Supplementary Information

On the Temporal Analysis of COVID - 19 Pandemic and Prediction of R_0

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Table S1: Error Metrics for the validated forecasts from May 01 to June 02 for 51 countries, World, 51 Countries combined and Rest of the World

	Name	nRMSE P	nRMSE E	MAPE P	MAPE E	Group		Name	nRMSE P	nRMSE E	MAPE P	MAPE E	Group
1	**Afghanistan**	0.56568	0.22256	31.92561	9.75480	**A**	28	**Rest of the World**	0.21567	1.31763	13.72199	103.05769	**B**
2	**Brazil**	0.47223	1.22471	25.88951	99.70106	**A**	29	**51 Countries Combined**	0.05395	0.10433	3.89508	8.03219	**B**
3	**Chile**	0.68415	0.55488	41.02731	30.73401	**A**	30	**Australia**	0.01252	0.55429	1.13948	46.23391	**C**
4	**India**	0.57619	0.15246	37.81518	7.57222	**A**	31	**Austria**	0.01558	1.29668	1.31525	107.83272	**C**
5	**Kuwait**	0.64513	0.20615	41.03015	11.96550	**A**	32	**Belgium**	0.06405	1.33947	4.74704	110.58570	**C**
6	**Mexico**	0.38312	0.15995	23.64825	14.98680	**A**	33	**Bulgaria**	0.10427	0.90154	6.59625	68.49740	**C**
7	**Nepal**	1.24948	0.77331	57.92955	37.61843	**A**	34	**China**	0.00028	0.65559	0.02239	58.99670	**C**
8	**Pakistan**	0.39097	1.98539	26.41874	156.79583	**A**	35	**Czech Republic**	0.02132	0.23071	1.84069	19.56785	**C**
9	**Peru**	0.40674	0.20631	28.19819	18.15178	**A**	36	**Denmark**	0.10961	0.53352	8.03118	46.42540	**C**
10	**Qatar**	0.34022	1.25945	19.89995	99.41537	**A**	37	**France**	0.10357	1.58223	8.35533	130.60755	**C**
11	**Russia**	0.24355	0.53943	19.04328	36.54444	**A**	38	**Germany**	0.07205	1.27682	5.75579	105.63205	**C**
12	**Canada**	0.06183	1.19812	4.12298	93.18943	**B**	39	**Israel**	0.15364	0.26721	12.84871	21.14442	**C**
13	**Ecuador**	0.34051	0.31661	28.80154	26.83623	**B**	40	**Italy**	0.08899	1.58293	6.94968	128.32452	**C**
14	**Egypt**	0.36115	0.39260	19.51932	34.98868	**B**	41	**Japan**	0.16871	1.60782	12.95766	134.04575	**C**
15	**Indonesia**	0.19536	2.14667	12.34792	163.74338	**B**	42	**Malaysia**	0.01567	0.64799	1.24209	52.36259	**C**
16	**Iran**	0.09786	1.12234	6.45756	86.65882	**B**	43	**Netherlands**	0.04539	0.34036	3.25806	27.17722	**C**
17	**Panama**	0.03838	0.68306	2.74308	54.12509	**B**	44	**New Zealand**	0.02286	0.09965	1.81997	8.33615	**C**
18	**Philippines**	0.07303	1.26117	3.63362	98.42781	**B**	45	**Norway**	0.07309	0.42673	5.84506	36.26950	**C**
19	**Poland**	0.02051	0.55259	2.03577	41.44583	**B**	46	**Portugal**	0.04173	1.04704	3.48976	84.52529	**C**
20	**Saudi Arabia**	0.23913	0.71382	15.07527	52.56732	**B**	47	**Romania**	0.09445	1.44792	6.32485	112.53643	**C**
21	**Singapore**	0.05274	0.82590	3.15030	63.64694	**B**	48	**Serbia**	0.24239	1.97732	19.11869	159.27315	**C**
22	**Sri Lanka**	0.12204	0.77890	10.80179	64.71045	**B**	49	**Slovenia**	0.05946	0.12398	4.75597	10.46249	**C**
23	**Sweden**	0.08146	1.37052	6.50737	106.39659	**B**	50	**South Korea**	0.02465	2.86515	1.83464	242.50675	**C**
24	**United Kingdom**	0.03731	1.81475	3.27590	139.69212	**B**	51	**Spain**	0.03174	0.21345	2.38334	17.24604	**C**
25	**United States**	0.01224	1.85024	1.13388	142.80767	**B**	52	**Switzerland**	0.04609	1.93231	3.63933	164.42533	**C**
26	**Vietnam**	0.13241	0.05183	10.54023	4.11661	**B**	53	**Taiwan**	0.04580	0.83819	4.25652	72.33208	**C**
27	**World**	0.06309	1.09197	4.43420	84.06977	**B**	54	**Turkey**	0.16573	0.40093	12.84151	31.18999	**C**

Description for Table S1

The **Table S1** gives an overall idea of the errors during validation. nRMSE P is the nRMSE value of the Principal Prediction and nRMSE E is the nRMSE value of the Exponential Prediction. The minimum of the nRMSE P and nRMSE E values of a region are highlighted in blue and yellow respectively. Similar notations are used for MAPE values.
Over the course of the validation period (33 days), the MAPE values for 41 out of 51 countries is below 15%, and for 5 countries is between 15% and 20% To gain different perspectives about how the suggested models capture the movement of the actual data, the boxplots of the actual and predicted values and the temporal plot of the percentage errors are shown in **Fig. S1 – S8**. These temporal plots of percentage error also show whether the forecast has been over predicted (negative values) or under predicted (positive values) the actual cases.

Note: The notations and abbreviations have been followed uniformly throughout the Manuscript and the Supplementary File.

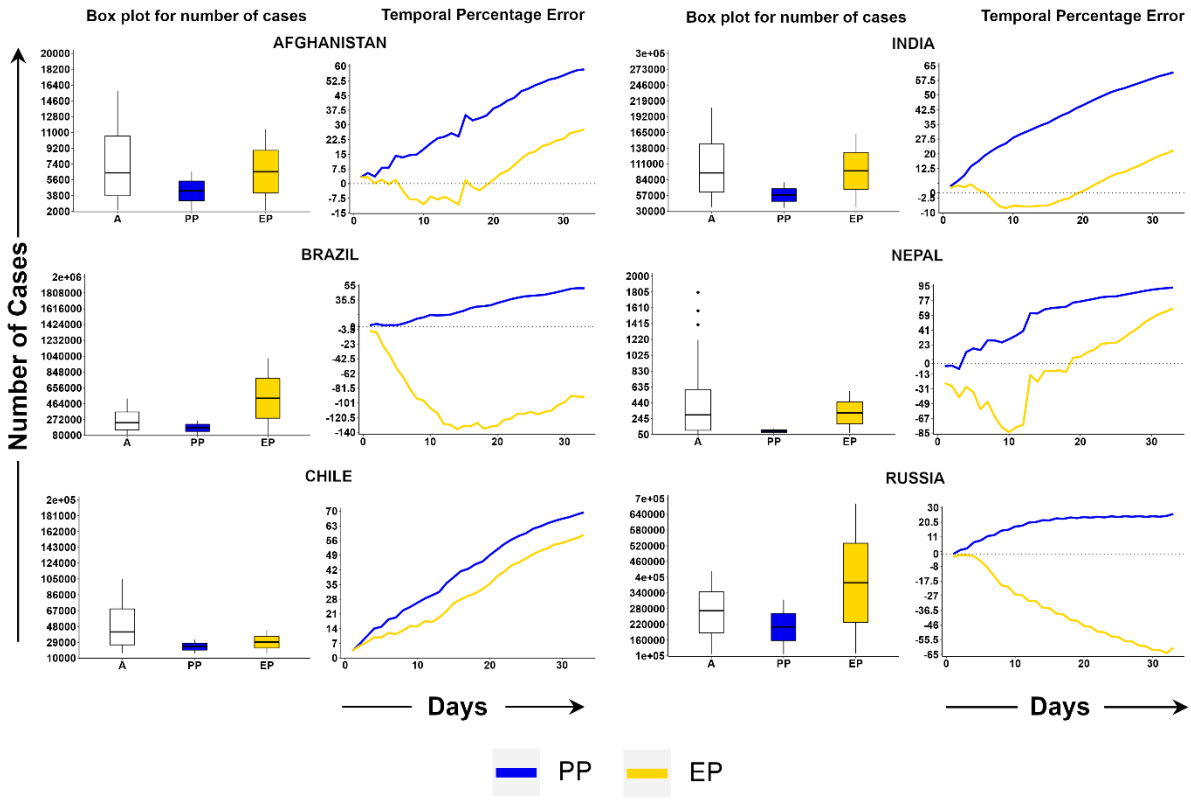

Fig. S1. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group A countries (selected 6 countries): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Afghanistan, (C) India, (E) Brazil, (G) Nepal, (I) Chile and (K) Russia; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Afghanistan, (D) India, (F) Brazil, (H) Nepal, (J) Chile and (L) Russia.

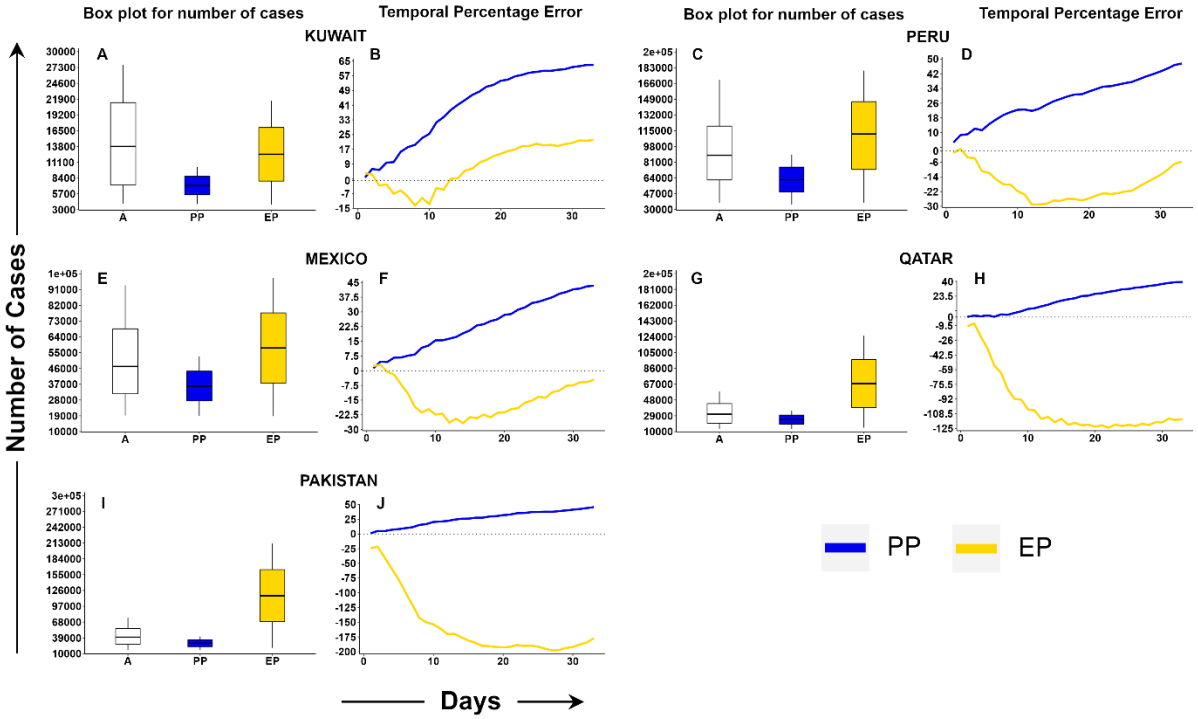

Fig. S2. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group A countries (others): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Kuwait, (C) Peru, (E) Mexico, (G) Qatar and (I) Pakistan; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Kuwait, (D) Peru, (F) Mexico, (H) Qatar and (J) Pakistan.

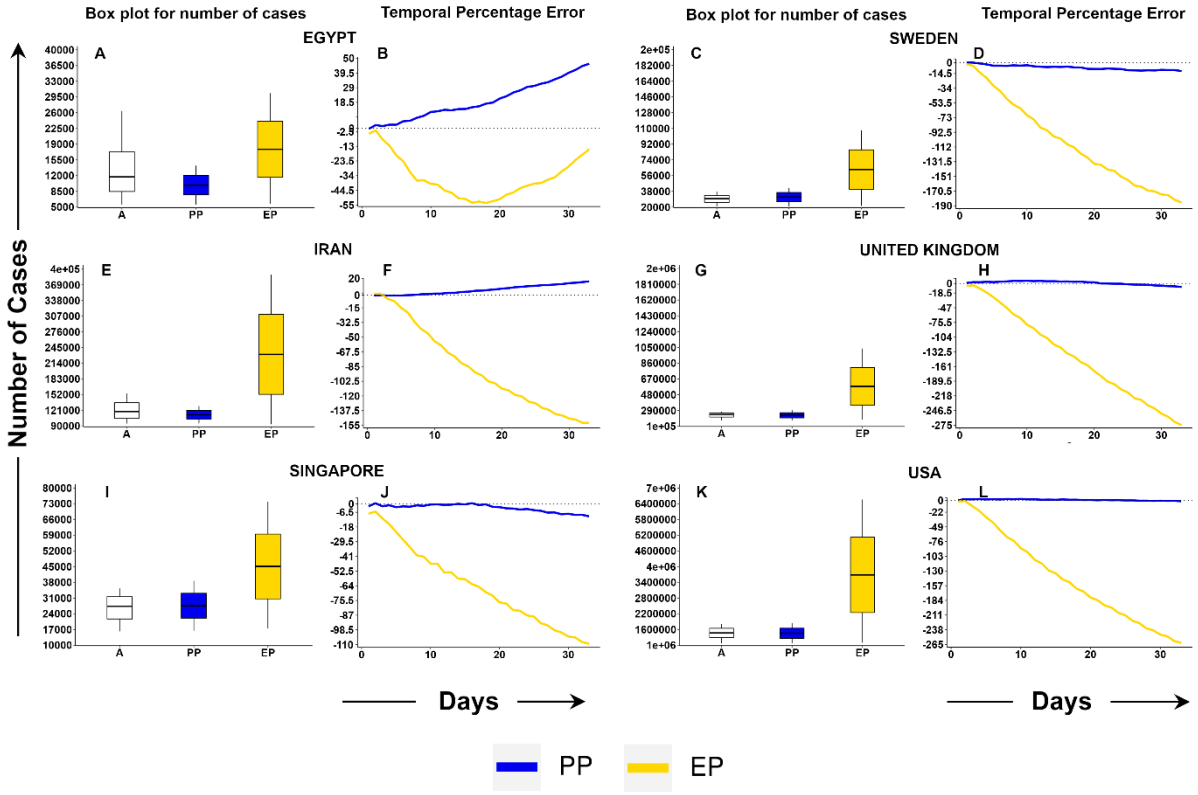

Fig. S3. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group B countries (selected 6 countries): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Egypt, (C) Sweden, (E) Iran, (G) United Kingdom, (I) Singapore and (K) USA; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Egypt, (D) Sweden, (F) Iran, (H) United Kingdom, (J) Singapore and (L) USA.

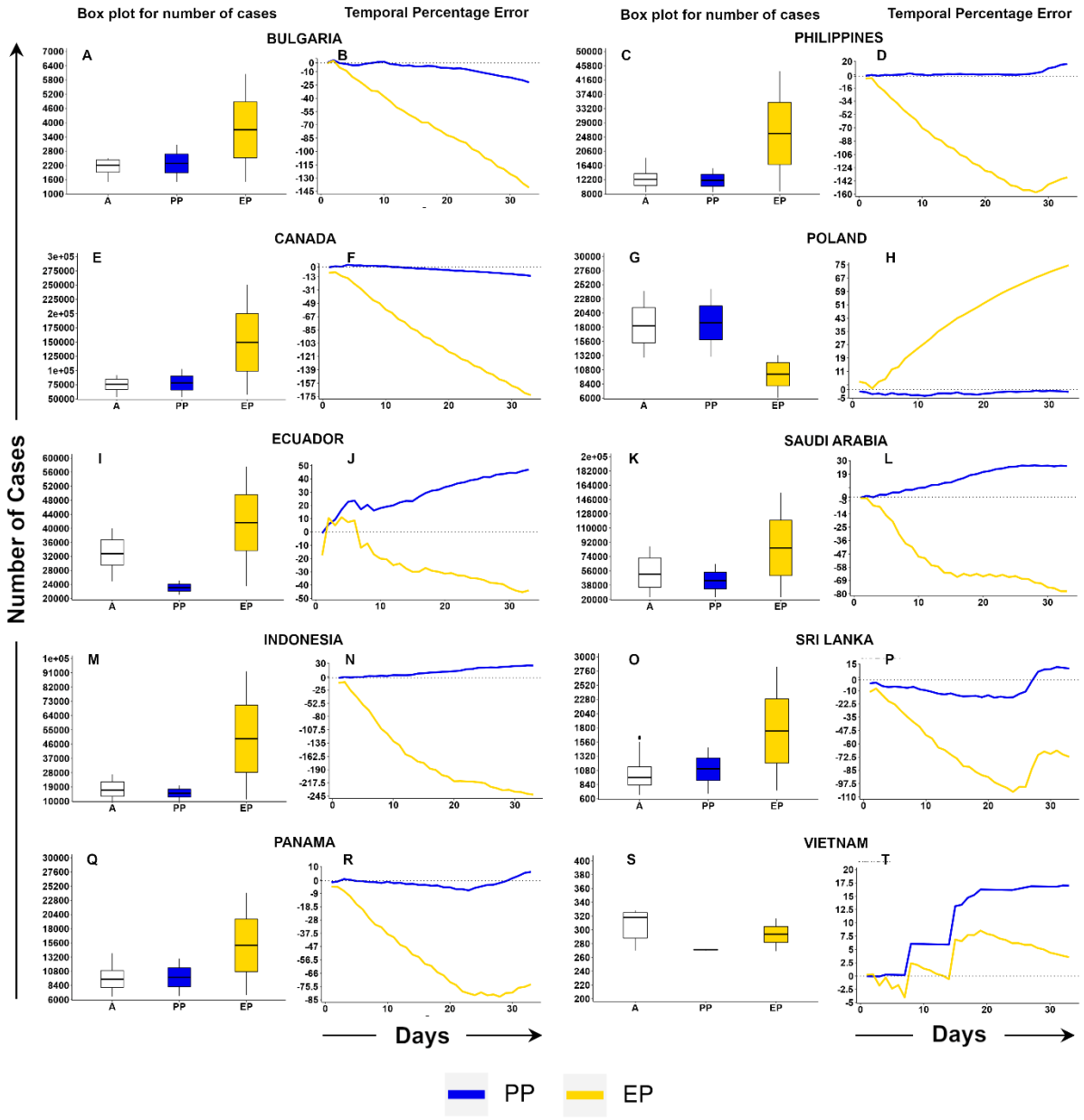

Fig. S4. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group B countries (others): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Bulgaria, (C) Philippines, (E) Canada, (G) Poland, (I) Ecuador, (K) Saudi Arabia, (M) Indonesia, (O) Sri Lanka, (Q) Panama and (S) Vietnam; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Bulgaria, (D) Philippines, (F) Canada, (H) Poland, (J) Ecuador, (L) Saudi Arabia, (N) Indonesia, (P) Sri Lanka, (R) Panama and (T) Vietnam.

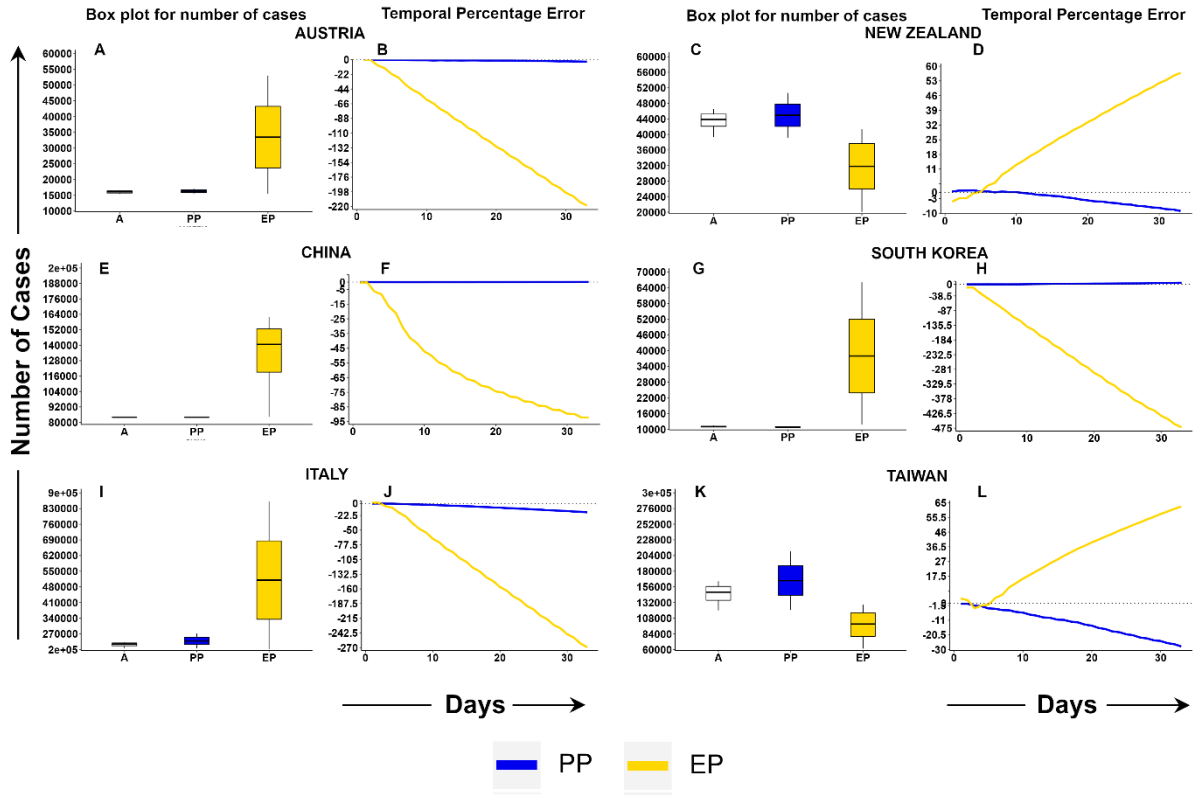

Fig. S5. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group C countries (selected 6 countries): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Austria, (C) New Zealand, (E) China, (G) South Korea, (I) Italy and (K) Taiwan; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Austria, (D) New Zealand, (F) China, (H) South Korea, (J) Italy and (L) Taiwan.

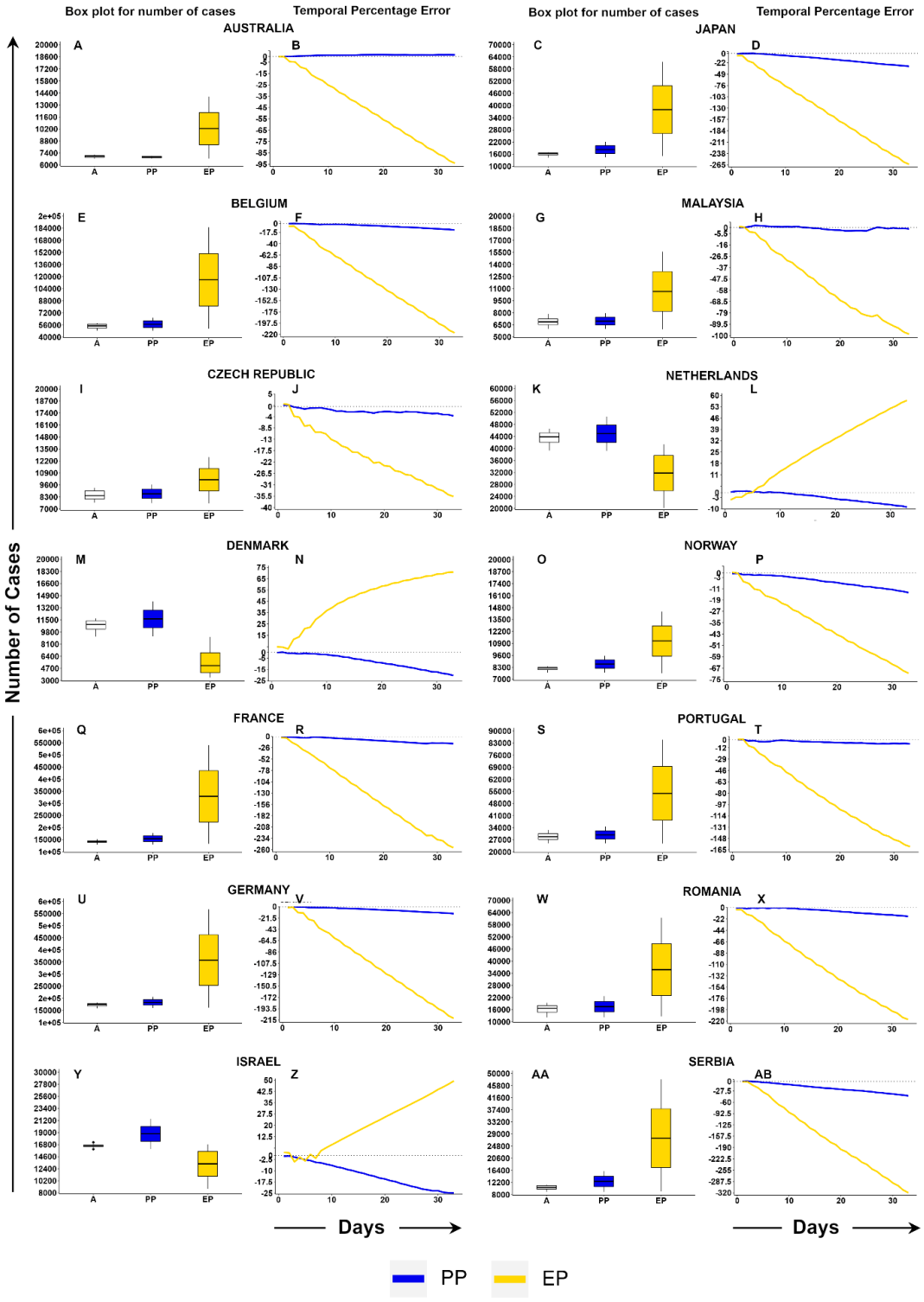

Fig. S6. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group C countries (others): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Australia, (C) Japan, (E) Belgium, (G) Malaysia, (I) Czech Republic, (K) Netherlands, (M) Denmark, (O) Norway, (Q) France, (S) Portugal, (U) Germany, (W) Romania, (Y) Israel and (AA) Serbia; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Australia, (D) Japan, (F) Belgium, (H) Malaysia, (J) Czech Republic, (L) Netherlands, (N) Denmark, (P) Norway, (R) France, (T) Portugal, (V) Germany, (X) Romania, (Z) Israel and (AB) Serbia.

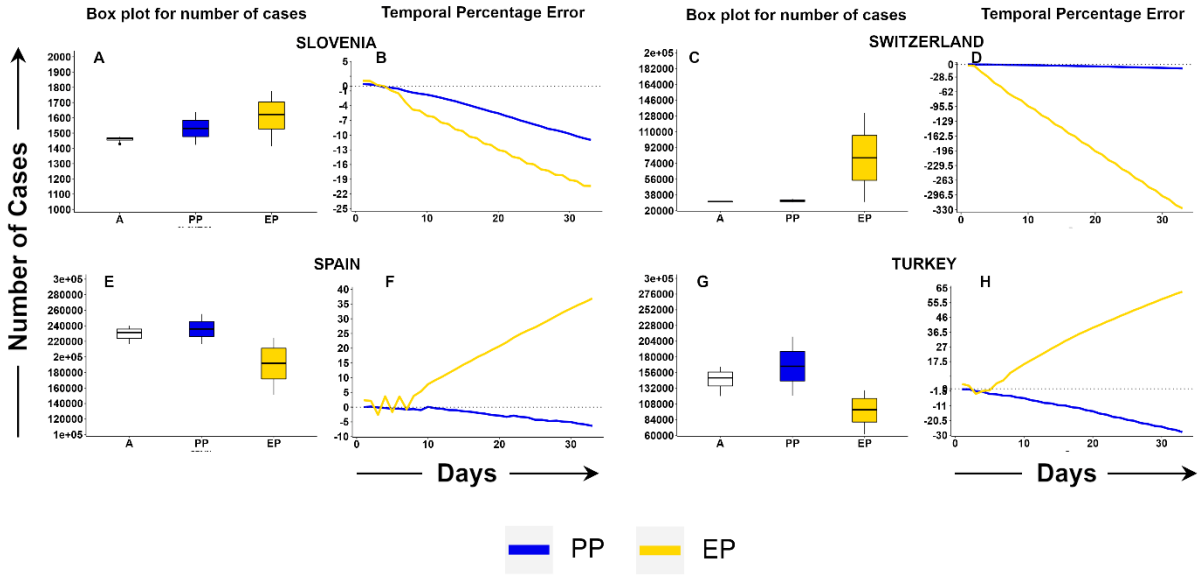

Fig. S7. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors for Group C countries (others): Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue) and Exponential prediction (yellow) each for (A) Slovenia, (C) Switzerland, (E) Spain and (G) Turkey; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) Slovenia, (D) Switzerland, (F) Spain and (H) Turkey.

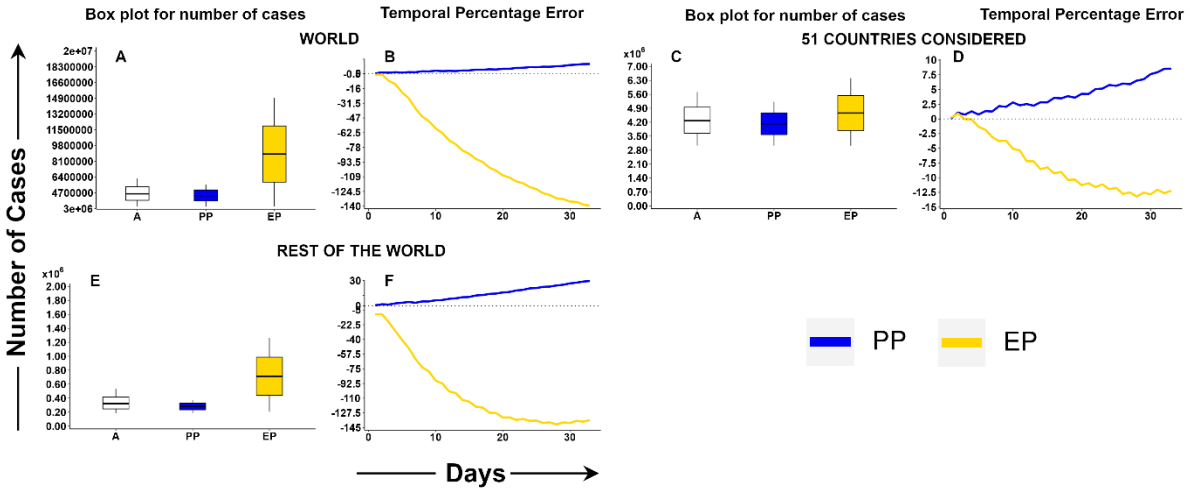

Fig. S8. Distribution of actual and predicted number of cases along with Temporal variation of Percentage Errors at Global Scale: Box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (PP) (blue) and Exponential prediction (EP) (yellow) each for (A) World, (C) 51 Countries Considered, (E) Rest of the World; Temporal variation of Percentage errors of Principal prediction (blue line) and Exponential prediction (yellow line) for 33 days for (B) World, (D) 51 Countries Considered and (F) Rest of the World.

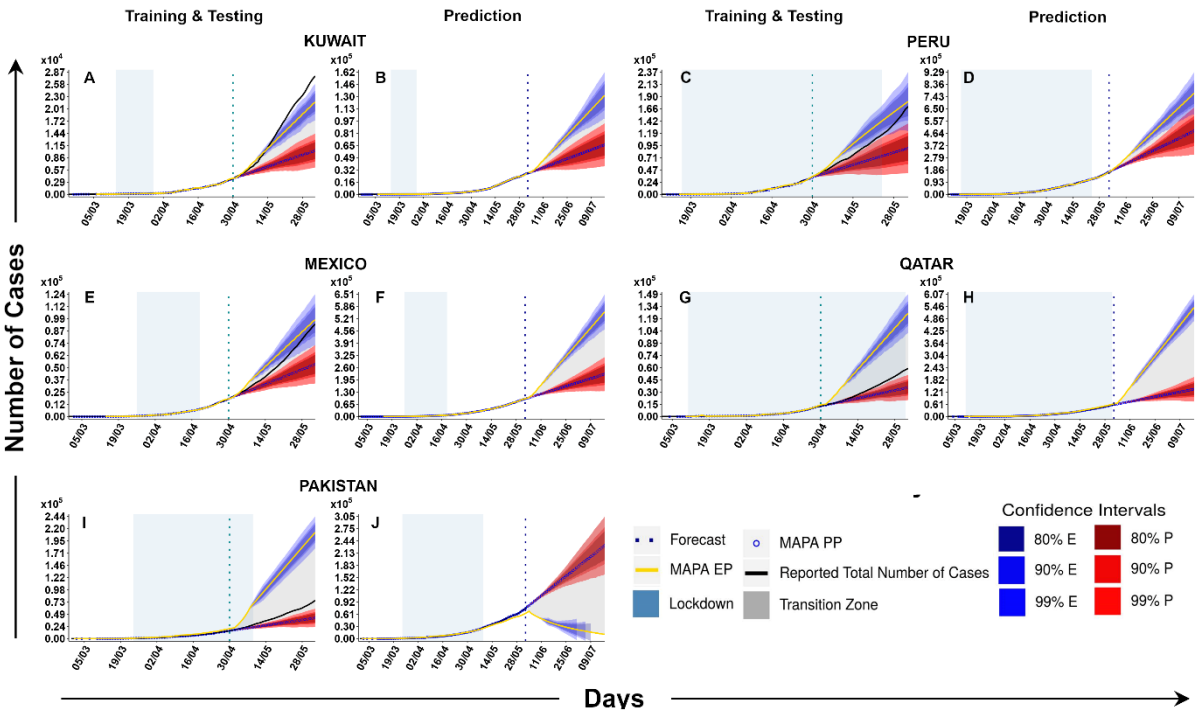

Fig. S9: Model Training and Validation of COVID-19 cases along with Use Case Prediction for Group A countries: Figure depicts Model Training (up to dotted line) and Validation for 33 days from 1st May to 02nd June by comparison of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) for (A) Kuwait, (C) Peru, (E) Mexico, (G) Qatar, and (I) Pakistan**;** (B, D, F, H, J) depicts use case prediction for the subsequent 45 days for the duration 3rd June to 17th July, 2020 for the same countries respectively; Blue shaded region depicts the lockdown for each country.

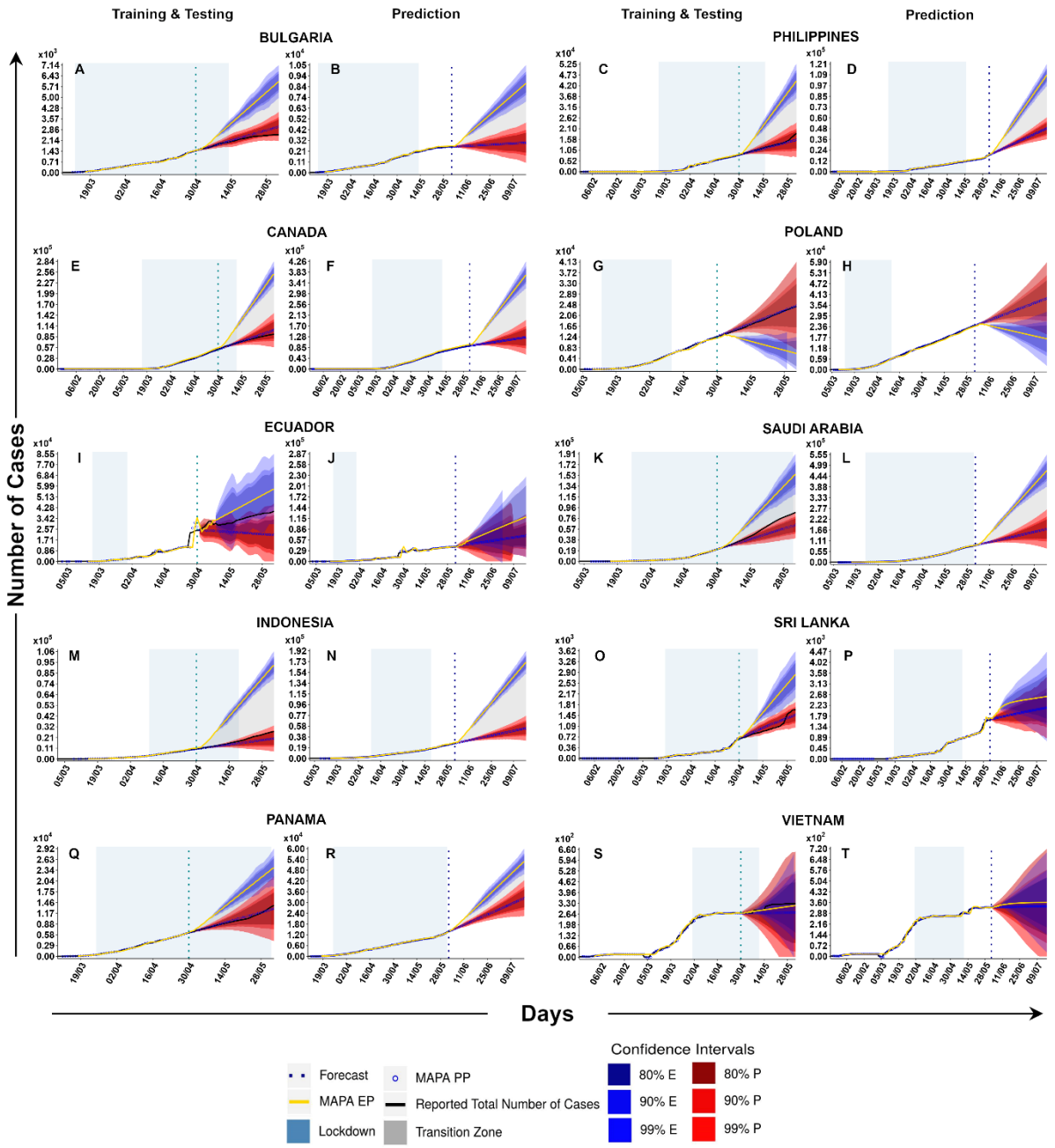

Fig. S10: Model Training and Validation of COVID-19 cases along with Use Case Prediction for Group B countries: Figure depicts Model Training (up to dotted line) and Validation for 33 days from 1st May to 02nd June by comparison of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) for (A) Bulgaria, (C) Philippines, (E) Canada, (G) Poland, (I) Ecuador, (K) Saudi Arabia, (M) Indonesia, (O) Sri Lanka, (Q) Panama and (S) Vietnam**;** (B, D, F, H, J, L, N, P, R, T) depicts use case prediction for the subsequent 45 days for the duration 3rd June to 17th July, 2020 for the same countries respectively; Blue shaded region depicts the lockdown for each country.

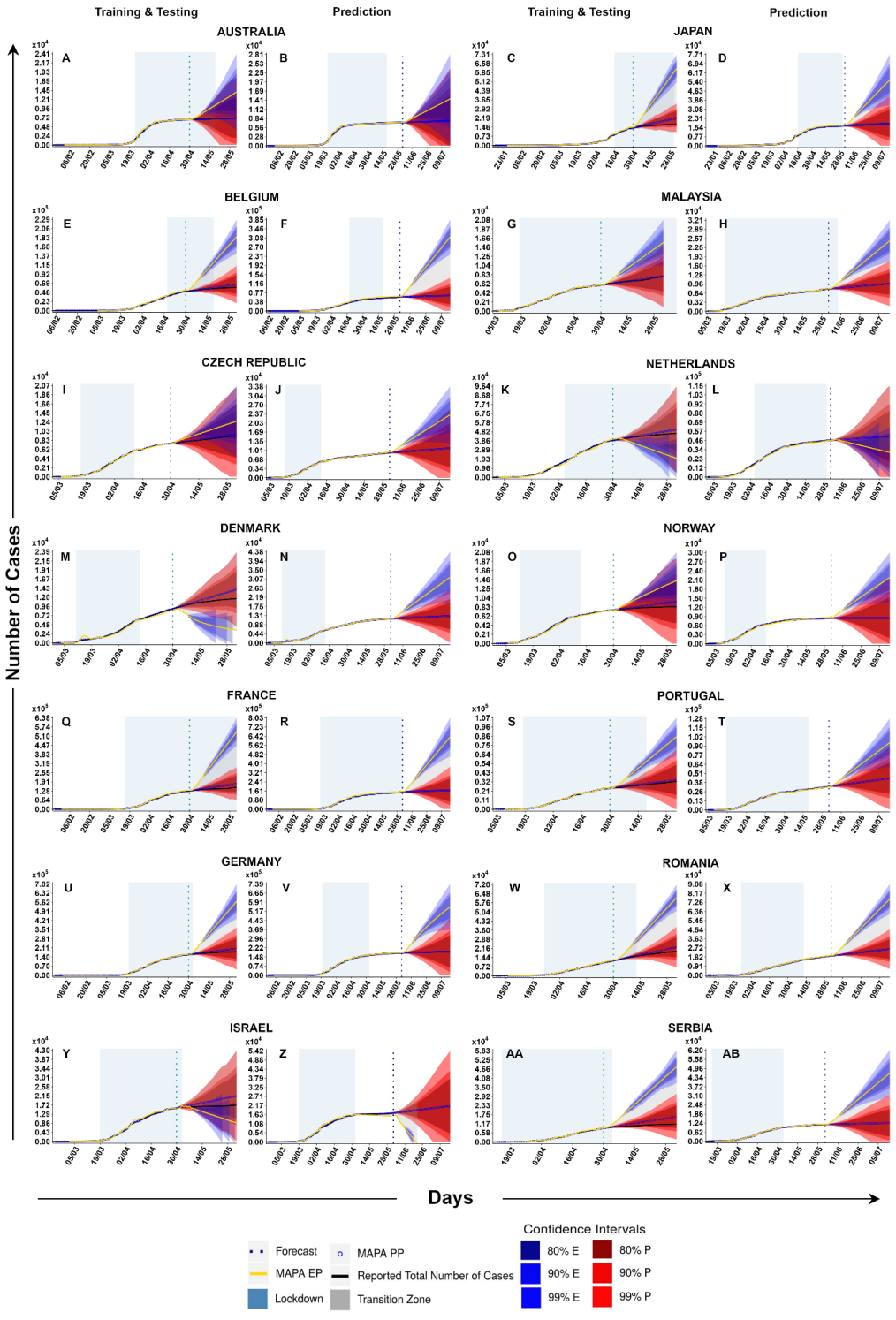

Fig. S11: Model Training and Validation of COVID-19 cases along with Use Case Prediction for Group C countries: Figure depicts Model Training (up to dotted line) and Validation for 33 days from 1st May to 02nd June by comparison of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) for(A) Australia, (C) Japan, (E) Belgium, (G) Malaysia, (I) Czech Republic, (K) Netherlands, (M) Denmark, (O) Norway, (Q) France, (S) Portugal, (U) Germany, (W) Romania, (Y) Israel and (AA) Serbia**;** (B, D, F, H, J, L, N, P, R, T, V, X, Z, AB) depicts use case prediction for the subsequent 45 days for the duration 3rd June to 17th July, 2020 for the same countries respectively; Blue shaded region depicts the lockdown for each country.

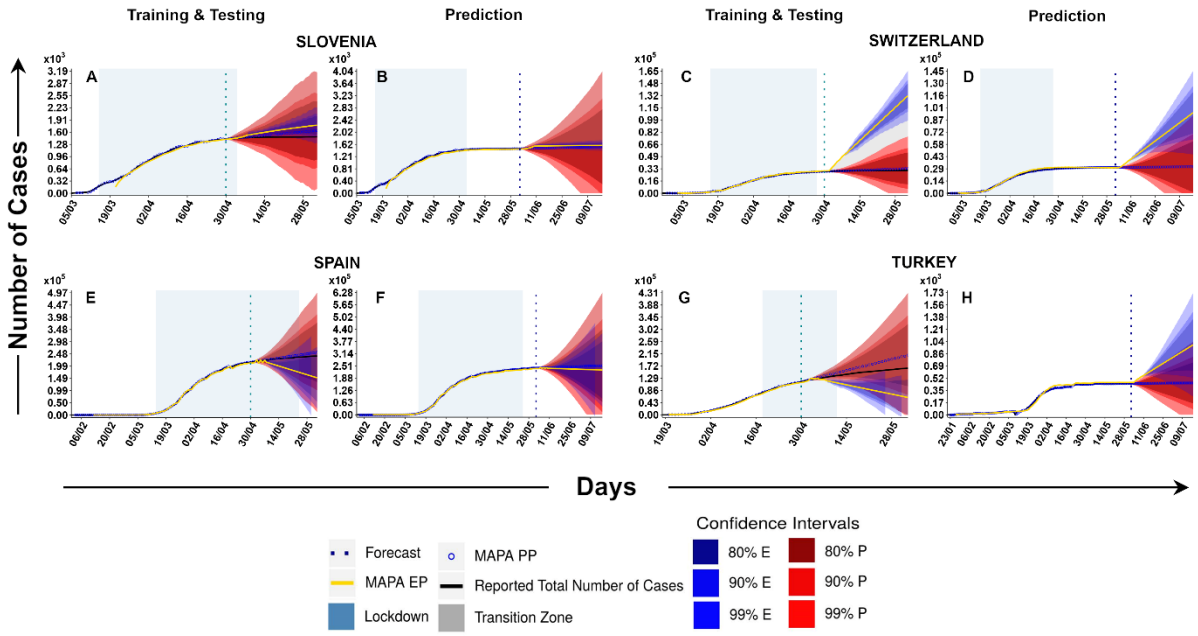

Fig. S12: Model Training and Validation of COVID-19 cases along with Use Case Prediction for Group C countries: Figure depicts Model Training (up to dotted line) and Validation for 33 days from 1st May to 02nd June by comparison of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) for (A) Slovenia, (C) Switzerland, (E) Spain and (G) Turkey**;** (B, D, F, H) depicts use case prediction for the subsequent 45 days for the duration 3rd June to 17th July, 2020 for the same countries respectively; Blue shaded region depicts the lockdown for each country.

Table S2: Comparison of predicted $R_0(t)$ values with actual data between first (01 May) and last (02 June) day of validation

	Country	$R_0(1)$	$R_0P(1)$	$R_0E(1)$	$R_0(33)$	$R_0P(33)$	$R_0E(33)$	ADA	ADP	ADE	MDA	MDP	MDE	ADA/33	ADP/33	ADE/33
1	**Peru**	1.96698	1.96258	1.96674	1.70282	1.66494	1.81303	0.26416	0.29764	0.15371	0.00826	0.0093	0.0048	0.008	0.00902	0.00466
2	**India**	1.58051	1.57858	1.58006	1.50192	1.4625	1.56545	0.07859	0.11608	0.01462	0.00246	0.00363	0.00046	0.00238	0.00352	0.00044
3	**Sweden**	1.56109	1.5609	1.56268	1.43893	1.4434	1.54775	0.12216	0.1175	0.01492	0.00382	0.00367	0.00047	0.0037	0.00356	0.00045
4	**Romania**	1.76771	1.76838	1.77078	1.5328	1.54132	1.71122	0.23491	0.22706	0.05956	0.00734	0.0071	0.00186	0.00712	0.00688	0.0018
5	**Austria**	1.75069	1.75071	1.75105	1.50842	1.51	1.6606	0.24227	0.24071	0.09045	0.00757	0.00752	0.00283	0.00734	0.00729	0.00274
6	**Portugal**	1.86805	1.86815	1.86814	1.57954	1.58282	1.73866	0.28851	0.28533	0.12947	0.00902	0.00892	0.00405	0.00874	0.00865	0.00392
7	**China**	1.4723	1.4723	1.47244	1.37451	1.37449	1.45503	0.09779	0.09781	0.01741	0.00306	0.00306	0.00054	0.00296	0.00296	0.00053
8	**World**	1.62512	1.6251	1.62566	1.51747	1.51397	1.6091	0.10764	0.11113	0.01655	0.00336	0.00347	0.00052	0.00326	0.00337	0.0005

Description for Table S2

As denoted in the **Table S2**, $R_0(1)$ is the true value of $R_0(t)$ [calculated from actual data using **Eq. (1)** and **Eq. (2)**] on May 1, $R_0(33)$ is the true value of R_0 on June 02. Similarly, R_0P (1) is the predicted value of $R_0(t)$ by the principal prediction and R_0E (1) is the exponential prediction.

ADA is the Absolute Difference of the Actual values, i.e. ADA = $|R_0(1)-R_0(33)|$. ADP and ADE are similarly defined as Absolute Difference of Principal Prediction and Absolute Difference of Exponential Prediction, respectively.

MDA is the Mean Absolute Difference of Daily Values, i.e. MDA = mean($|R_0(i)-R_0(i-1)|$) [i = 1,2,...,33], while MDP and MDE are similarly defined as Mean Absolute Difference of Principal Prediction and Absolute Difference of Exponential Prediction, respectively.

We explain further using China as an example. Here, by definition, a value of $R_0(1)$ = 1.4723 means that an infected individual infects 1.4723 people on average in a completely susceptible population. Equivalently, 100000 infected people would in turn infect 147230 new people in total. This was the case on May 1 by our calculation.

On June 02 we interpreted the value of 1.37451 as on average 100000 infected individuals will infect 137451 people in total. The total difference in value R_0 from May 01 to June 02 is 0.09779, or equivalently, 100000 infected people would in total infect 9779 lesser people on June 02 than on May 01. We also compute the average of the daily difference in $R_0(t)$ and show it in the MDA, MDP and MDE columns. We interpret it by saying that, everyday 100000 individuals infected in total 306 individuals lesser than the previous day.

We also note that this average change is almost captured by dividing the Absolute Difference column by the total number of days passed which is 33.

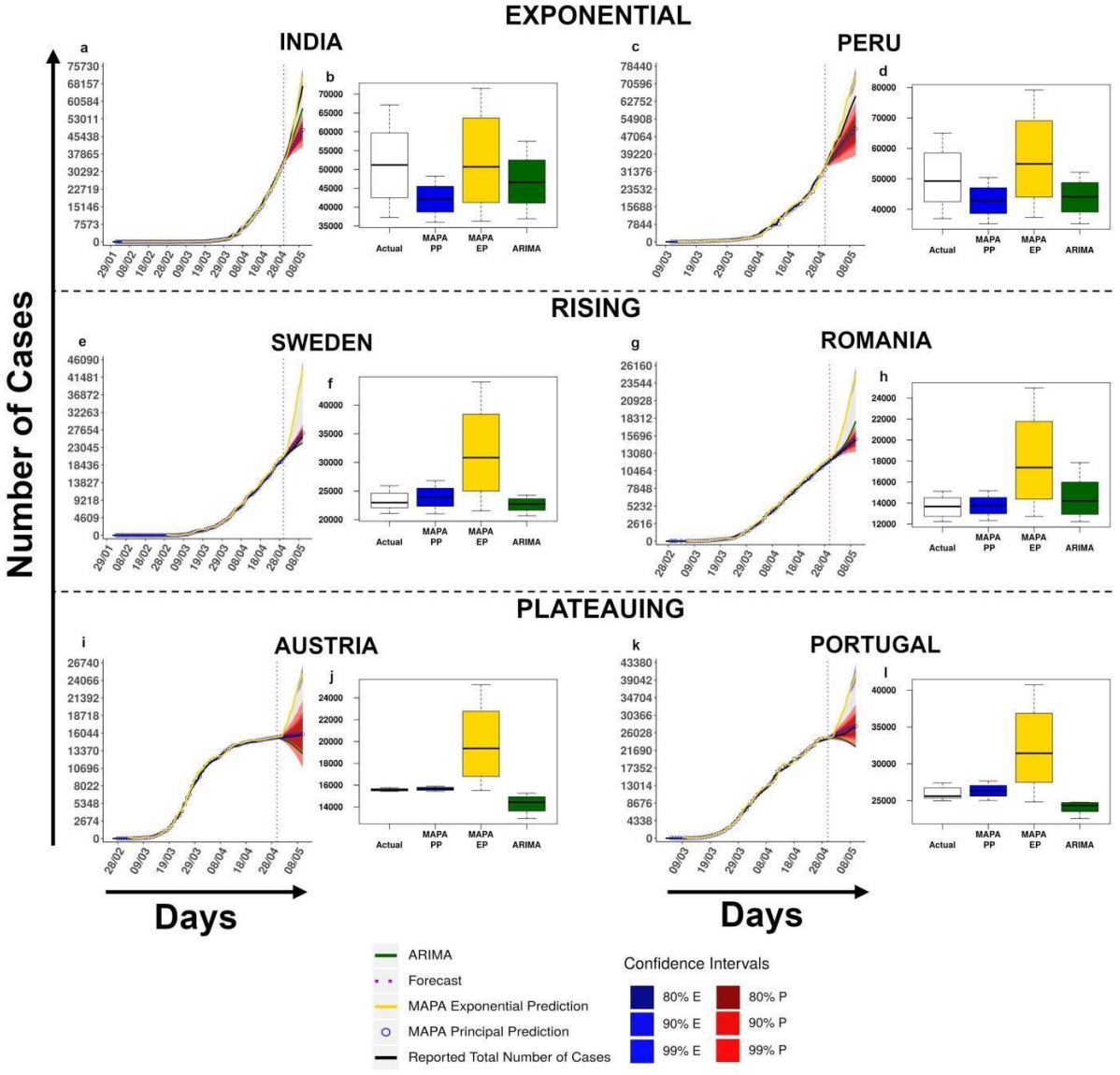

Fig. S13: Short term Comparison and Validation of COVID-19 cases using MAPA and ARIMA: Figure depicts Model Training (up to dotted line) and Validation for 10 days by comparison from 1st May to 10th May of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) and ARIMA (green line) for (a) India, (c) Peru, (e) Sweden, (g) Romania, (i) Austria and (k) Portugal**;** (b, d, f, h, j, l) depict box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue), Exponential prediction+ (yellow) and ARIMA(green).

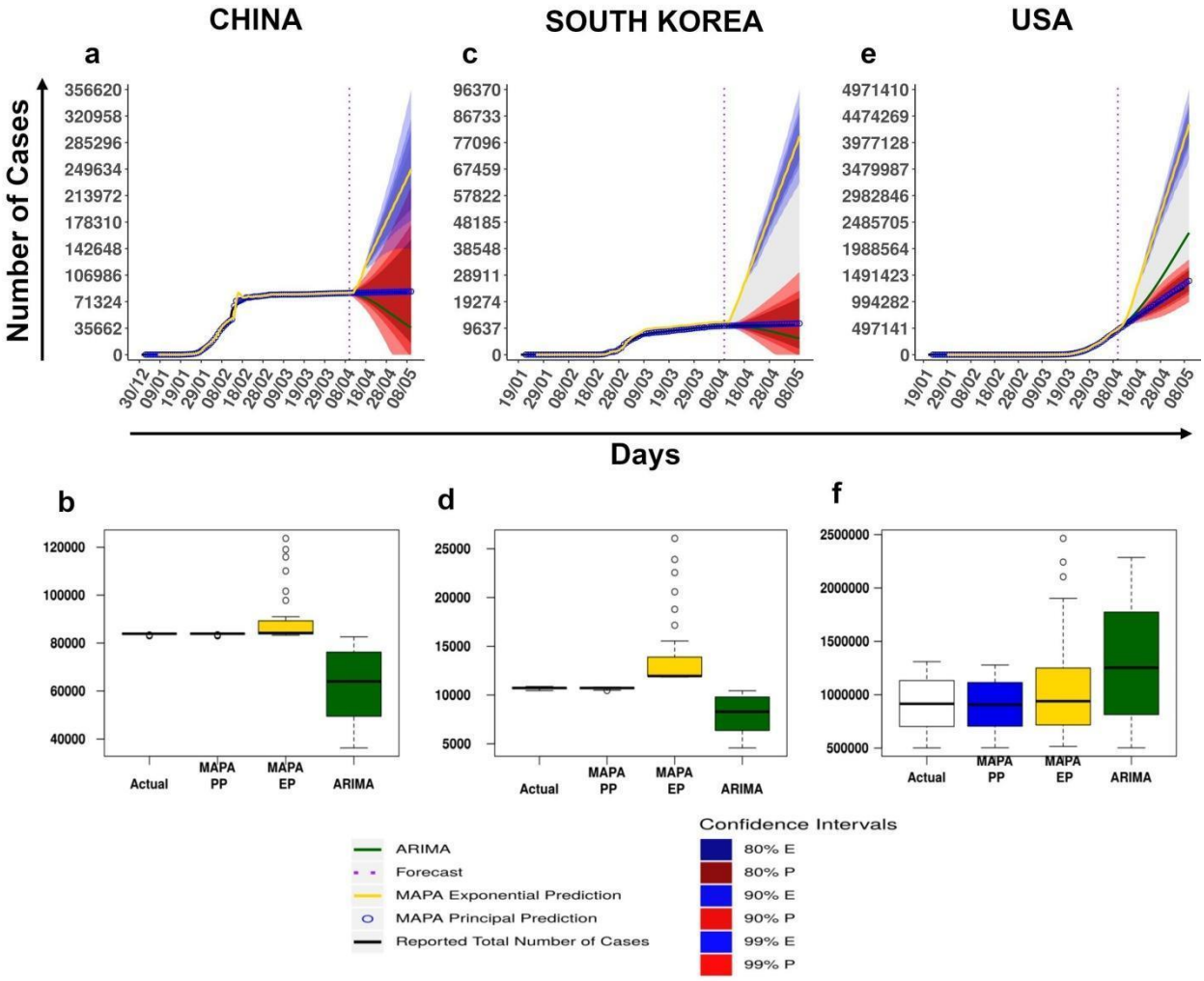

Fig. S14: Long term comparison and validation of COVID -19 cases using MAPA and ARIMA: Figure depicts Model Training (up to dotted line) and Validation for 30 days from 11th April to 10th May by comparison of Actual number of cases (black line) with the Principal Prediction (blue circles in red confidence band) and Exponential Prediction (yellow line in blue confidence band) and ARIMA (green line) for (a) China, (c) South Korea and (e) USA**;** (b, d, f) depict box plots showing comparison of distribution of Actual number of cases (white) to Principal prediction (blue), Exponential prediction (yellow) and ARIMA(green).

Table S3: Comparison of Short-Term Prediction performance (MAPE) between ARIMA and MAPA

Country	Principal Prediction MAPE	Exponential Prediction MAPE	ARIMA MAPE
Peru	14.09972	**10.58328**	12.12238
India	16.62616	**4.00577**	8.09491
Sweden	2.74507	34.24193	**2.70428**
Romania	**0.72406**	30.27769	6.13240
Austria	**0.49705**	26.44360	8.41083
Portugal	**1.43673**	16.66623	7.22686

Table S4: Comparison of Long-Term Prediction performance (MAPE) between ARIMA and MAPA

Country	Principal Prediction MAPE	Exponential Prediction MAPE	ARIMA MAPE
United States	**2.85977**	134.50014	36.87733
South Korea	**2.09441**	310.68480	25.01196
China	**–0.43440**	95.93821	25.42755

Table S5: Comparison of $R_0P(t)$ and $R_0E(t)$ values for first (03 June) and last (17 July) day of forecast. [*S5]

	Country	R_0P (1)	R_0E (1)	R_0P (45)	R_0E (45)	ADP	ADE	MDP	MDE	ADP/45	ADE/45
1	Peru	1.96567	1.96549	1.50435	1.60748	0.46133	0.35801	0.00599	0.00465	0.00591	0.00459
2	India	1.57995	1.57971	1.39997	1.48849	0.17997	0.09122	0.00234	0.00118	0.00231	0.00117
3	Sweden	1.56094	1.56364	1.33204	1.43084	0.22889	0.1328	0.00297	0.00172	0.00293	0.0017
4	Romania	1.76834	1.76951	1.37191	1.49461	0.39643	0.27491	0.00515	0.00357	0.00508	0.00352
5	Austria	1.75071	1.75112	1.34948	1.46546	0.40123	0.28567	0.00521	0.00371	0.00514	0.00366
6	Portugal	1.86818	1.86664	1.39995	1.49503	0.46823	0.37161	0.00608	0.00483	0.006	0.00476
7	China	1.4723	1.47236	1.29006	1.36126	0.18224	0.1111	0.00237	0.00144	0.00234	0.00142
8	World	1.62513	1.62565	1.41568	1.50397	0.20944	0.12168	0.00272	0.00158	0.00269	0.00156

[*S5]The notations used in Table S2 are used in Table S5.

Table S6: Error Metrics for verification of forecasts for 51 countries and the World from June 03 to June 20 [*S6]

	Name	MAPE PP	MAPE EP	nRMSE PP	nRMSE EP	Group		Name	MAPE PP	MAPE EP	nRMSE PP	nRMSE EP	Group
1	**Afghanistan**	1.90850	36.66317	0.02068	0.49170	A	28	**Rest of the World**	4.85705	60.06649	0.06846	0.75366	B
2	**Brazil**	12.67847	85.63381	0.15397	1.10867	A	29	**51 Countries Combined**	1.49067	8.68542	0.01987	0.11160	B
3	**Chile**	3.78322	11.98233	0.08617	0.13589	A	30	**Australia**	0.15445	16.71675	0.00191	0.20168	C
4	**India**	5.87319	22.06036	0.08168	0.30621	A	31	**Austria**	0.70624	42.23568	0.00797	0.51267	C
5	**Kuwait**	5.39523	35.26908	0.06950	0.45884	A	32	**Belgium**	0.52479	77.28773	0.00604	0.91856	C
6	**Mexico**	7.60827	28.76199	0.09736	0.40041	A	33	**Bulgaria**	13.85638	19.49330	0.18696	0.23932	C
7	**Nepal**	17.51693	5.68352	0.27207	0.09055	A	34	**China**	0.08213	28.35075	0.00127	0.32856	C
8	**Pakistan**	10.74954	55.53981	0.14758	0.67458	A	35	**Czech Republic**	1.77065	23.71986	0.02095	0.27872	C
9	**Peru**	10.92349	32.90223	0.12855	0.40996	A	36	**Denmark**	0.46717	27.18570	0.00559	0.32912	C
10	**Qatar**	1.35553	96.69700	0.02126	1.22403	A	37	**France**	0.35268	54.31408	0.00419	0.64993	C
11	**Russia**	5.80690	46.20905	0.06786	0.58783	A	38	**Germany**	0.67591	40.78387	0.00785	0.49214	C
12	**Canada**	1.81705	48.23827	0.02381	0.57940	B	39	**Israel**	2.87514	55.45260	0.03861	0.65314	C
13	**Ecuador**	3.05904	24.58924	0.03421	0.30034	B	40	**Italy**	0.23990	51.00591	0.00269	0.62736	C
14	**Egypt**	1.79586	36.09105	0.01874	0.47304	B	41	**Japan**	0.18371	41.60294	0.00289	0.49106	C
15	**Indonesia**	6.24633	49.98382	0.08977	0.63454	B	42	**Malaysia**	0.98191	30.75972	0.01269	0.38223	C
16	**Iran**	0.88276	51.87333	0.01010	0.66987	B	43	**Netherlands**	0.97805	6.37124	0.01147	0.08311	C
17	**Panama**	4.29415	13.95826	0.07151	0.16825	B	44	**New Zealand**	0.07265	7.67286	0.00146	0.09143	C
18	**Philippines**	4.49157	46.27392	0.05349	0.58630	B	45	**Norway**	1.60961	31.76988	0.01780	0.36707	C
19	**Poland**	2.30958	13.78142	0.02754	0.17999	B	46	**Portugal**	1.40067	22.33511	0.01653	0.27900	C
20	**Saudi Arabia**	8.61293	29.71562	0.12659	0.39455	B	47	**Romania**	1.89869	37.35161	0.02704	0.46374	C
21	**Singapore**	1.90469	29.96786	0.02581	0.36135	B	48	**Serbia**	3.33222	43.76242	0.03989	0.54390	C
22	**Sri Lanka**	5.41700	13.07709	0.05563	0.15731	B	49	**Slovenia**	0.18433	3.24020	0.00312	0.03700	C
23	**Sweden**	13.25446	49.46495	0.15522	0.62630	B	50	**South Korea**	1.13215	83.63956	0.01378	0.98948	C
24	**United Kingdom**	0.52598	44.36539	0.00709	0.53490	B	51	**Spain**	0.22105	2.02333	0.00263	0.02316	C
25	**United States**	0.42807	70.77258	0.00633	0.88641	B	52	**Switzerland**	0.14848	34.18677	0.00213	0.42037	C
26	**Vietnam**	0.89846	3.25381	0.01507	0.03687	B	53	**Taiwan**	0.48168	26.79809	0.00534	0.30401	C
27	**World**	1.85704	45.86292	0.02487	0.59206	B	54	**Turkey**	0.97567	4.77471	0.01453	0.06576	C

[*S6]The notations used in Table S1 are used in Table S6.

Table S7: Table of Actual values, Principal Prediction (PP) and Exponential Prediction (EP) for verification of forecasts from 03 June to 20 June for selected countries of Group A.[*S7-S9]

Name	Date	Actual	PP	EP	Name	Date	Actual	PP	EP
Afghanistan	03/06/20	0.0165	0.0166	0.0174	India	03/06/20	0.2168	0.2165	0.2171
	04/06/20	0.0173	0.0171	0.0181		04/06/20	0.2267	0.2228	0.2250
	05/06/20	0.0181	0.0179	0.0191		05/06/20	0.2362	0.2333	0.2408
	06/06/20	0.0190	0.0184	0.0204		06/06/20	0.2466	0.2396	0.2553
	07/06/20	0.0196	0.0192	0.0222		07/06/20	0.2575	0.2500	0.2761
	08/06/20	0.0203	0.0197	0.0240		08/06/20	0.2659	0.2563	0.2960
	09/06/20	0.0209	0.0205	0.0262		09/06/20	0.2761	0.2668	0.3221
	10/06/20	0.0215	0.0210	0.0285		10/06/20	0.2866	0.2731	0.3475
	11/06/20	0.0221	0.0218	0.0300		11/06/20	0.2975	0.2836	0.3649
	12/06/20	0.0229	0.0223	0.0324		12/06/20	0.3090	0.2899	0.3931
	13/06/20	0.0235	0.0231	0.0339		13/06/20	0.3209	0.3003	0.4106
	14/06/20	0.0241	0.0236	0.0364		14/06/20	0.3324	0.3067	0.4387
	15/06/20	0.0248	0.0244	0.0379		15/06/20	0.3431	0.3171	0.4562
	16/06/20	0.0255	0.0249	0.0403		16/06/20	0.3541	0.3234	0.4843
	17/06/20	0.0263	0.0257	0.0419		17/06/20	0.3669	0.3339	0.5018
	18/06/20	0.0269	0.0262	0.0443		18/06/20	0.3805	0.3402	0.5300
	19/06/20	0.0275	0.0271	0.0458		19/06/20	0.3950	0.3507	0.5474
	20/06/20	0.0279	0.0275	0.0482		20/06/20	0.4105	0.3570	0.5756
Brazil	03/06/20	0.5554	0.5468	0.6188	Nepal	03/06/20	0.0021	0.0020	0.0019
	04/06/20	0.5840	0.5568	0.6276		04/06/20	0.0023	0.0022	0.0022
	05/06/20	0.6149	0.5782	0.7387		05/06/20	0.0026	0.0024	0.0024
	06/06/20	0.6458	0.5883	0.8319		06/06/20	0.0029	0.0026	0.0027
	07/06/20	0.6728	0.6097	0.9636		07/06/20	0.0029	0.0028	0.0029
	08/06/20	0.6918	0.6197	1.0687		08/06/20	0.0034	0.0030	0.0033
	09/06/20	0.7074	0.6411	1.2264		09/06/20	0.0038	0.0033	0.0036
	10/06/20	0.7395	0.6512	1.3659		10/06/20	0.0041	0.0034	0.0040
	11/06/20	0.7724	0.6726	1.4560		11/06/20	0.0044	0.0037	0.0042
	12/06/20	0.8028	0.6826	1.6060		12/06/20	0.0046	0.0038	0.0046
	13/06/20	0.8288	0.7040	1.6925		13/06/20	0.0051	0.0041	0.0049
	14/06/20	0.8505	0.7141	1.8390		14/06/20	0.0053	0.0042	0.0053

	15/06/20	0.8676	0.7354	1.9221		15/06/20	0.0058	0.0045	0.0055
	16/06/20	0.8883	0.7455	2.0652		16/06/20	0.0062	0.0046	0.0059
	17/06/20	0.9232	0.7669	2.1450		17/06/20	0.0066	0.0049	0.0062
	18/06/20	0.9554	0.7770	2.2849		18/06/20	0.0072	0.0051	0.0065
	19/06/20	0.9781	0.7983	2.3616		19/06/20	0.0078	0.0053	0.0068
	20/06/20	1.0329	0.8084	2.4983		20/06/20	0.0083	0.0055	0.0072
Chile	03/06/20	0.1087	0.1109	0.1110	**Russia**	03/06/20	0.4237	0.4304	0.4288
	04/06/20	0.1136	0.1148	0.1167		04/06/20	0.4323	0.4394	0.4471
	05/06/20	0.1183	0.1212	0.1288		05/06/20	0.4411	0.4536	0.4803
	06/06/20	0.1225	0.1251	0.1315		06/06/20	0.4498	0.4626	0.5060
	07/06/20	0.1277	0.1315	0.1448		07/06/20	0.4587	0.4768	0.5456
	08/06/20	0.1342	0.1355	0.1482		08/06/20	0.4677	0.4858	0.5833
	09/06/20	0.1388	0.1419	0.1635		09/06/20	0.4767	0.5000	0.6356
	10/06/20	0.1428	0.1458	0.1678		10/06/20	0.4853	0.5090	0.6860
	11/06/20	0.1485	0.1522	0.1731		11/06/20	0.4937	0.5232	0.7158
	12/06/20	0.1541	0.1561	0.1828		12/06/20	0.5024	0.5322	0.7663
	13/06/20	0.1608	0.1625	0.1881		13/06/20	0.5114	0.5465	0.7961
	14/06/20	0.1674	0.1665	0.1978		14/06/20	0.5201	0.5554	0.8466
	15/06/20	0.1743	0.1729	0.2031		15/06/20	0.5290	0.5697	0.8763
	16/06/20	0.1794	0.1768	0.2128		16/06/20	0.5372	0.5786	0.9268
	17/06/20	0.1844	0.1832	0.2181		17/06/20	0.5455	0.5929	0.9566
	18/06/20	0.2206	0.1871	0.2278		18/06/20	0.5533	0.6018	1.0071
	19/06/20	0.2251	0.1935	0.2331		19/06/20	0.5611	0.6161	1.0369
	20/06/20	0.2314	0.1975	0.2428		20/06/20	0.5691	0.6250	1.0874

*S7-S9The values are in the millions.

The cells under PP column are blue in colour if the PP value is closer to the Actual value. The cells in the EP column are yellow in colour if the EP value is closer to the Actual value.

Table S8: Table of Actual values, Principal Prediction (PP) and Exponential Prediction (EP) for verification of forecasts from 03 June to 20 June for selected countries of Group B.[*S7-S9]

Name	Date	Actual	PP	EP	Name	Date	Actual	PP	EP
Egypt	03/06/20	0.0275	0.0280	0.0285	Sweden	03/06/20	0.0386	0.0383	0.0407
	04/06/20	0.0286	0.0291	0.0301		04/06/20	0.0408	0.0385	0.0407
	05/06/20	0.0298	0.0309	0.0330		05/06/20	0.0419	0.0390	0.0457
	06/06/20	0.0311	0.0319	0.0354		06/06/20	0.0429	0.0393	0.0497
	07/06/20	0.0326	0.0337	0.0388		07/06/20	0.0439	0.0398	0.0546
	08/06/20	0.0341	0.0348	0.0418		08/06/20	0.0447	0.0400	0.0579
	09/06/20	0.0354	0.0366	0.0459		09/06/20	0.0451	0.0405	0.0631
	10/06/20	0.0368	0.0377	0.0497		10/06/20	0.0459	0.0407	0.0673
	11/06/20	0.0383	0.0394	0.0524		11/06/20	0.0468	0.0412	0.0704
	12/06/20	0.0397	0.0405	0.0568		12/06/20	0.0483	0.0414	0.0756
	13/06/20	0.0413	0.0423	0.0595		13/06/20	0.0497	0.0419	0.0788
	14/06/20	0.0430	0.0434	0.0639		14/06/20	0.0509	0.0422	0.0840
	15/06/20	0.0446	0.0452	0.0666		15/06/20	0.0516	0.0427	0.0871
	16/06/20	0.0463	0.0462	0.0710		16/06/20	0.0524	0.0429	0.0924
	17/06/20	0.0479	0.0480	0.0737		17/06/20	0.0533	0.0434	0.0955
	18/06/20	0.0492	0.0491	0.0780		18/06/20	0.0546	0.0436	0.1007
	19/06/20	0.0504	0.0509	0.0807		19/06/20	0.0560	0.0441	0.1039
	20/06/20	0.0522	0.0520	0.0851		20/06/20	0.0560	0.0443	0.1091
Iran	03/06/20	0.1576	0.1573	0.1587	United Kingdom	03/06/20	0.2780	0.2783	0.2832
	04/06/20	0.1607	0.1594	0.1623		04/06/20	0.2799	0.2795	0.2847
	05/06/20	0.1643	0.1627	0.1735		05/06/20	0.2817	0.2816	0.3081
	06/06/20	0.1672	0.1648	0.1838		06/06/20	0.2833	0.2829	0.3157
	07/06/20	0.1694	0.1681	0.1992		07/06/20	0.2849	0.2849	0.3433
	08/06/20	0.1718	0.1702	0.2131		08/06/20	0.2862	0.2862	0.3530
	09/06/20	0.1738	0.1736	0.2330		09/06/20	0.2874	0.2883	0.3861
	10/06/20	0.1759	0.1756	0.2514		10/06/20	0.2891	0.2895	0.3986
	11/06/20	0.1779	0.1790	0.2641		11/06/20	0.2901	0.2916	0.4111
	12/06/20	0.1802	0.1810	0.2846		12/06/20	0.2914	0.2928	0.4333
	13/06/20	0.1825	0.1844	0.2973		13/06/20	0.2930	0.2948	0.4458
	14/06/20	0.1850	0.1865	0.3179		14/06/20	0.2944	0.2961	0.4680

	15/06/20	0.1874	0.1898	0.3306		15/06/20	0.2959	0.2981	0.4805
	16/06/20	0.1899	0.1919	0.3511		16/06/20	0.2969	0.2993	0.5027
	17/06/20	0.1924	0.1952	0.3638		17/06/20	0.2981	0.3013	0.5151
	18/06/20	0.1951	0.1973	0.3843		18/06/20	0.2993	0.3026	0.5374
	19/06/20	0.1976	0.2006	0.3970		19/06/20	0.3005	0.3046	0.5498
	20/06/20	0.2003	0.2027	0.4175		20/06/20	0.3018	0.3058	0.5720
Singapore	03/06/20	0.0358	0.0358	0.0371	**United States**	03/06/20	1.8318	1.8360	1.8963
	04/06/20	0.0364	0.0362	0.0375		04/06/20	1.8515	1.8514	1.9136
	05/06/20	0.0369	0.0368	0.0390		05/06/20	1.8727	1.8776	2.0748
	06/06/20	0.0372	0.0371	0.0409		06/06/20	1.8978	1.8931	2.2507
	07/06/20	0.0375	0.0377	0.0428		07/06/20	1.9201	1.9193	2.4685
	08/06/20	0.0379	0.0381	0.0448		08/06/20	1.9424	1.9347	2.6617
	09/06/20	0.0383	0.0387	0.0469		09/06/20	1.9612	1.9609	2.9133
	10/06/20	0.0385	0.0390	0.0491		10/06/20	1.9799	1.9764	3.1629
	11/06/20	0.0390	0.0396	0.0503		11/06/20	2.0005	2.0026	3.3337
	12/06/20	0.0394	0.0400	0.0525		12/06/20	2.0233	2.0181	3.6093
	13/06/20	0.0399	0.0406	0.0537		13/06/20	2.0490	2.0443	3.7801
	14/06/20	0.0402	0.0409	0.0559		14/06/20	2.0745	2.0597	4.0558
	15/06/20	0.0406	0.0415	0.0572		15/06/20	2.0941	2.0859	4.2266
	16/06/20	0.0408	0.0419	0.0593		16/06/20	2.1140	2.1014	4.5022
	17/06/20	0.0410	0.0425	0.0606		17/06/20	2.1377	2.1276	4.6730
	18/06/20	0.0412	0.0429	0.0627		18/06/20	2.1633	2.1430	4.9487
	19/06/20	0.0415	0.0435	0.0640		19/06/20	2.1911	2.1692	5.1195
	20/06/20	0.0416	0.0438	0.0662		20/06/20	2.2210	2.1847	5.3951

Table S9: Table of Actual values, Principal Prediction (PP) and Exponential Prediction (EP) for verification of forecasts from 03 June to 20 June for selected countries of Group C.[*S7-S9]

Name	Date	Actual	PP	EP	Name	Date	Actual	PP	EP
Austria	03/06/20	0.0167	0.0167	0.0169	New Zealand	03/06/20	0.0012	0.0012	0.0011
	04/06/20	0.0167	0.0167	0.0169		04/06/20	0.0012	0.0012	0.0011
	05/06/20	0.0167	0.0167	0.0178		05/06/20	0.0012	0.0012	0.0012
	06/06/20	0.0168	0.0167	0.0185		06/06/20	0.0012	0.0012	0.0012
	07/06/20	0.0168	0.0167	0.0196		07/06/20	0.0012	0.0012	0.0012
	08/06/20	0.0169	0.0168	0.0204		08/06/20	0.0012	0.0012	0.0012
	09/06/20	0.0169	0.0168	0.0217		09/06/20	0.0012	0.0012	0.0012
	10/06/20	0.0169	0.0168	0.0227		10/06/20	0.0012	0.0012	0.0012
	11/06/20	0.0169	0.0168	0.0235		11/06/20	0.0012	0.0012	0.0012
	12/06/20	0.0170	0.0168	0.0247		12/06/20	0.0012	0.0012	0.0013
	13/06/20	0.0170	0.0169	0.0254		13/06/20	0.0012	0.0012	0.0013
	14/06/20	0.0170	0.0169	0.0267		14/06/20	0.0012	0.0012	0.0013
	15/06/20	0.0170	0.0169	0.0274		15/06/20	0.0012	0.0012	0.0013
	16/06/20	0.0171	0.0169	0.0286		16/06/20	0.0012	0.0012	0.0013
	17/06/20	0.0171	0.0169	0.0294		17/06/20	0.0012	0.0012	0.0013
	18/06/20	0.0171	0.0169	0.0306		18/06/20	0.0012	0.0012	0.0013
	19/06/20	0.0172	0.0170	0.0313		19/06/20	0.0012	0.0012	0.0013
	20/06/20	0.0172	0.0170	0.0326		20/06/20	0.0012	0.0012	0.0013
China	03/06/20	0.0842	0.0842	0.0843	South Korea	03/06/20	0.0116	0.0116	0.0125
	04/06/20	0.0842	0.0842	0.0843		04/06/20	0.0116	0.0116	0.0125
	05/06/20	0.0842	0.0842	0.0885		05/06/20	0.0117	0.0116	0.0140
	06/06/20	0.0842	0.0842	0.0898		06/06/20	0.0117	0.0117	0.0153
	07/06/20	0.0842	0.0842	0.0953		07/06/20	0.0118	0.0117	0.0165
	08/06/20	0.0842	0.0842	0.0981		08/06/20	0.0118	0.0117	0.0177
	09/06/20	0.0842	0.0842	0.1047		09/06/20	0.0119	0.0118	0.0189
	10/06/20	0.0842	0.0842	0.1090		10/06/20	0.0119	0.0118	0.0203
	11/06/20	0.0842	0.0842	0.1112		11/06/20	0.0119	0.0118	0.0212
	12/06/20	0.0842	0.0842	0.1144		12/06/20	0.0120	0.0119	0.0228
	13/06/20	0.0842	0.0842	0.1159		13/06/20	0.0121	0.0119	0.0237

	14/06/20	0.0843	0.0842	0.1183		14/06/20	0.0121	0.0119	0.0253
	15/06/20	0.0843	0.0842	0.1192		15/06/20	0.0121	0.0119	0.0262
	16/06/20	0.0844	0.0843	0.1211		16/06/20	0.0122	0.0120	0.0278
	17/06/20	0.0844	0.0843	0.1217		17/06/20	0.0122	0.0120	0.0287
	18/06/20	0.0845	0.0843	0.1232		18/06/20	0.0123	0.0120	0.0303
	19/06/20	0.0845	0.0843	0.1236		19/06/20	0.0123	0.0120	0.0312
	20/06/20	0.0845	0.0843	0.1248		20/06/20	0.0124	0.0120	0.0328
Italy	03/06/20	0.2335	0.2335	0.2370	**Taiwan**	03/06/20	0.0004	0.0004	0.0005
	04/06/20	0.2338	0.2336	0.2370		04/06/20	0.0004	0.0004	0.0005
	05/06/20	0.2340	0.2339	0.2496		05/06/20	0.0004	0.0004	0.0005
	06/06/20	0.2345	0.2341	0.2562		06/06/20	0.0004	0.0004	0.0005
	07/06/20	0.2348	0.2344	0.2740		07/06/20	0.0004	0.0004	0.0005
	08/06/20	0.2350	0.2345	0.2873		08/06/20	0.0004	0.0004	0.0005
	09/06/20	0.2353	0.2349	0.3107		09/06/20	0.0004	0.0004	0.0005
	10/06/20	0.2356	0.2350	0.3298		10/06/20	0.0004	0.0004	0.0005
	11/06/20	0.2358	0.2353	0.3432		11/06/20	0.0004	0.0004	0.0006
	12/06/20	0.2361	0.2355	0.3649		12/06/20	0.0004	0.0004	0.0006
	13/06/20	0.2363	0.2358	0.3782		13/06/20	0.0004	0.0004	0.0006
	14/06/20	0.2367	0.2359	0.3999		14/06/20	0.0004	0.0004	0.0006
	15/06/20	0.2370	0.2362	0.4133		15/06/20	0.0004	0.0004	0.0006
	16/06/20	0.2373	0.2364	0.4349		16/06/20	0.0004	0.0004	0.0006
	17/06/20	0.2375	0.2367	0.4483		17/06/20	0.0004	0.0004	0.0006
	18/06/20	0.2378	0.2368	0.4700		18/06/20	0.0004	0.0004	0.0006
	19/06/20	0.2382	0.2371	0.4834		19/06/20	0.0004	0.0004	0.0007
	20/06/20	0.2380	0.2373	0.5050		20/06/20	0.0004	0.0004	0.0007

Table S10: Table of Principal Prediction (PP) and Exponential Prediction (EP) for 17 July *S10

	Name	PP	EP		Name	PP	EP
1	**Afghanistan**	0.0454	0.1012	28	**51 Countries Combined**	10.0187	14.3019
2	**Brazil**	1.2386	4.8474	29	**Rest of the World**	1.2292	3.8713
3	**Chile**	0.3382	0.4432	30	**Australia**	0.0076	0.0144
4	**India**	0.5854	1.1860	31	**Austria**	0.0174	0.0589
5	**Kuwait**	0.0658	0.1312	32	**Belgium**	0.0650	0.3116
6	**Mexico**	0.2261	0.5562	33	**Bulgaria**	0.0029	0.0087
7	**Nepal**	0.0111	0.0157	34	**China**	0.0843	0.1319
8	**Pakistan**	0.2326	0.0111	35	**Czech Republic**	0.0110	0.0233
9	**Peru**	0.4829	0.7677	36	**Denmark**	0.0130	0.0315
10	**Qatar**	0.1359	0.5403	37	**France**	0.1675	0.6334
11	**Russia**	0.9409	2.1607	38	**Germany**	0.1925	0.5515
12	**Canada**	0.1254	0.3718	39	**Israel**	0.0213	0.0000
13	**Ecuador**	0.0688	0.1184	40	**Italy**	0.2435	0.9740
14	**Egypt**	0.0909	0.1800	41	**Japan**	0.0188	0.0557
15	**Indonesia**	0.0538	0.1710	42	**Malaysia**	0.0098	0.0248
16	**Iran**	0.2765	0.8621	43	**Netherlands**	0.0518	0.0311
17	**Panama**	0.0325	0.0529	44	**New Zealand**	0.0012	0.0016
18	**Philippines**	0.0486	0.1081	45	**Norway**	0.0085	0.0218
19	**Poland**	0.0392	0.0169	46	**Portugal**	0.0444	0.0941
20	**Saudi Arabia**	0.1712	0.4718	47	**Romania**	0.0262	0.0759
21	**Singapore**	0.0568	0.1119	48	**Serbia**	0.0125	0.0463
22	**Sri Lanka**	0.0021	0.0026	49	**Slovenia**	0.0015	0.0016
23	**Sweden**	0.0543	0.2209	50	**South Korea**	0.0125	0.0661
24	**United Kingdom**	0.3483	1.0354	51	**Spain**	0.2520	0.2300
25	**United States**	2.7525	11.3699	52	**Switzerland**	0.0314	0.0957
26	**Vietnam**	0.0003	0.0004	53	**Taiwan**	0.0005	0.0010
27	**World**	11.2371	33.6624	54	**Turkey**	0.2026	0.1446

*S10The values are in the millions.

Table S11: List of 51 countries used for the study and the date of first report of Covid-19 case.

	Country	First reported case on		Country	First reported case on
1	World	31/12/19	**27**	Kuwait	24/02/20
2	China	31/12/19	**28**	Afghanistan	25/02/20
3	Japan	15/01/20	**29**	Brazil	26/02/20
4	South Korea	20/01/20	**30**	Austria	26/02/20
5	United States	21/01/20	**31**	Switzerland	26/02/20
6	Taiwan	21/01/20	**32**	Pakistan	27/02/20
7	Singapore	24/01/20	**33**	Denmark	27/02/20
8	Vietnam	24/01/20	**34**	Norway	27/02/20
9	Nepal	25/01/20	**35**	Romania	27/02/20
10	Australia	25/01/20	**36**	Netherlands	28/02/20
11	France	25/01/20	**37**	New Zealand	28/02/20
12	Malaysia	25/01/20	**38**	Mexico	29/02/20
13	Canada	26/01/20	**39**	Qatar	01/03/20
14	Sri Lanka	28/01/20	**40**	Ecuador	01/03/20
15	Germany	28/01/20	**41**	Indonesia	02/03/20
16	India	30/01/20	**42**	Czech Republic	02/03/20
17	Philippines	30/01/20	**43**	Saudi Arabia	03/03/20
18	United Kingdom	31/01/20	**44**	Portugal	03/03/20
19	Italy	31/01/20	**45**	Chile	04/03/20
20	Russia	01/02/20	**46**	Poland	04/03/20
21	Sweden	01/02/20	**47**	Slovenia	05/03/20
22	Spain	01/02/20	**48**	Peru	07/03/20
23	Belgium	04/02/20	**49**	Serbia	07/03/20
24	Egypt	15/02/20	**50**	Bulgaria	08/03/20
25	Iran	20/02/20	**51**	Panama	10/03/20
26	Israel	22/02/20	**52**	Turkey	12/03/20

Table S12: Selected dates for the 51 countries and the world for model training, Long Term comparison (LTC), Short Term Comparison (STC), Long Term Validation (LTV) and Use Case (UC) [EP: Exponential Prediction; PP: Principal Prediction]

Sl. No.	Country	First Training date for		Last Training Date for			Sl. No.	Country	First Training date for		Last Training Date for		
		PP	EP	LTC	STC, LTV	UC			PP	EP	LTC	STC, LTV	UC
1	World	31/12/19	09/01/20	-	30/04/20	02/06/20	27	Switzerland	26/02/20	01/03/20	-	30/04/20	02/06/20
2	China	31/12/19	06/01/20	10/04/20	30/04/20	02/06/20	28	Austria	26/02/20	01/03/20	-	30/04/20	02/06/20
3	Japan	15/01/20	24/01/20	-	30/04/20	02/06/20	29	Norway	27/02/20	04/03/20	-	30/04/20	02/06/20
4	South Korea	20/01/20	24/01/20	10/04/20	30/04/20	02/06/20	30	Romania	27/02/20	02/03/20	-	30/04/20	02/06/20
5	United States	21/01/20	27/01/20	10/04/20	30/04/20	02/06/20	31	Netherlands	28/02/20	29/02/20	-	30/04/20	02/06/20
6	Taiwan	21/01/20	25/01/20	-	30/04/20	02/06/20	32	Denmark	28/02/20	01/03/20	-	30/04/20	02/06/20
7	Vietnam	24/01/20	02/02/20	-	30/04/20	02/06/20	33	Mexico	29/02/20	12/03/20	-	30/04/20	02/06/20
8	France	25/01/20	29/01/20	-	30/04/20	02/06/20	34	Pakistan	29/02/20	28/02/20	-	30/04/20	02/06/20
9	Australia	25/01/20	31/01/20	-	30/04/20	02/06/20	35	Ecuador	01/03/20	10/03/20	-	30/04/20	02/06/20
10	Singapore	25/01/20	27/01/20	-	30/04/20	02/06/20	36	Qatar	01/03/20	08/03/20	-	30/04/20	02/06/20
11	Nepal	25/01/20	24/03/20	-	30/04/20	02/06/20	37	Czech Republic	02/03/20	04/03/20	-	30/04/20	02/06/20
12	Canada	26/01/20	28/01/20	-	30/04/20	02/06/20	38	Indonesia	02/03/20	12/03/20	-	30/04/20	02/06/20
13	Germany	28/01/20	12/03/20	-	30/04/20	02/06/20	39	Afghanistan	02/03/20	08/03/20	-	30/04/20	02/06/20
14	Sri Lanka	28/01/20	02/02/20	-	30/04/20	02/06/20	40	Egypt	02/03/20	02/03/20	-	30/04/20	02/06/20
15	India	30/01/20	02/02/20	-	30/04/20	02/06/20	41	Portugal	03/03/20	07/03/20	-	30/04/20	02/06/20
16	Philippines	30/01/20	02/02/20	-	30/04/20	02/06/20	42	Saudi Arabia	03/03/20	14/03/20	-	30/04/20	02/06/20
17	United Kingdom	31/01/20	03/02/20	-	30/04/20	02/06/20	43	Chile	04/03/20	05/03/20	-	30/04/20	02/06/20
18	Spain	01/02/20	10/02/20	-	30/04/20	02/06/20	44	Poland	04/03/20	07/03/20	-	30/04/20	02/06/20
19	Russia	01/02/20	03/02/20	-	30/04/20	02/06/20	45	Malaysia	04/03/20	04/03/20	-	30/04/20	02/06/20
20	Sweden	01/02/20	27/02/20	-	30/04/20	02/06/20	46	Slovenia	05/03/20	19/03/20	-	30/04/20	02/06/20
21	Belgium	04/02/20	02/03/20	-	30/04/20	02/06/20	47	Bulgaria	08/03/20	15/03/20	-	30/04/20	02/06/20
22	Iran	20/02/20	24/02/20	-	30/04/20	02/06/20	48	Peru	09/03/20	13/03/20	-	30/04/20	02/06/20
23	Italy	21/02/20	22/02/20	-	30/04/20	02/06/20	49	Panama	10/03/20	16/03/20	-	30/04/20	02/06/20
24	Israel	22/02/20	29/02/20	-	30/04/20	02/06/20	50	Serbia	11/03/20	15/03/20	-	30/04/20	02/06/20
25	Kuwait	24/02/20	02/03/20	-	30/04/20	02/06/20	51	New Zealand	14/03/20	18/03/20	-	30/04/20	02/06/20
26	Brazil	26/02/20	01/03/20	-	30/04/20	02/06/20	52	Turkey	18/03/20	18/03/20	-	30/04/20	02/06/20

Error Metrics

The error matrices (RMSE, PE, MAPE) calculated to estimate the model performance are as follows:

a. RMSE: The root mean squared error and is defined as

$$RMSE = \sqrt{\sum_{i=1}^{n} \frac{|Observed(i) - Predcited(i)|^2}{n}} \quad \text{(Eq. S1)}$$

We use the normalised RMSE (nRMSE), which is derived by dividing the RMSE by the mean of the actual data.

b. Percentage Error

$$PE(t) = \left(\frac{Observed(t) - Predicted(t)}{Observed(t)}\right) * 100 \quad \text{(Eq. S2)}$$

c. Mean Absolute Percentage Error:

It is the mean of the absolute values of PE for a set of n time points.

$$MAPE = \frac{1}{n}\left(\sum_{t=1}^{n} |PE(t)|\right) \quad \text{(Eq. S3)}$$