Data Article

Covid-19 risk data during lockdown-like policy in Indonesia

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**ABSTRACT**

Covid-19 pandemic has spread fast almost all countries in the world including Indonesia. In order to slow such pandemic confirmed cases, Indonesian local and central governments apply a lockdown-like policy. We call this Large-Scale Social Restriction (Pembatasan Sosial Berskala Besar, known as PSBB) and PSBB-variant that is Expanded and Tightened Social Restriction or Pembatasan Sosial yang Diperluas dan Diperketat (PSDD). In this paper, we present number of cases and case fatality rate before, during and after such lockdown-like policy. This article contains Covid-19 risk data of several cities and provinces in Indonesia. We have used central and local government Covid-19 tracking sites to determine the daily risks for several cities and provinces in Indonesia. All data were extracted on August 22, 2020. We developed these data and calculated daily rate of confirmed and active cases, case fatality rate and rate of case fatality rate before, during and after lockdown-like policy. Furthermore, such risk modeling is used to forecast of what so-called Value-at-Risk (VaR).

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Specifications Table

| Subject        | Public Health and Health Policy |
|----------------|---------------------------------|
| Specific subject area | Health Risk and Health Forecast |
| Type of data   | Table                           |
|                | Figure                          |
|                | Raw data                        |
| How data were acquired | By using central and local government Covid-19 tracking sites, we extracted the number of confirmed Covid-19 cases, the number of active cases and the number of deaths. We then calculated daily rate of confirmed and active cases, case fatality rate and rate of case fatality rate. All data were extracted on August 22, 2020. |
| Data format    | Raw                              |
|                | Analyzed                         |
|                | Excel file of the daily data are presented in Supplementary Data. The data were analyzed using the statistical software of R. |
| Parameters for data collection | Provinces and cities included in these data are located in major islands in Indonesia. In addition, provinces included in these data are among the top ten provinces with most confirmed Covid-19 cases in Indonesia. Cities included in these data are cities with daily data available on the local government Covid-19 tracking site. |
| Description of data collection | We developed these data and calculated daily rate of confirmed cases, rate of active cases, case fatality rate and rate of case fatality rate. The Covid-19 risks are grouped according to lockdown-like policy. |
| Data source location | Country: Indonesia |
|                | Raw data can be retrieved from https://covid19.go.id/peta-sebaran, https://pikobar.jabarprov.go.id, https://covid19.papua.go.id, https://covid19.pemkomedan.go.id, https://covid19.kaltimprov.go.id. |
| Data accessibility | Summary data are available with this article. Raw data including R code used for analysis are available in Mendeley Data (https://data.mendeley.com/datasets/stksys9c3r/1). |

Value of the Data

- Daily Covid-19 risk data of confirmed cases, active cases and case fatality rate are presented during lockdown-like policy to provide information related to the increase or decrease of the risk, i.e., to carry out a risk modeling.
- These data may be used by policy makers to make decision whether to continue lockdown-like policy or not and to forecast future cases.
- The Covid-19 risk data may increase people awareness in making social or physical distancing to slow pandemic spread.

1. Data Description

The daily prevalence data of Covid-19 to August 22, 2020 were collected from central and local government Covid-19 tracking site (https://covid19.go.id/peta-sebaran, https://pikobar.jabarprov.go.id, https://covid19.papua.go.id, https://covid19.pemkomedan.go.id, https://covid19.kaltimprov.go.id) [1-5]. The starting dates for each city and province were as follows: City of Bandung: March 6, 2020, Province of West Java: March 2, 2020, Province of South Sulawesi: March 19, 2020, City of Jayapura: April 3, 2020, Province of Papua: March 22, 2020, City of Medan: March 27, 2020, Province of North Sumatera: March 17, 2020, City of Samarinda: April 4, 2020, and Province of East Kalimantan: March 14, 2020. It was known that the governments in the first three provinces and the corresponding capital cities applied lockdown-like policy called PSBB (Pembatasan Sosial Berskala Besar) or PSDD (Pembatasan Sosial yang Diperluas dan Diperketat). PSBB and PSDD are actually similar. The Health Minister regulated the former and several local governments then implemented it under his permission [6]. Meanwhile, the latter had been regulated only by the local government of Province of Papua [7] before the regulation
of PSBB was set up by the Health Minister. The dates of these lockdown-like policies were 6 May to 25 June (PSBB in Bandung/West Java), 24 April to 22 May (PSBB in South Sulawesi), 24 April to 22 August (PSDD in Jayapura), 24 April to 3 August (PSDD in Papua). The data for such three provinces and their capital cities were grouped according to the period of pre-, during

|                    | Pre-PSBB | PSBB | Post-PSBB |
|--------------------|----------|------|-----------|
| Bandung            | Mean     | 0.1089 | 0.0137 | 0.0140 |
|                    | Q1       | 0.0000 | 0.0000 | 0.0020 |
|                    | Median   | 0.0000 | 0.0000 | 0.0059 |
|                    | Q3       | 0.1329 | 0.0086 | 0.0277 |
|                    | Min      | 0.0000 | 0.0000 | 0.0000 |
|                    | Max      | 0.8267 | 0.1711 | 0.0775 |
| West Java          | Mean     | 0.1008 | 0.0167 | 0.0195 |
|                    | Q1       | 0.0133 | 0.0076 | 0.0098 |
|                    | Median   | 0.0508 | 0.0134 | 0.0142 |
|                    | Q3       | 0.1367 | 0.0192 | 0.0213 |
|                    | Min      | 0.0000 | 0.0000 | 0.0044 |
|                    | Max      | 0.6931 | 0.0987 | 0.2219 |

|                    | Pre-PSBB | PSBB | Post-PSBB |
|--------------------|----------|------|-----------|
| Bandung            | Mean     | 0.1200 | 0.1256 | 0.0920 |
|                    | Q1       | 0.0000 | 0.1140 | 0.0757 |
|                    | Median   | 0.1500 | 0.1209 | 0.0986 |
|                    | Q3       | 0.2000 | 0.1339 | 0.1096 |
|                    | Min      | 0.0000 | 0.1049 | 0.0588 |
|                    | Max      | 0.2500 | 0.1733 | 0.1117 |
| West Java          | Mean     | 0.1345 | 0.0639 | 0.0368 |
|                    | Q1       | 0.0904 | 0.0619 | 0.0305 |
|                    | Median   | 0.1081 | 0.0635 | 0.0345 |
|                    | Q3       | 0.1429 | 0.0657 | 0.0374 |
|                    | Min      | 0.0000 | 0.0581 | 0.0271 |
|                    | Max      | 0.5000 | 0.0734 | 0.0581 |

**Table 1**
Statistics of risks in the period of pre-, during and post-lockdown-like policy (PSBB) in City of Bandung and Province of West Java.

| R_f                     | Pre-PSBB | PSBB | Post-PSBB |
|-------------------------|----------|------|-----------|
| Bandung                 | Mean     | 0.0108 | 0.0088 | 0.0059 |
|                        | Q1       | 0.0000 | 0.0000 | 0.0000 |
|                        | Median   | 0.0000 | 0.0000 | 0.0161 |
|                        | Q3       | 0.1484 | 0.0120 | 0.0389 |
|                        | Min      | -0.3365 | -0.4078 | -0.6568 |
|                        | Max      | 1.1137 | 0.2398 | 0.2079 |
| West Java              | Mean     | 0.0962 | 0.0061 | 0.0171 |
|                        | Q1       | 0.0000 | -0.0119 | 0.0033 |
|                        | Median   | 0.0428 | 0.0052 | 0.0150 |
|                        | Q3       | 0.1151 | 0.0174 | 0.0274 |
|                        | Min      | -0.6931 | -0.0532 | -0.1861 |
|                        | Max      | 1.0986 | 0.1406 | 0.3971 |

| CFR_f                   | Pre-PSBB | PSBB | Post-PSBB |
|-------------------------|----------|------|-----------|
| Bandung                 | Mean     | -0.0122 | 0.1256 | -0.0100 |
|                        | Q1       | -0.0269 | -0.0078 | -0.0150 |
|                        | Median   | 0.0000 | 0.0000 | 0.0000 |
|                        | Q3       | 0.0692 | 0.0000 | 0.0000 |
|                        | Min      | -0.8267 | -0.1768 | -0.0775 |
|                        | Max      | 0.3254 | 0.1419 | 0.0473 |
| West Java              | Mean     | -0.0306 | -0.0032 | -0.0126 |
|                        | Q1       | -0.0621 | -0.0134 | -0.0155 |
|                        | Median   | -0.0094 | -0.0066 | -0.0093 |
|                        | Q3       | 0.0082 | 0.0037 | 0.0045 |
|                        | Min      | -0.6931 | -0.0987 | -0.2002 |
|                        | Max      | 0.3494 | 0.0955 | 0.0221 |
Table 2
Statistics of risks in the period of pre-, during and post-lockdown-like policy (PSBB) in Province of South Sulawesi.

|        | Pre-PSBB | PSBB   | Post-PSBB |
|--------|----------|--------|-----------|
| Mean   | 0.1512   | 0.0383 | 0.0243    |
| Q1     | 0.0081   | 0.0261 | 0.0117    |
| Median | 0.0465   | 0.0383 | 0.0221    |
| Q3     | 0.2131   | 0.0529 | 0.0325    |
| Min    | 0.0000   | 0.0000 | 0.0023    |
| Max    | 1.1787   | 0.1080 | 0.0841    |

|        | Pre-PSBB | PSBB   | Post-PSBB |
|--------|----------|--------|-----------|
| Mean   | 0.1595   | 0.0652 | 0.0360    |
| Q1     | 0.0854   | 0.0574 | 0.0317    |
| Median | 0.0909   | 0.0658 | 0.0334    |
| Q3     | 0.1091   | 0.0693 | 0.0384    |
| Min    | 0.0426   | 0.0486 | 0.0294    |
| Max    | 0.5000   | 0.0818 | 0.0515    |

and post-lockdown-like policy, where the period of pre-lockdown-like policy was defined from the above starting date to one day before lockdown-like policy. Meanwhile, the corresponding period of post-lockdown-like policy was from one day after lockdown-like policy to August 22, 2020. Note that the latter period was not defined in City of Jayapura since PSDD still applied in this city on August 22, 2020. Note also that, unlike the other three provinces, North Sumatera and East Kalimantan experienced the period of pre-lockdown-like policy only since they did not enforce the lockdown-like policy. The obtained data were then used to carry out a risk modeling based on daily rates and thus to forecast of what so-called Value-at-Risk (VaR).

We define several risks as follows. The first risk, called confirmed cases rate ($R_t$), is a natural logarithm of number of confirmed cases ($C_t$) up to time $t$ over the one up to time $t-1$, $R_t = \ln(C_t/C_{t-1})$. The case fatality rate at time $t$, called $CFR_t$, is defined as (total) number of deaths up to time $t$, $D_t$, over (total) number of confirmed cases up to time $t$ given by $CFR_t = D_t/C_t$ \[8\]. The active cases rate ($RA_t$) is a natural logarithm of number of active cases ($A_t$) up to time $t$ over the one up to time $t-1$, $RA_t = \ln(A_t/A_{t-1})$, where the active cases provide information on number of confirmed cases subtracted by number of deaths and number of recoveries. The last risk is rate of case fatality rate ($RCFR_t$) defined as a natural logarithm of case fatality rate ($CFR_t$) at time $t$ over the one up to time $t-1$, $RCFR_t = \ln(CFR_t/CFR_{t-1})$.

Number of confirmed cases, number of active cases and number of deaths defining the above risks are plotted in Fig. 1. Their plots show that number of confirmed cases and number of active cases are positively and strongly correlated which means that the increase of the former is followed by that of the latter. Furthermore, they are also correlated to number of deaths. The resulting risks are then displayed in Fig. 2.

Tables 1-3 summarize statistics of risks of confirmed cases rate, active case rate, case fatality rate and rate of case fatality rate in three provinces (West Java, South Sulawesi and Papua) along with their capital cities in the period of before, during and after lockdown-like policy. Meanwhile, statistics of such risks for the other provinces (North Sumatera and East Kalimantan) along with their capital cities are summarized in Table 4. Raw data and R code used for this analysis are available at https://data.mendeley.com/datasets/stksys9c3r/1.

2. Experimental Design, Materials and Methods

Using the local government sites, we extracted risk data of confirmed cases rate, active cases rate, case fatality rate and rate of case fatality rate. The data were collected before, during and
Table 3
Statistics of risks in the period of pre-, during and post-lockdown-like policy (PSDD) in City of Jayapura and Province of Papua.

|          | $R_t$ | $CFR_t$ |          | $R_t$ | $CFR_t$ |
|----------|-------|---------|----------|-------|---------|
|          | Pre-PSDD | PSDD | Post-PSDD | Pre-PSDD | PSDD | Post-PSDD |
| **Jayapura** | | | | | | |
| Mean | 0.0755 | 0.0379 | | Mean | 0.1059 | 0.0229 |
| Q1 | 0.0000 | 0.0013 | | Q1 | 0.0952 | 0.0130 |
| Median | 0.0418 | 0.0170 | | Median | 0.1036 | 0.0139 |
| Q3 | 0.0786 | 0.0418 | | Q3 | 0.1278 | 0.0224 |
| Min | 0.0000 | 0.0000 | | Min | 0.0000 | 0.0103 |
| Max | 0.4796 | 0.3909 | | Max | 0.1538 | 0.0789 |
| **Papua** | | | | | | |
| Mean | 0.1178 | 0.0311 | 0.0071 | Mean | 0.0432 | 0.0129 | 0.0018 |
| Q1 | 0.0000 | 0.0108 | 0.0028 | Q1 | 0.0000 | 0.0080 | 0.0105 |
| Median | 0.0484 | 0.0203 | 0.0061 | Median | 0.0544 | 0.0104 | 0.0106 |
| Q3 | 0.1094 | 0.0402 | 0.0093 | Q3 | 0.0648 | 0.0153 | 0.0108 |
| Min | 0.0000 | 0.0000 | 0.0000 | Min | 0.0000 | 0.0042 | 0.0104 |
| Max | 0.8473 | 0.1589 | 0.2228 | Max | 0.1154 | 0.0441 | 0.0119 |

Table 4
Statistics of risks in City of Medan, Province of North Sumatera, City of Samarinda and Province of East Kalimantan.

|          | $R_t$ | $RA_t$ | $CFR_t$ | $RCFR_t$ | $R_t$ | $RA_t$ | $CFR_t$ | $RCFR_t$ |
|----------|-------|--------|---------|---------|-------|--------|---------|---------|
|          | Pre-PSDD | PSDD | Post-PSDD | Pre-PSDD | PSDD | Post-PSDD | Pre-PSDD | PSDD | Post-PSDD |
| **Medan** | | | | | | | | | |
| Mean | 0.0430 | 0.0397 | 0.0810 | -0.0069 | Mean | 0.0381 | 0.0299 | 0.0213 | 0.0010 |
| Q1 | 0.0060 | 0.0000 | 0.0527 | -0.0196 | Q1 | 0.0000 | 0.0000 | 0.0000 | -0.0301 |
| Median | 0.0230 | 0.0133 | 0.0753 | 0.0000 | Median | 0.0037 | 0.0000 | 0.0233 | 0.0000 |
| Q3 | 0.0523 | 0.0537 | 0.1024 | 0.0088 | Q3 | 0.0502 | 0.0978 | 0.0342 | 0.0000 |
| Min | 0.0000 | -0.1989 | 0.0489 | -0.3054 | Min | 0.0000 | -0.5390 | 0.0000 | -0.1975 |
| Max | 0.9985 | 1.1632 | 0.1875 | 0.2589 | Max | 0.4055 | 0.7621 | 0.0575 | 0.6790 |
| **North Sumatera** | | | | | | | | | |
| Mean | 0.0420 | 0.0377 | 0.0940 | -0.0064 | Mean | 0.0386 | 0.0346 | 0.0168 | -0.0029 |
| Q1 | 0.0071 | 0.0000 | 0.0525 | -0.0205 | Q1 | 0.0083 | -0.0020 | 0.0101 | -0.0341 |
| Median | 0.0203 | 0.0152 | 0.0884 | -0.0027 | Median | 0.0236 | 0.0139 | 0.0133 | -0.0130 |
| Q3 | 0.0523 | 0.0610 | 0.1230 | 0.0037 | Q3 | 0.0460 | 0.0751 | 0.0231 | 0.0000 |
| Min | 0.0000 | -0.1744 | 0.0432 | -0.7492 | Min | -0.0109 | -0.2048 | 0.0000 | -0.2288 |
| Max | 0.7492 | 0.8675 | 0.2500 | 0.6931 | Max | 0.3747 | 0.4418 | 0.0526 | 0.6425 |

| **Samarinda** | | | | | | | | | |
| Mean | 0.0410 | 0.0397 | 0.0810 | -0.0069 | Mean | 0.0381 | 0.0299 | 0.0213 | 0.0010 |
| Q1 | 0.0060 | 0.0000 | 0.0527 | -0.0196 | Q1 | 0.0000 | 0.0000 | 0.0000 | -0.0301 |
| Median | 0.0230 | 0.0133 | 0.0753 | 0.0000 | Median | 0.0037 | 0.0000 | 0.0233 | 0.0000 |
| Q3 | 0.0523 | 0.0537 | 0.1024 | 0.0088 | Q3 | 0.0502 | 0.0978 | 0.0342 | 0.0000 |
| Min | 0.0000 | -0.1989 | 0.0489 | -0.3054 | Min | 0.0000 | -0.5390 | 0.0000 | -0.1975 |
| Max | 0.9985 | 1.1632 | 0.1875 | 0.2589 | Max | 0.4055 | 0.7621 | 0.0575 | 0.6790 |
| **East Kalimantan** | | | | | | | | | |
| Mean | 0.0420 | 0.0377 | 0.0940 | -0.0064 | Mean | 0.0386 | 0.0346 | 0.0168 | -0.0029 |
| Q1 | 0.0071 | 0.0000 | 0.0525 | -0.0205 | Q1 | 0.0083 | -0.0020 | 0.0101 | -0.0341 |
| Median | 0.0203 | 0.0152 | 0.0884 | -0.0027 | Median | 0.0236 | 0.0139 | 0.0133 | -0.0130 |
| Q3 | 0.0523 | 0.0610 | 0.1230 | 0.0037 | Q3 | 0.0460 | 0.0751 | 0.0231 | 0.0000 |
| Min | 0.0000 | -0.1744 | 0.0432 | -0.7492 | Min | -0.0109 | -0.2048 | 0.0000 | -0.2288 |
| Max | 0.7492 | 0.8675 | 0.2500 | 0.6931 | Max | 0.3747 | 0.4418 | 0.0526 | 0.6425 |
Fig. 2. Scatter plots of confirmed cases rate against active cases rate (and rate of case fatality rate) and active cases rate against rate of case fatality rate for cities and provinces in Indonesia.

Table 5
Value-at-Risk forecast of Covid-19 risks in the period of pre-, during and post-lockdown-like policy (PSBB) in City of Bandung and Province of West Java at 0.95 level of confidence and the corresponding coverage probability (in parentheses).

|                  | Pre-PSBB | PSBB | Post-PSBB | Pre-PSBB | PSBB | Post-PSBB |
|------------------|----------|------|-----------|----------|------|-----------|
| **R_t**          |          |      |           |          |      |           |
| Bandung          |          |      |           |          |      |           |
| QAR              | 0.6910   | 0.0784 | 0.0401    |          |      |           |
|                  | (0.9348) | (0.9231) | (0.9138) |          |      |           |
| QARCH            | 1.8297   | 0.2718 | 0.1059    |          |      |           |
|                  | (1.0000) | (1.0000) | (1.0000) |          |      |           |
| **CFR_t**        |          |      |           |          |      |           |
| Bandung          |          |      |           |          |      |           |
| QAR              | 0.2353   | 0.1121 | 0.0605    |          |      |           |
|                  | (0.9787) | (0.1692) | (0.0517) |          |      |           |
| QARCH            | 0.4210   | 0.1367 | 0.0671    |          |      |           |
|                  | (1.0000) | (0.7692) | (0.1552) |          |      |           |
| **RA_t**         |          |      |           |          |      |           |
| Bandung          |          |      |           |          |      |           |
| QAR              | 1.1546   | 0.0782 | 0.0397    |          |      |           |
|                  | (1.0000) | (0.9231) | (0.7414) |          |      |           |
| QARCH            | 3.2396   | 0.3201 | 0.7640    |          |      |           |
|                  | (1.0000) | (1.0000) | (1.0000) |          |      |           |
| **RCFR_t**       |          |      |           |          |      |           |
| Bandung          |          |      |           |          |      |           |
| QAR              | 0.0731   | 0.0466 | 0.0045    |          |      |           |
|                  | (0.7333) | (0.9385) | (0.9310) |          |      |           |
| QARCH            | 1.3394   | 0.2357 | 0.0997    |          |      |           |
|                  | (1.0000) | (1.0000) | (1.0000) |          |      |           |
| **RA_t**         |          |      |           |          |      |           |
| Bandung          |          |      |           |          |      |           |
| QAR              | 0.4397   | 0.0165 | 0.0620    |          |      |           |
|                  | (0.9692) | (0.7059) | (0.9310) |          |      |           |
| QARCH            | 2.0909   | 0.1391 | 0.2985    |          |      |           |
|                  | (1.0000) | (0.9804) | (0.9828) |          |      |           |

after lockdown-like policy, i.e., pre-PSBB/PSDD, PSBB/PSDD, and post-PSBB/PSDD. We analyzed such daily data and constructed two stochastic models: one model with constant volatility and the other model known as heteroscedastic model (model with dynamic volatility). The former was called quantile autoregressive (QAR) model whilst the latter was quantile autoregressive conditional heteroscedastic (QARCH) model [9-11]. Covid-19 risk forecasting is conducted by using the risk measure concept commonly used in finance and insurance. In particular, we forecast future confirmed cases rate, active cases rate, case fatality rate and rate of case fatality rate by a what so-called Value-at-Risk (VaR). It is a maximum risk that can be tolerated at a certain level of confidence. Tables 5-7 display risk modeling of VaR forecast through the models of QAR and QARCH for West Java, South Sulawesi, Papua and their capital cities. Meanwhile, the VaR
| QARCH | Value-at-Risk Table |
|-------|---------------------|
|       | Pre-PSBB  | PSBB  | Post-PSBB |
|       | VaR      | VaR   | VaR       |
|       | 0.1035   | 0.0208 | 0.0113    |
|       | 0.9655   | 0.4783 | (0.7778)  |
|       | 1.0581   | 0.0949 | 0.2109    |
|       | 0.9714   | 1.0000 | (0.8333)  |

| Papua | Value-at-Risk Table |
|-------|---------------------|
|       | Pre-PSBB  | PSBB  | Post-PSBB |
|       | VaR      | VaR   | VaR       |
|       | 0.0970   | 0.0655 | 0.2434    |
|       | 0.9310   | 0.9022 | (0.8857)  |
|       | 1.2178   | 0.3249 | 0.9474    |
|       | 1.0000   | 1.0000 | (1.0000)  |

### Table 7
Value-at-Risk forecast of Covid-19 risks in the period of pre-, during and post-lockdown-like policy (PSDD) in City of Jayapura and Province of Papua at 0.95 level of confidence and the corresponding coverage probability (in parentheses).

| QARCH | Value-at-Risk Table |
|-------|---------------------|
|       | Pre-PSDD  | PSDD  | Post-PSDD |
|       | VaR      | VaR   | VaR       |
|       | 0.01589  | 0.0161 | 0.1531    |
|       | 0.9439   | 0.8947 | (0.6262)  |
|       | 0.6107   | 0.0113 | 0.0241    |
|       | 1.0000   | 1.0000 | (0.7944)  |

| Papua | Value-at-Risk Table |
|-------|---------------------|
|       | Pre-PSDD  | PSDD  | Post-PSDD |
|       | VaR      | VaR   | VaR       |
|       | 0.0329   | 0.0113 | 0.0841    |
|       | 0.6667   | 0.9661 | (0.8421)  |
|       | 0.3510   | 0.0146 | 0.0132    |
|       | 1.0000   | 1.0000 | (0.7255)  |

### Table 8
The accuracy of each VaR forecast is also provided in these tables in terms of coverage probability as in [12]. The VaR forecast obtained from the model with coverage probability whose value is closer to the 0.95 level of confidence shows the best accuracy and is presented in boldface. The best VaR forecasts for all regions are provided in Fig. 3 that represents the map of Indonesia. The forecasts for North Sumatera and East Kalimantan are provided in the period of pre-lockdown-like policy only since these provinces did not apply the lockdown-like policy as already stated before in the section of Data Description.
Fig. 3. Value-at-Risk forecast of Covid-19 risks with the best accuracy in the period of pre-, during and post-lockdown-like policy in all provinces according to the map of Indonesia.
Table 8
Value-at-Risk forecast of Covid-19 risks in City of Medan, Province of North Sumatera, City of Samarinda and Province of East Kalimantan at 0.95 level of confidence and the corresponding coverage probability (in parentheses).

|                    | Medan     | North Sumatera | Samarinda | East Kalimantan |
|--------------------|-----------|----------------|-----------|-----------------|
|                    | QAR       | QARCH          | QAR       | QARCH           |
|                   | (0.0714)  | 0.3194         | (0.0961)  | 0.3633          |
|                   | (0.8446)  | (0.9932)       | (0.9177)  | (0.9873)        |
| $R_t$              | 0.0530    | 0.0737         | 0.0463    | 0.0486          |
|                   | (0.2770)  | (0.4864)       | (0.0886)  | (0.1203)        |
| $CFR_t$            | 0.1437    | 0.4977         | 0.1382    | 0.5372          |
|                   | (0.9324)  | (0.9932)       | (0.9114)  | (0.9873)        |
| $RA_t$             | 0.0556    | 0.2855         | 0.1255    | 0.5099          |
|                   | (0.9456)  | (1.0000)       | (0.9682)  | (0.9937)        |
| $RCFR_t$           | 0.1571    | 0.4454         | 0.1197    | 0.3425          |
|                   | (0.9286)  | (1.0000)       | (0.9317)  | (0.9938)        |
|                   | 0.0381    | 0.0538         | 0.0353    | 0.0424          |
|                   | (0.8440)  | (0.9858)       | (0.9295)  | (0.9691)        |
|                   | 0.2855    | 0.5372         | 0.2247    | 0.6725          |
|                   | (0.9357)  | (1.0000)       | (0.9752)  | (1.0000)        |
|                   | 0.1373    | 0.7554         | 0.2425    | 0.7755          |
|                   | (0.9615)  | (1.0000)       | (0.9653)  | (1.0000)        |

CRediT Author Statement

Khreshna Syuhada: Conceptualization, methodology, validation, formal analysis, writing original draft, writing review & editing, supervision; Aqilah Wibisono: Methodology, data curation, writing original draft, visualization; Arief Hakim: Methodology, validation, formal analysis, writing review & editing; Fida Addini: Methodology, writing review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

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