**Supplementary Materials for**

**Impact of systematic factors on the outbreak outcome of novel coronavirus disease (COVID-19) in China**

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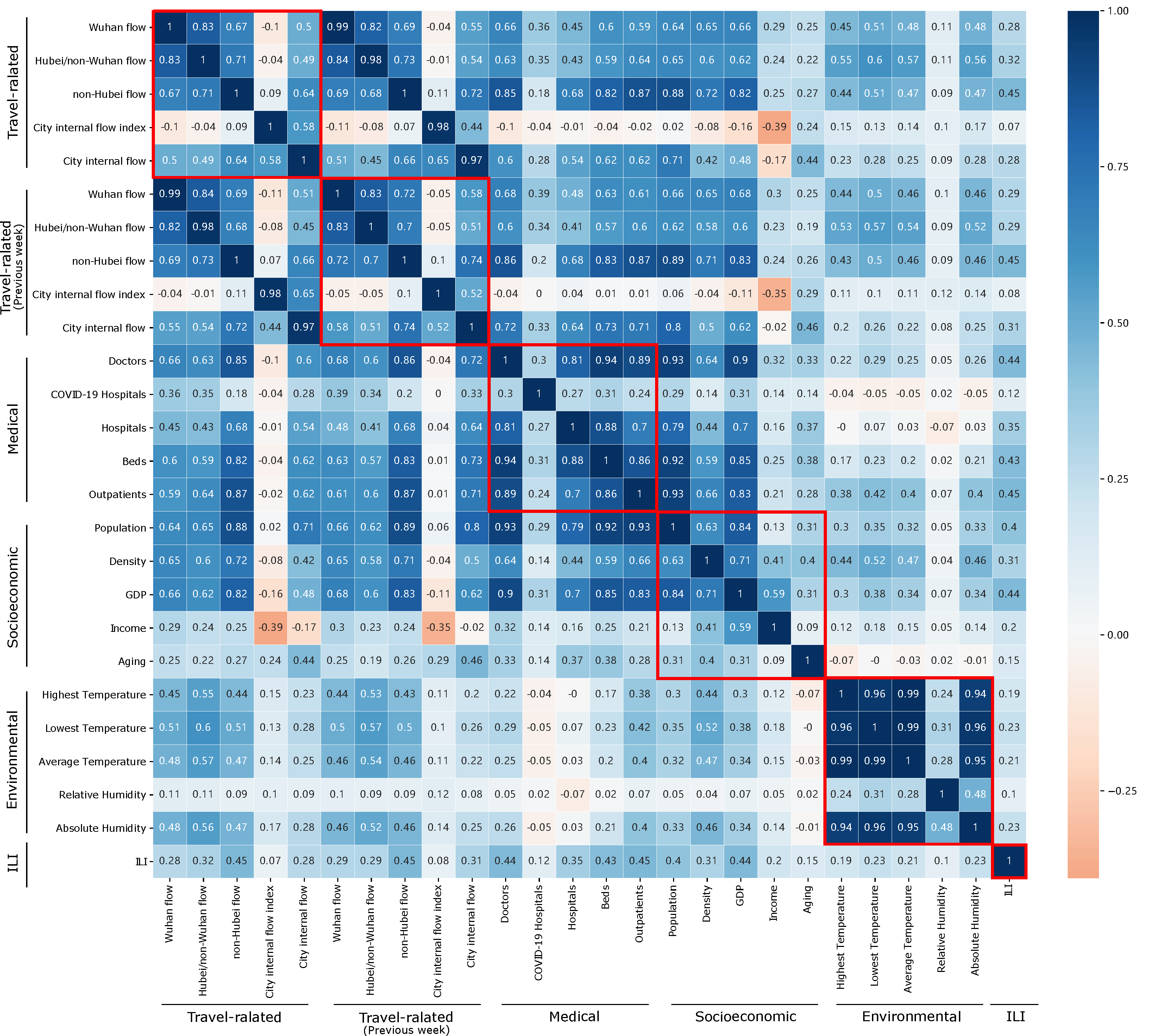
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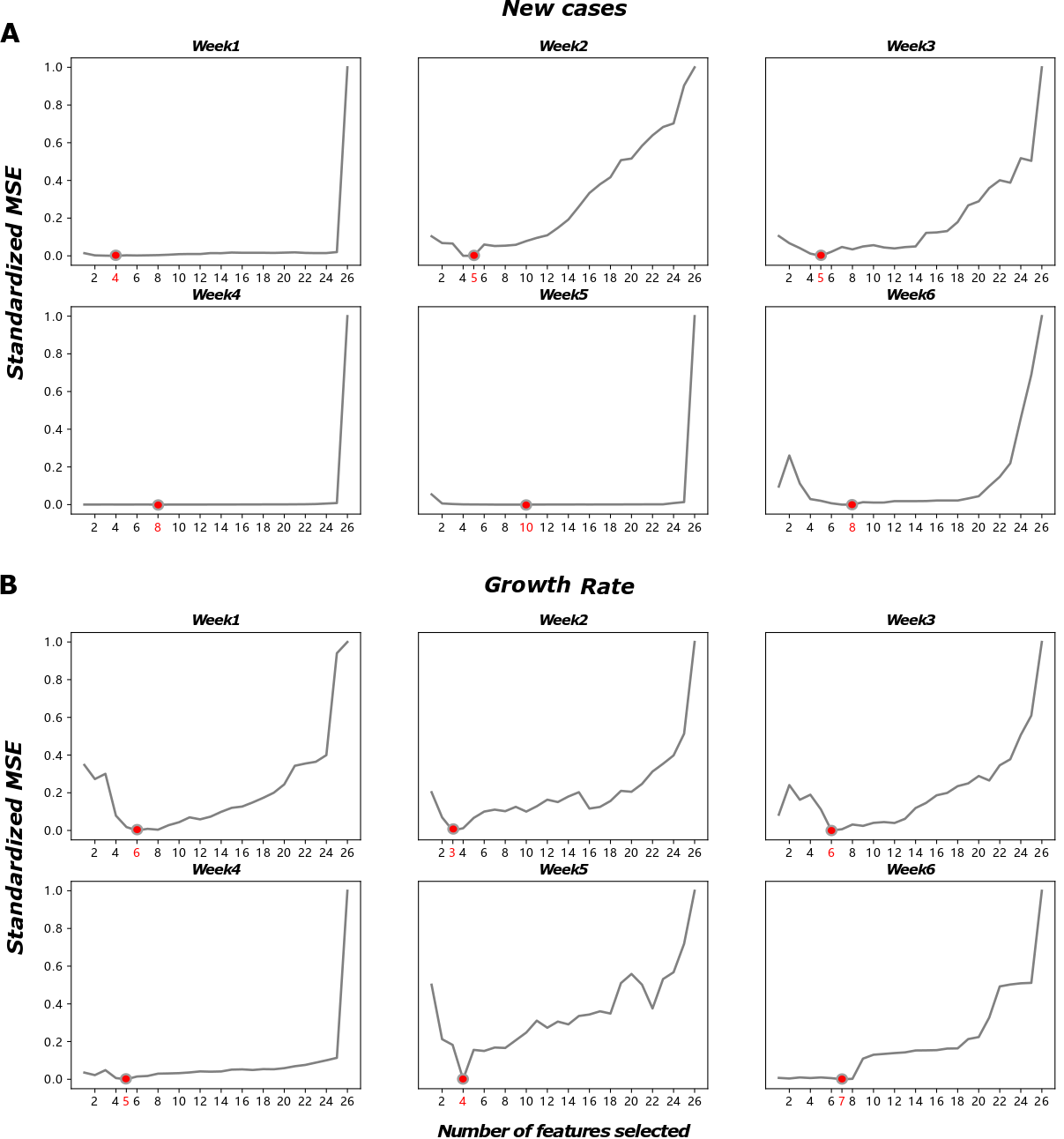
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**Figure S1: Correlation matrix between factors.** Spearman correlation coefficients are color coded and factors from the same group are circled.

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**Figure S2: Feature selection curve for new cases (A) and growth rate (B).** The optimal number of features selected is indicated by the red circle. Standardized mean squared error (MSE) was used in this study for selecting important features.

**Table S~~1~~2. Contribution percentage of factors.** Average contribution percentage is calculated as the mean of the contribution percentage across six weeks. Group contribution percentage is calculated as the sum of the individual contribution for factors within the group and shown at the end of each group.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Factor | Week1  New Cases Growth Rate | | Week2  New Cases Growth Rate | | Week3  New Cases Growth Rate | | Week4  New Cases Growth Rate | | | | Week5  New Cases Growth Rate | | | Week6  New Cases Growth Rate | | | Average  New Cases Growth Rate | | |
| Wuhan flow | 0 | 0 | 0.45 | 0 | 0.58 | 0.13 | | 0 | | 0 | | 0 | 0.33 | | 0 | 0 | | 0.17 | 0.08 |
| Hubei/non-Wuhan flow | 0 | 0 | 0 | 0 | 0.19 | 0.22 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0.03 | 0.04 |
| non-Hubei flow | 0.20 | 0 | 0 | 0.25 | 0 | 0 | | 0 | | 0 | | 0.04 | 0 | | 0 | 0 | | 0.04 | 0.04 |
| City internal flow index | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 |
| City internal flow | 0 | 0 | 0.12 | 0 | 0 | 0 | | | 0 | 0.25 | | 0.10 | 0 | | 0.28 | 0 | | 0.08 0.04 | |
| **Travel-related** | **0.20** | **0** | **0.57** | **0.25** | **0.77** | **0.35** | | **0** | | **0.25** | | **0.14** | **0.33** | | **0.28** | **0** | | **0.32** | **0.20** |
|  |  |  |  |  |  |  | |  | |  | |  |  | |  |  | |  |  |
| Wuhan flow | 0.49 | 0 | 0 | 0 | 0.13 | 0 | | | 0.31 | 0.08 | | 0.49 | 0 | | 0.51 | 0 | | 0.32 0.01 | |
| Hubei/non-Wuhan flow | 0 | 0 | 0.22 | 0 | 0 | 0.14 | | 0 | | 0.21 | | 0.06 | 0 | | 0 | 0.16 | | 0.05 | 0.09 |
| non-Hubei flow | 0 | 0.29 | 0 | 0 | 0 | 0.13 | | | 0 | 0 | | 0 | 0 | | 0 | 0.13 | | 0 0.09 | |
| City internal flow index | 0 | 0 | 0 | 0 | 0 | 0 | | | 0.32 | 0 | | 0 | 0 | | 0 | 0.11 | | 0.05 0.02 | |
| City internal flow | 0 | 0 | 0.09 | 0 | 0.06 | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0.03 | | 0.03 | 0.01 |
| **Travel-related (Previous week)** | **0.49** | **0.29** | **0.31** | **0** | **0.19** | **0.27** | | **0.63** | | **0.29** | | **0.55** | **0** | | **0.51** | **0.43** | | **0.45** | **0.21** |
|  |  |  |  |  |  |  | |  | |  | |  |  | |  |  | |  |  |
| Doctors | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0.03 | 0.06 | | 0.01 | 0.01 |
| COVID-19 Hospitals | 0 | 0.13 | 0 | 0 | 0 | 0 | | 0.07 | | 0 | | 0 | 0.20 | | 0 | 0 | | 0.01 | 0.06 |
| Hospitals | 0.12 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0.02 | 0 |
| Beds | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0.04 | 0 | | 0 | 0 | | 0.01 | 0 |
| Outpatients | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | |  | 0 | | 0 | 0 | | 0 | 0 |
| **Medical** | **0.12** | **0.13** | **0** | **0** | **0** | **0** | | **0.07** | | **0** | | **0.04** | **0.20** | | **0.03** | **0.06** | | **0.05** | **0.07** |
|  |  |  |  |  |  |  | |  | |  | |  |  | |  |  | |  |  |
| Population | 0 | 0.13 | 0 | 0 | 0 | 0 | | 0.09 | | 0 | | 0.10 | 0.21 | | 0 | 0 | | 0.03 | 0.06 |
| Density | 0 | 0 | 0.13 | 0 | 0 | 0.26 | | 0 | | 0 | | 0.05 | 0 | | 0.09 | 0.31 | | 0.05 | 0.10 |
| GDP | 0 | 0 | 0 | 0 | 0 | 0 | | 0.05 | | 0 | | 0.01 | 0.26 | | 0 | 0 | | 0.01 | 0.04 |
| Income | 0 | 0.20 | 0 | 0 | 0 | 0.13 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0.05 |
| Aging | 0 | 0.06 | 0 | 0 | 0 | 0 | | 0.01 | | 0.13 | | 0 | 0 | | 0 | 0 | | 0 | 0.03 |
| **Socioeconomic** | **0** | **0.39** | **0.13** | **0** | **0** | **0.39** | | **0.15** | | **0.13** | | **0.16** | **0.47** | | **0.09** | **0.31** | | **0.09** | **0.28** |
|  |  |  |  |  |  |  | |  | |  | |  |  | |  |  | |  |  |
| Highest Temperature | 0 | 0.18 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0.03 |
| Lowest Temperature | 0 | 0 | 0 | 0.35 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0.01 | 0 | | 0 | 0.06 |
| Average Temperature | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Relative Humidity | 0.19 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0.10 | 0 | | 0.08 | 0 | | 0.06 | 0 |
| Absolute Humidity | 0 | 0 | 0 | 0 | 0.03 | 0 | | 0.06 | | 0.33 | | 0 | 0 | | 0 | 0 | | 0.02 | 0.06 |
| **Environmental** | **0.19** | **0.18** | **0** | **0.35** | **0.03** | **0** | | **0.06** | | **0.33** | | **0.10** | **0** | | **0.09** | **0** | | **0.08** | **0.14** |
|  |  |  |  |  |  |  | |  | |  | |  |  | |  |  | |  |  |
| ILI | 0 | 0 | 0 | 0.41 | 0 | 0 | | 0.09 | | 0 | | 0 | 0 | | 0 | 0.20 | | 0.01 | 0.1 |
| **ILI** | **0** | **0** | **0** | **0.41** | **0** | **0** | | **0.09** | | **0** | | **0** | **0** | | **0** | **0.20** | | **0.01** | **0.1** |