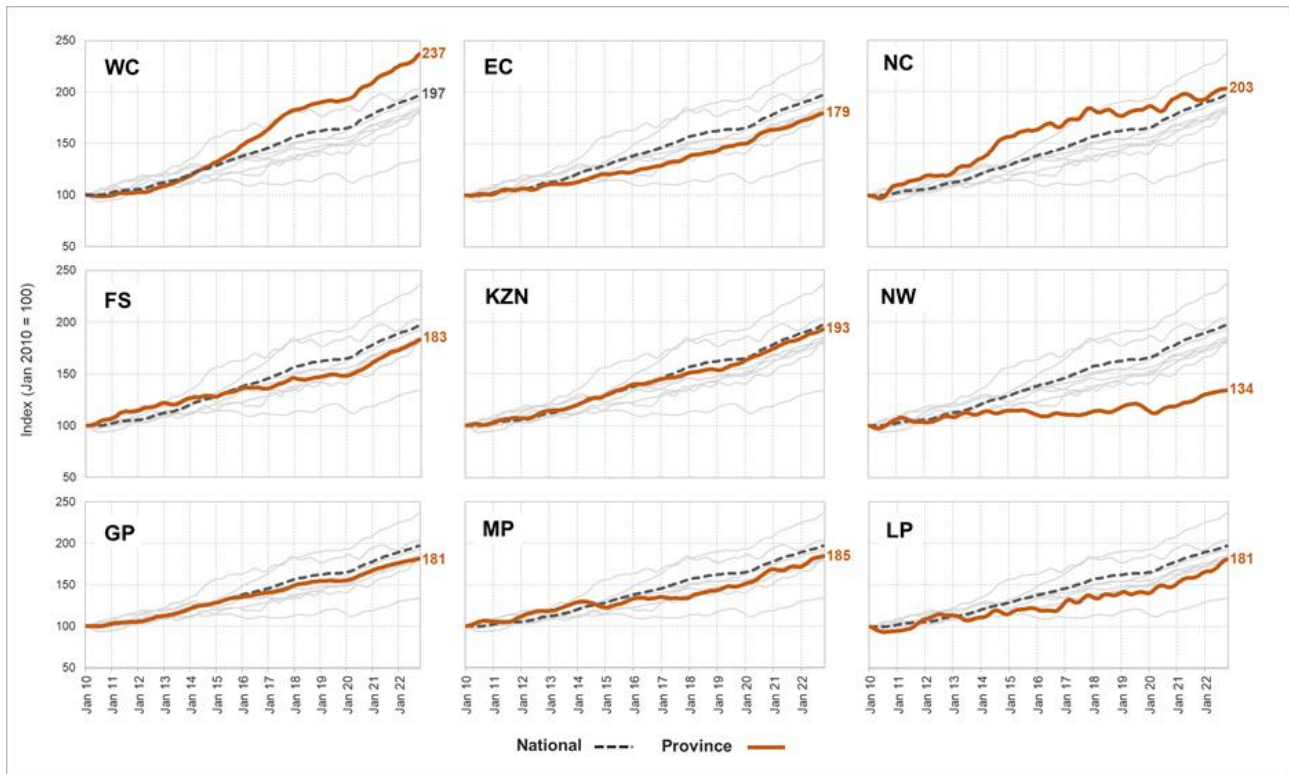


Table 4 – Provincial RPPI growth rates from January 2010 to October 2022

Province	Percentage change in RPPI January 2010 – October 2022
National	97,3
Western Cape	137,0
Eastern Cape	79,2
Northern Cape	103,3
Free State	83,1
KwaZulu-Natal	92,8
North West	34,1
Gauteng	81,4
Mpumalanga	84,9
Limpopo	80,7

¹ Note the indices in Figure 4 have an index reference period of January 2010 to illustrate the long-term development of the indices. The indices published elsewhere in the discussion document have a reference period of December 2020.

Average annual national RPPI inflation, as shown in Figure 5, ranged between 2,4% (2019) and 8,0% (2014). It increased from 2,4% in 2019 to 4,8% in 2020 and 7,3% in 2021.

Figure 5 – Average annual national RPPI inflation

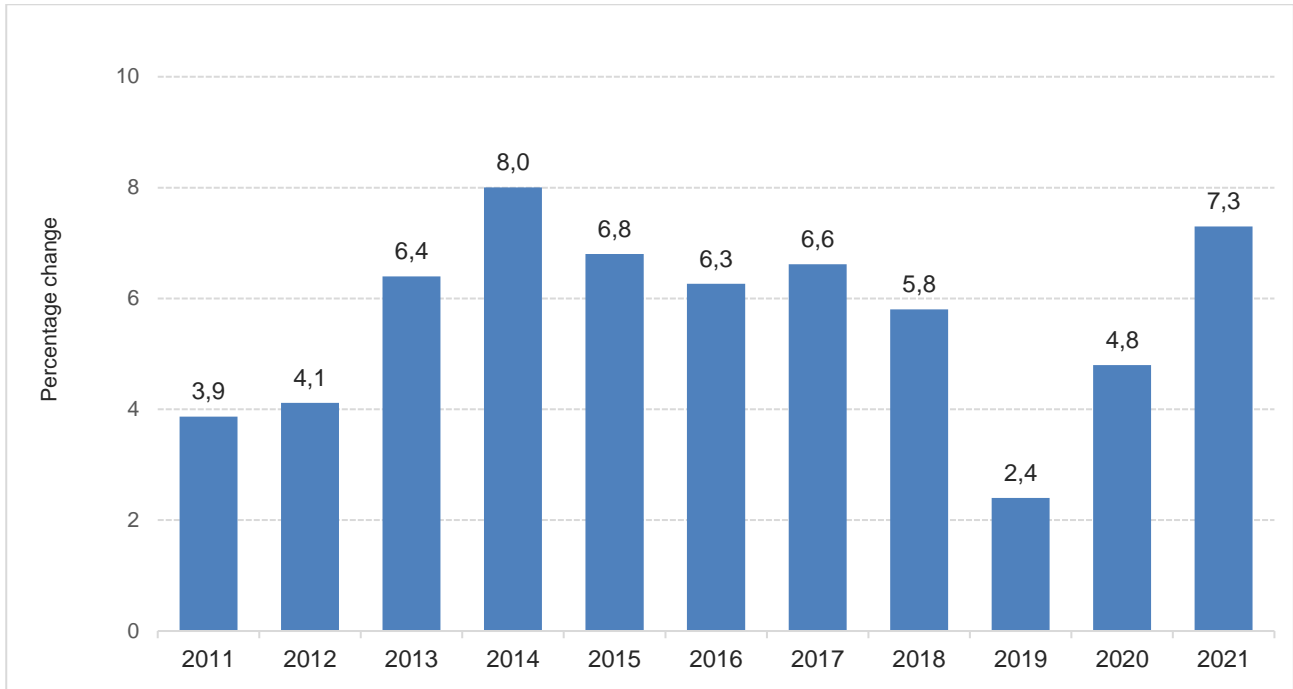


Table 5 shows the growth rates in the RPPI for each metropolitan area from January 2010 to October 2022. City of Cape Town showed the highest growth from 2010, with prices increasing by 139,9%, followed by Ekurhuleni (92,7%) and City of Tshwane (90,9%). City of Johannesburg recorded the lowest growth rate (69,9%).

Table 5 – Percentage change in the RPPI for metropolitan areas from January 2010 to October 2022

Metropolitan area	Percentage change in RPPI January 2010 – October 2022
All metropolitan areas	97,5
City of Cape Town	139,9
Buffalo City	86,1
Nelson Mandela Bay	74,4
Mangaung	79,6
eThekweni	82,2
Ekurhuleni	92,7
City of Johannesburg	69,9
City of Tshwane	90,9

EXPLANATORY NOTES

Purpose of the survey	The RPPI aims to measure the rate at which the prices of residential properties purchased by households change over time. It measures this rate at national, provincial and metropolitan municipality levels.
Scope of the survey	Both new and existing dwellings are covered. Only market prices from actual transactions are considered. They include the price of the land on which residential buildings are located.
Data source	The primary source data used to estimate the RPPI comes from the Office of the Chief Registrar of Deeds (Deeds office). It is an administrative record of all property transactions in South Africa.
The model	<p>The time dummy hedonic regression method was used to estimate the indices.</p> <p>According to this method, regression analysis is used to describe the relation between the prices set by the market for residential property and the available characteristics.</p> <p>The prices and characteristics of all dwellings for 12 months are pooled in the same regression and a dummy variable is established for each period. The estimated coefficients of these dummy variables are used to derive the index.</p> <p>The resulting indices show a high level of volatility and in order to provide a more meaningful interpretation of changes in the index, a smoothing algorithm (a Henderson filter) is applied.</p>
Revisions	The RPPIs for the latest 12 months are preliminary and subject to revision.
Weights	<p>The sales values of the most recent complete calendar year are calculated from the Deeds office data and are used to compile the weights. The 'most recent complete calendar year' refers to the most recent calendar year that is no longer open for revision. The weights in this publication are based on the sales values for 2020.</p> <p>Weights will be updated annually with effect from the January RPPI each year.</p>

Further information on the sources of information, weighting structure and methods of compilation of the RPPI can be found in the RPPI sources and methods document, soon to be available on the Stats SA website at:

https://www.statssa.gov.za/?page_id=2528

GLOSSARY

Annual percentage change	The annual percentage change is the change in the index of the relevant month of the current year compared with the index of the same month in the previous year expressed as a percentage.
Average annual percentage change	The average annual percentage change is the change in the average index of one year compared with the average index of the previous year expressed as a percentage.
Chain linking	The construction of a continuous price series by multiplying together price indices that have been calculated using different weights reference periods. The resulting index is referred to as a chained index. Linking is intended to ensure that the individual indices on all levels show the correct development through time, but leads to non-additivity. The RPPI is chained annually as new weights are implemented.
Metropolitan municipality	Local authority that has a municipal executive and legislative authority in an area that includes more than one municipality, as described in section 155(1) of the Constitution as a category A municipality.
Monthly percentage change	The monthly percentage change is the change in the index of the relevant month compared with the index of the previous month expressed as a percentage.
Residential Property Price Index	Residential property price indices measure the changes in the price of residential properties.

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GENERAL INFORMATION

Stats SA publishes approximately 300 different statistical releases each year. It is not economically viable to produce them in more than one of South Africa's eleven official languages. Since the releases are used extensively, not only locally but also by international economic and social-scientific communities, Stats SA releases are published in English only.

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Forthcoming issues

Issue	Expected release date
November 2022	13 April 2023
December 2022	11 May 2023
January 2023	8 June 2023

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