Validation process forNORTE SANTANDER

The epidemiology research group, EAFIT

06-Apr-2022

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Chapter 1. Extension number1

1.1. Basic information

The extension to be validated consists of the time series from the data1 to the 121. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

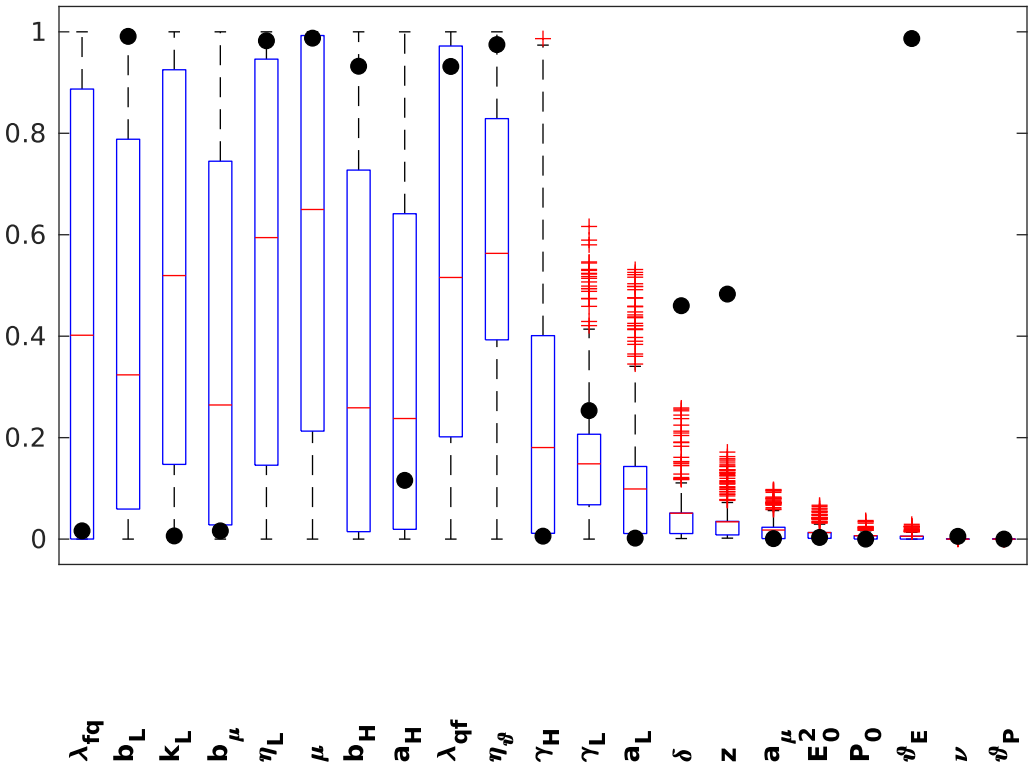
1.2. Estimated parameters with their intervals

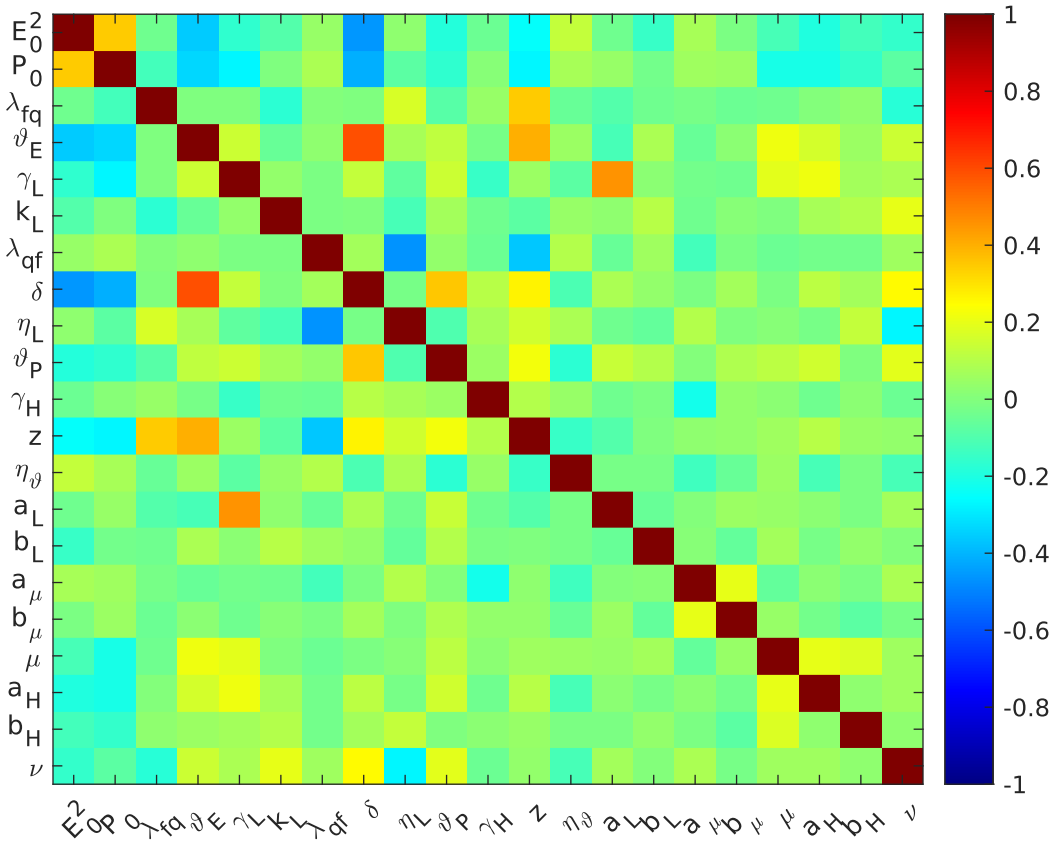
It was necessary to fix 0 parameters of 11 that could be fixed to complete validation.

Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
E^2_0	'6.4575'	'7.9938'	'25.9529'	'6.5588'	'0.0833'
P_0	'0'	'0'	'2.6982'	'0'	'0.0844'
\lambda_{fq}	'0.0039'	'0.018'	'0.4019'	'0.0163'	'0.098'
\vartheta_E	'0.9861'	'0.9869'	'0.0057'	'0.9868'	'0.095'
\gamma_L	'0.2391'	'0.261'	'0.1484'	'0.2533'	'0.0904'
k_L	'1'	'8.29'	'5.6756'	'1.0563'	'0.0905'
\lambda_{qf}	'0.5487'	'1'	'0.5158'	'0.9317'	'0.0932'
\delta	'0.0636'	'0.0867'	'0.0077'	'0.069'	'0.1094'
\eta_L	'0.689'	'1'	'0.5944'	'0.9824'	'0.1022'
\vartheta_P	'0'	'0'	'0'	'0'	'0.0664'
\gamma_H	'0'	'0.013'	'0.1812'	'0.0058'	'0.089'
z	'14.0155'	'14.893'	'1.0488'	'14.4901'	'0.096'
\eta_\vartheta	'0.6137'	'1'	'0.5633'	'0.9748'	'0.0806'
a_L	'1'	'1.1123'	'2.3919'	'1.0268'	'0.0839'
b_L	'13.4521'	'15'	'5.5327'	'14.8746'	'0.0872'
a_\mu	'1'	'3.0842'	'1.2525'	'1.0133'	'0.0641'
b_\mu	'1.2188'	'6.4692'	'4.7015'	'1.2271'	'0.0879'
\mu	'0.476'	'1'	'0.6498'	'0.9875'	'0.0965'
a_H	'1'	'15'	'4.3279'	'2.621'	'0.0954'
b_H	'1.7'	'14.335'	'4.6234'	'14.0503'	'0.0907'
\nu	'0.3051'	'6.1011'	'0.0148'	'2.7116'	'0.0725'

1.3. Identifiability analisys




E_0^2
P_0
λ_{fq}
ϑ_E
γ_L
k_L
λ_{qf}
δ
η_L
ϑ_P
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η_ϑ
a_L
b_L
a_μ
b_μ
μ
a_H
b_H
ν
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0.4
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0
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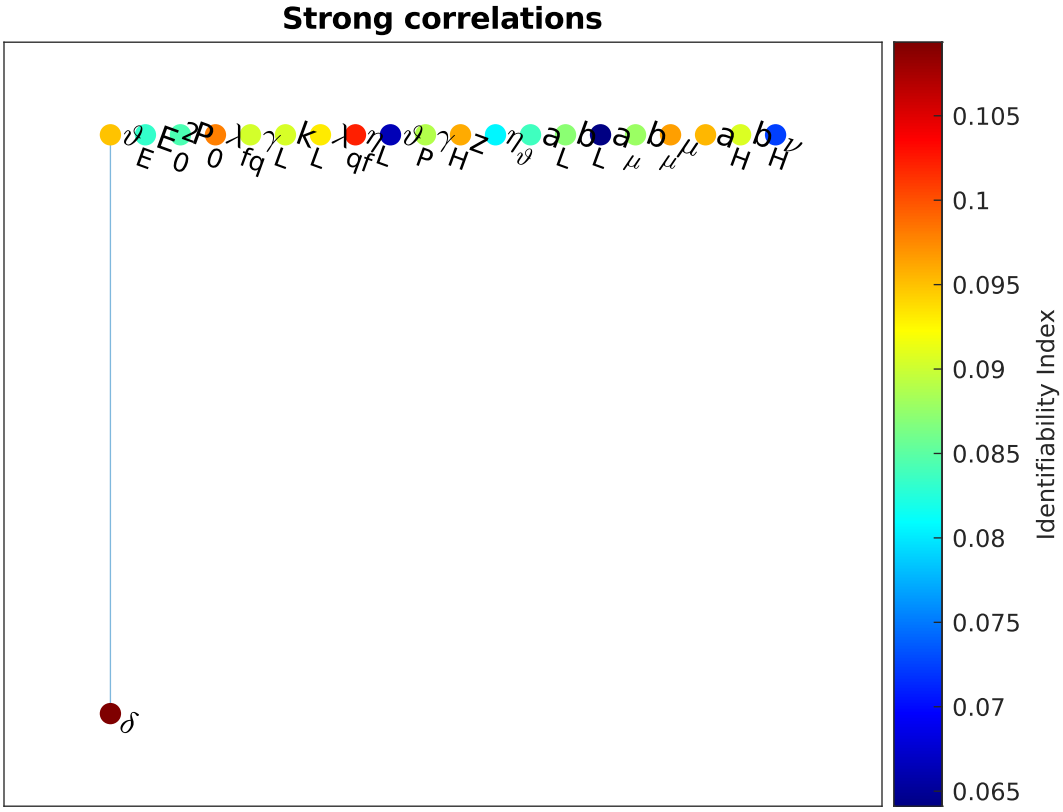
-0.4
-0.6
-0.8
-1


Strong correlations
Identifiability Index
0.105
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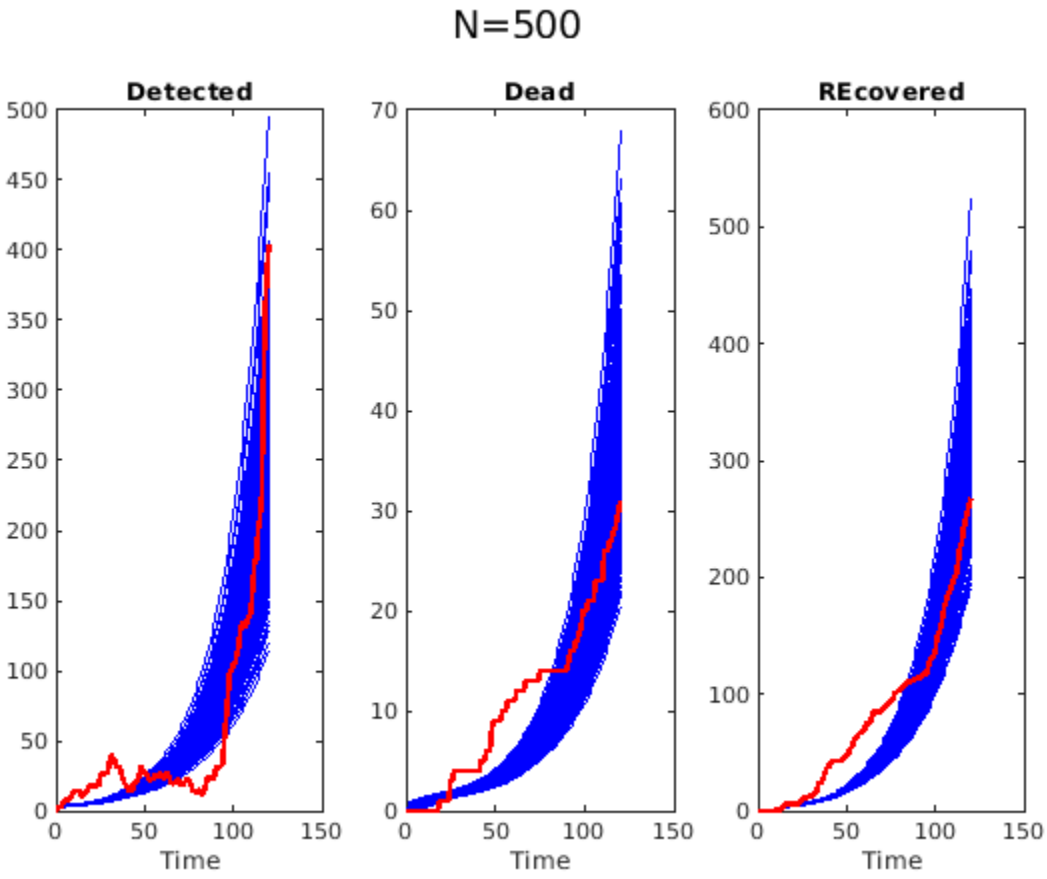
0.09
0.085
0.08
0.075
0.07
0.065

1.4. Uncertainty analisys



Chapter 2. Extension number2

2.1. Basic information

The extension to be validated consists of the time series from the data121 to the 146. The status of the validation is: COMPLETED.

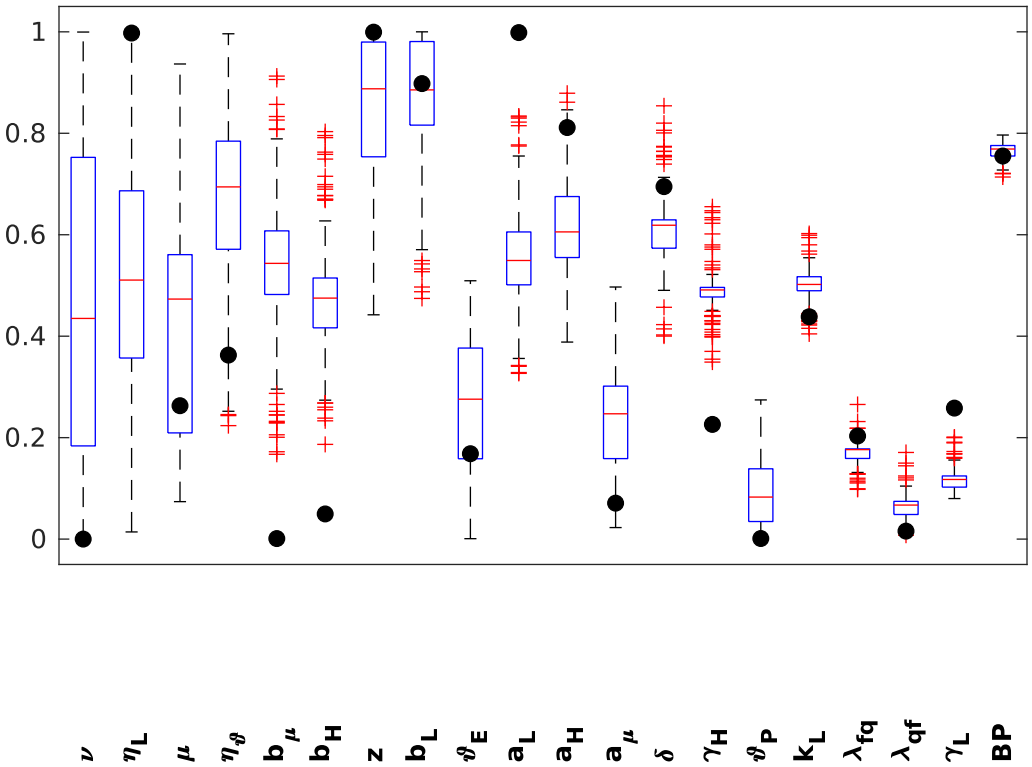
The number of estimations needed to perform the validation was1000.

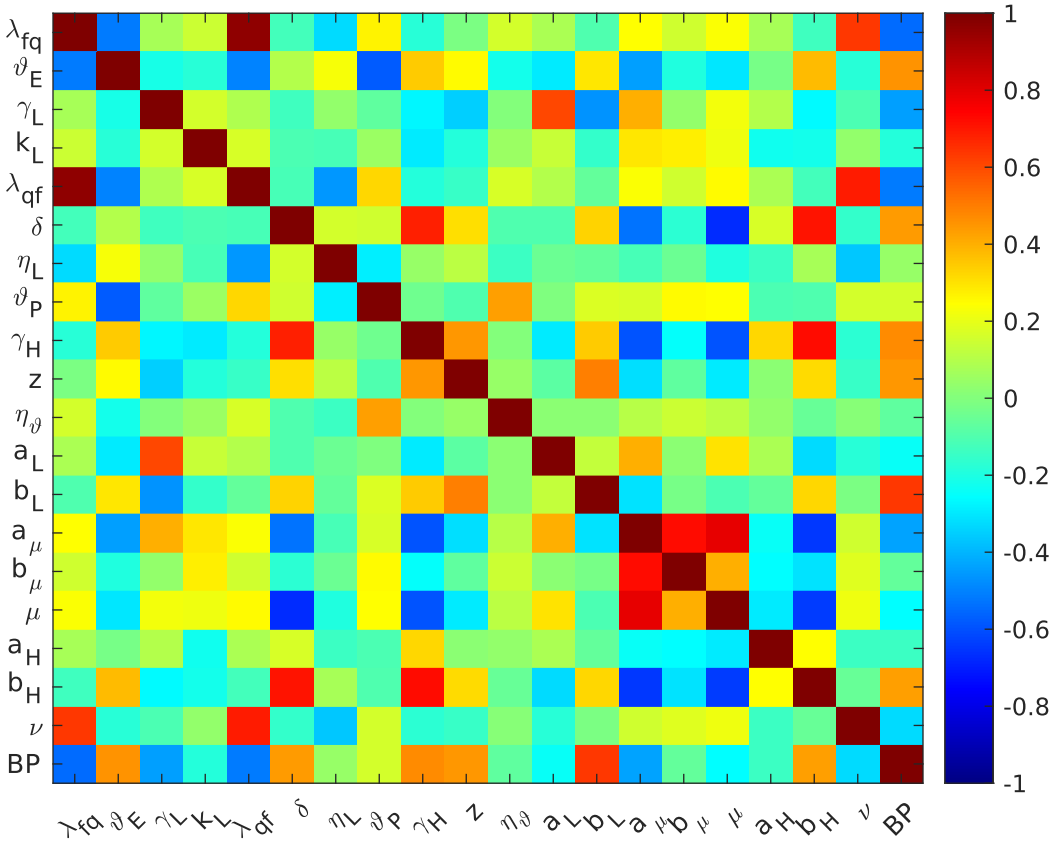
2.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.1141'	'0.2386'	'0.1764'	'0.2032'	'0.1993'
\vartheta_E	'0.2486'	'0.3031'	'0.2758'	'0.1683'	'0.148'
\gamma_L	'0.0912'	'0.144'	'0.1176'	'0.2582'	'0.1142'
k_L	'5.3249'	'5.7115'	'5.5182'	'4.9445'	'0.0862'
\lambda_{qf}	'0.0166'	'0.1182'	'0.0674'	'0.0157'	'0.1796'
\delta	'0.0879'	'0.0978'	'0.0928'	'0.1042'	'0.1732'
\eta_L	'0.4593'	'0.5619'	'0.5106'	'0.9976'	'0.1134'
\vartheta_P	'0.0617'	'0.1049'	'0.0833'	'0.0012'	'0.1047'
\gamma_H	'0.4537'	'0.5286'	'0.4912'	'0.2261'	'0.1904'
z	'25.587'	'27.6693'	'26.6282'	'29.9807'	'0.1113'
\eta_\vartheta	'0.652'	'0.7309'	'0.6915'	'0.3628'	'0.088'
a_L	'8.2928'	'9.0859'	'8.6893'	'14.9789'	'0.1087'
b_L	'12.86'	'13.9306'	'13.3953'	'13.5714'	'0.1267'
a_\mu	'4.1707'	'4.7462'	'4.4584'	'1.992'	'0.1972'
b_\mu	'8.0578'	'9.1617'	'8.6097'	'1.0147'	'0.1234'
\mu	'0.4282'	'0.5181'	'0.4732'	'0.263'	'0.1989'
a_H	'9.1162'	'9.8402'	'9.4782'	'12.3583'	'0.0849'
b_H	'7.1538'	'8.1484'	'7.6511'	'1.6943'	'0.186'
\nu	'184.6178'	'250.3909'	'217.5043'	'0.0155'	'0.1645'
BP	'111.8914'	'113.1086'	'112.5'	'110.4999'	'0.1449'

2.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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0.6
0.4
0.2
0
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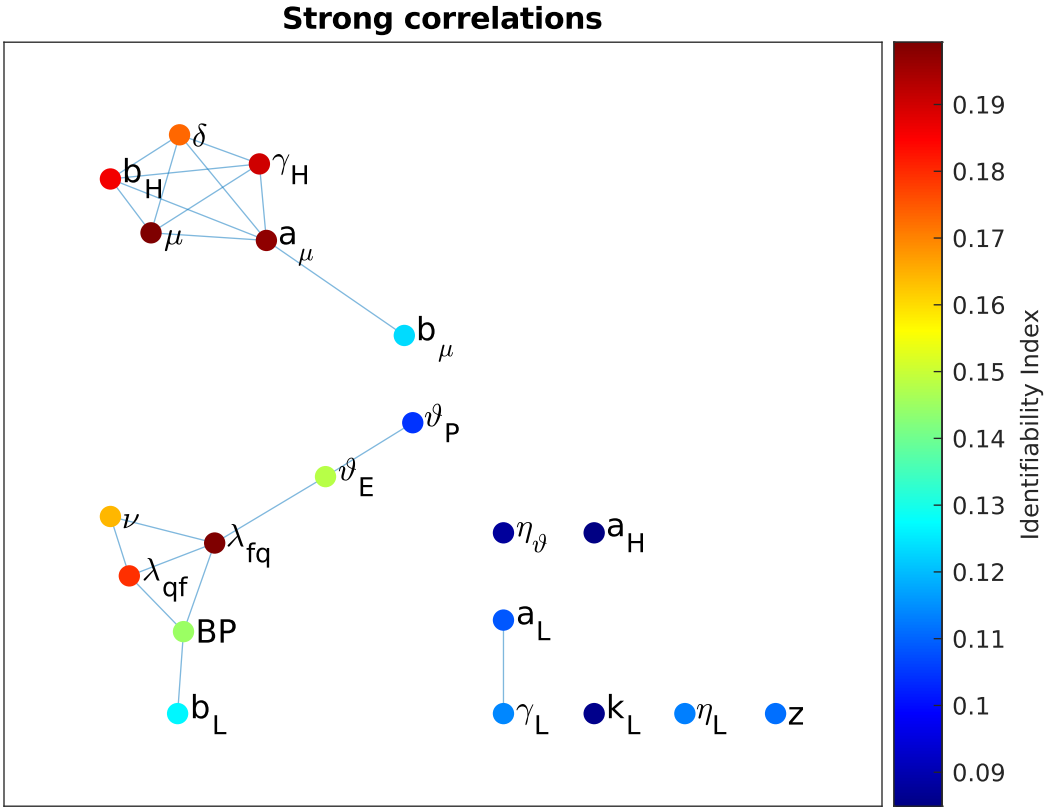
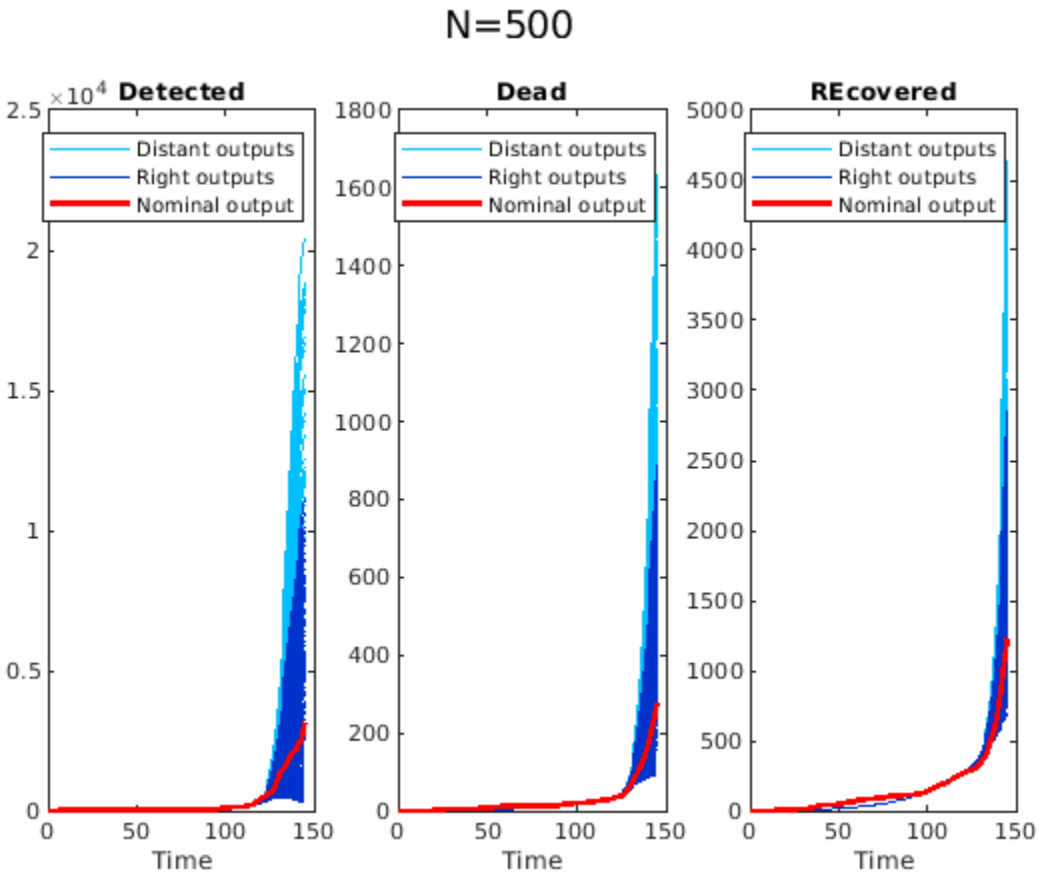
-0.4
-0.6
-0.8
-1


Strong correlations
δ
γH
bH
μ
aμ
bμ
ϑP
ϑE
ν
λfq
λqf
BP
bL
ηϑ
aH
aL
γL
kL
ηL
z
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
Identifiability Index

2.4. Uncertainty analisys



Chapter 3. Extension number3

3.1. Basic information

The extension to be validated consists of the time series from the data146 to the 169. The status of the validation is: COMPLETED.

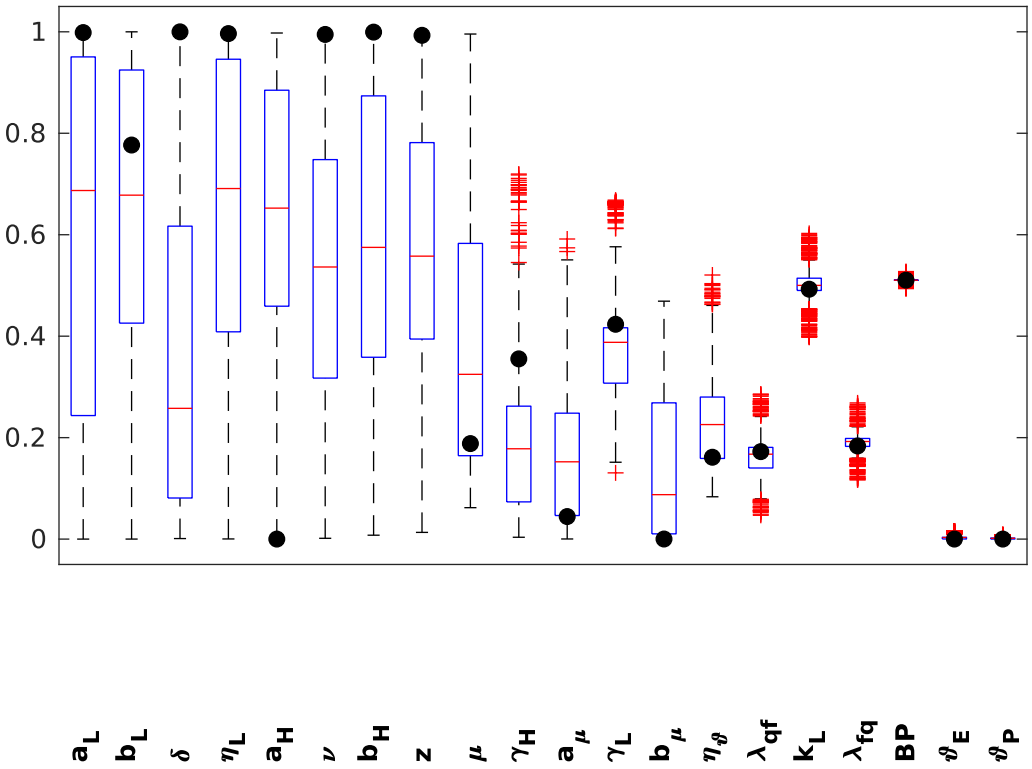
The number of estimations needed to perform the validation was1000.

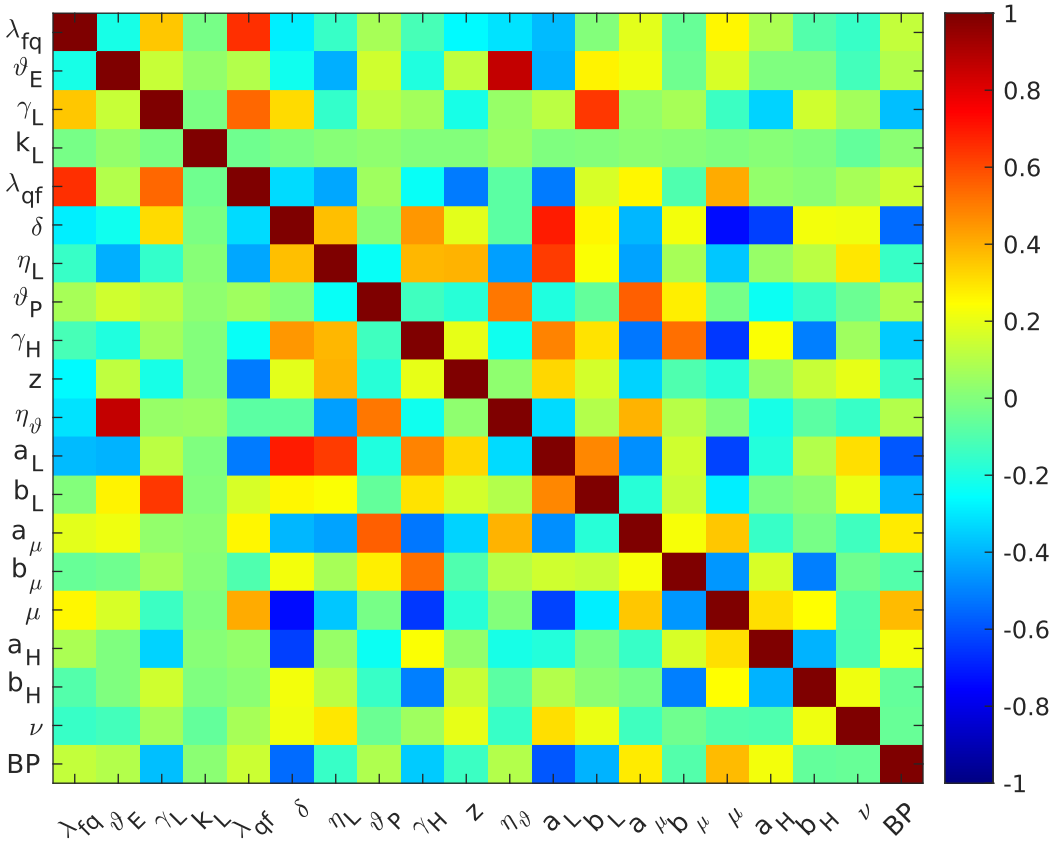
3.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.1809'	'0.2039'	'0.1924'	'0.1836'	'0.0961'
\vartheta_E	'0'	'0.0205'	'0.0031'	'0.0001'	'0.0947'
\gamma_L	'0.3781'	'0.3977'	'0.3879'	'0.4235'	'0.1082'
k_L	'5.431'	'5.5715'	'5.5012'	'5.4336'	'0.037'
\lambda_{qf}	'0.1505'	'0.1843'	'0.1674'	'0.1724'	'0.1506'
\delta	'0.0339'	'0.0435'	'0.0387'	'0.15'	'0.1842'
\eta_L	'0.6635'	'0.7186'	'0.691'	'0.9965'	'0.1314'
\vartheta_P	'0.0008'	'0.0024'	'0.0016'	'0.0001'	'0.0897'
\gamma_H	'0.1511'	'0.205'	'0.1781'	'0.3553'	'0.1722'
z	'16.0385'	'17.4271'	'16.7328'	'29.7927'	'0.1068'
\eta_\vartheta	'0.2107'	'0.2408'	'0.2258'	'0.1614'	'0.1159'
a_L	'10.1762'	'11.0637'	'10.62'	'14.9786'	'0.2064'
b_L	'10.1025'	'10.881'	'10.4917'	'11.875'	'0.1142'
a_\mu	'2.9605'	'3.3057'	'3.1331'	'1.622'	'0.127'
b_\mu	'1.9586'	'2.4943'	'2.2265'	'1.0024'	'0.1108'
\mu	'0.3016'	'0.348'	'0.3248'	'0.1883'	'0.1564'
a_H	'9.7196'	'10.5482'	'10.1339'	'1.0007'	'0.1098'
b_H	'8.7214'	'9.3797'	'9.0506'	'14.9913'	'0.1113'
\nu	'256.9565'	'279.4251'	'268.1908'	'497.4049'	'0.0793'
BP	'145.4403'	'145.5597'	'145.5'	'145.5'	'0.1039'

3.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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0.6
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0.2
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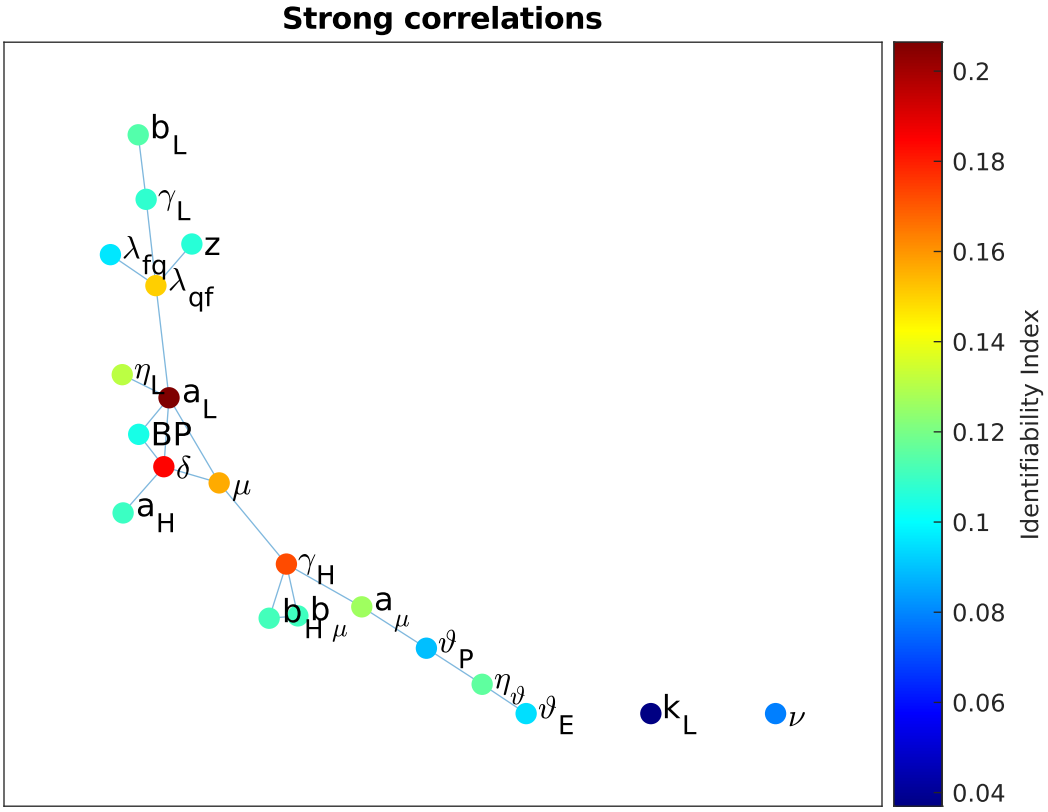
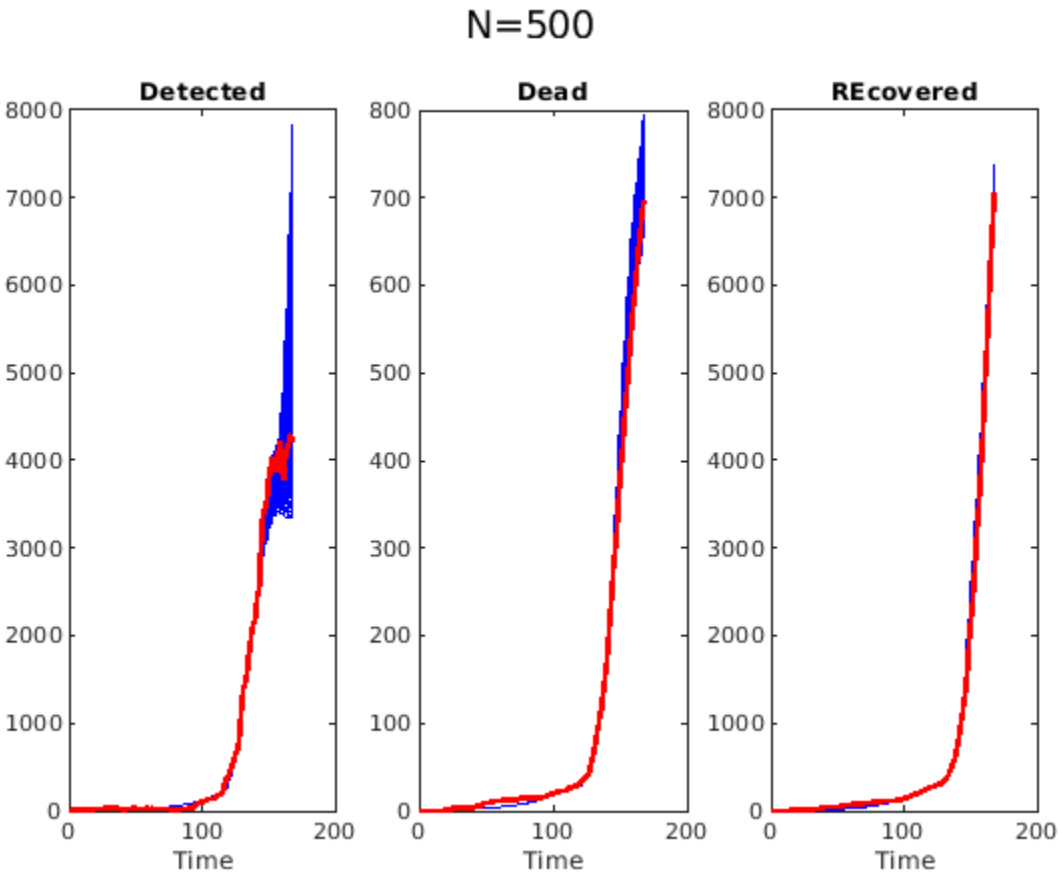
-0.4
-0.6
-0.8
-1


Strong correlations
b L
γ L
λ fq
z
λ qf
η L
a L
BP
δ
μ
a H
γ H
b H
b μ
a μ
ϑ P
η ϑ
ϑ E
k L
ν
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
Identifiability Index

3.4. Uncertainty analisys



Chapter 4. Extension number4

4.1. Basic information

The extension to be validated consists of the time series from the data169 to the 206. The status of the validation is: COMPLETED.

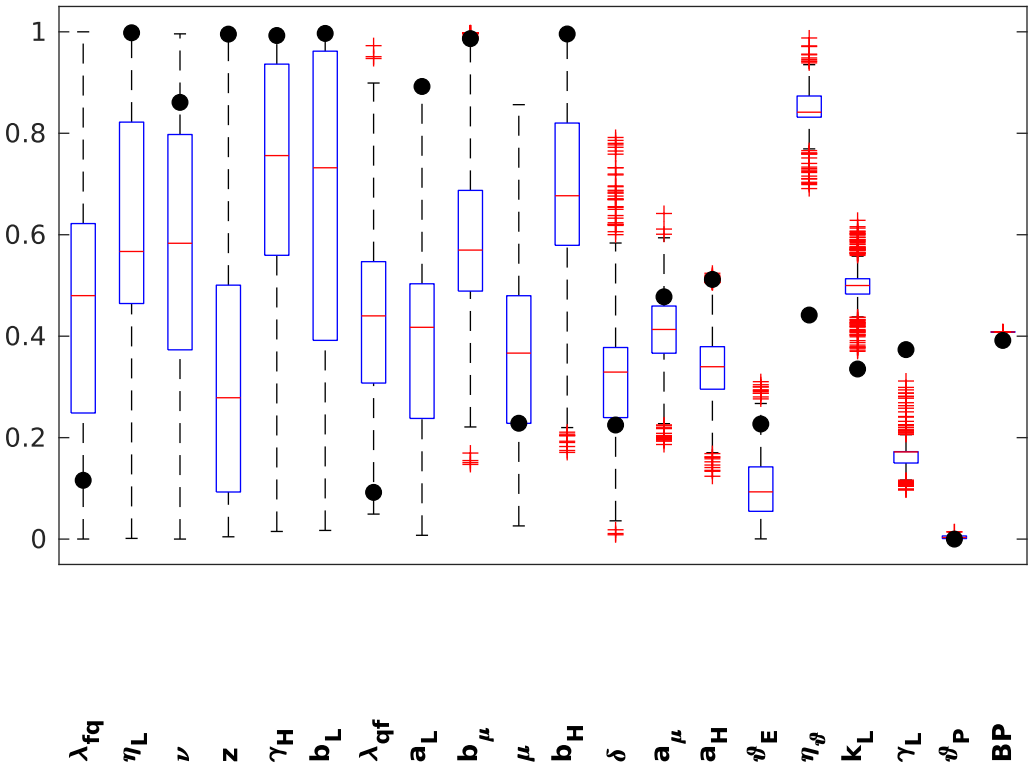
The number of estimations needed to perform the validation was1000.

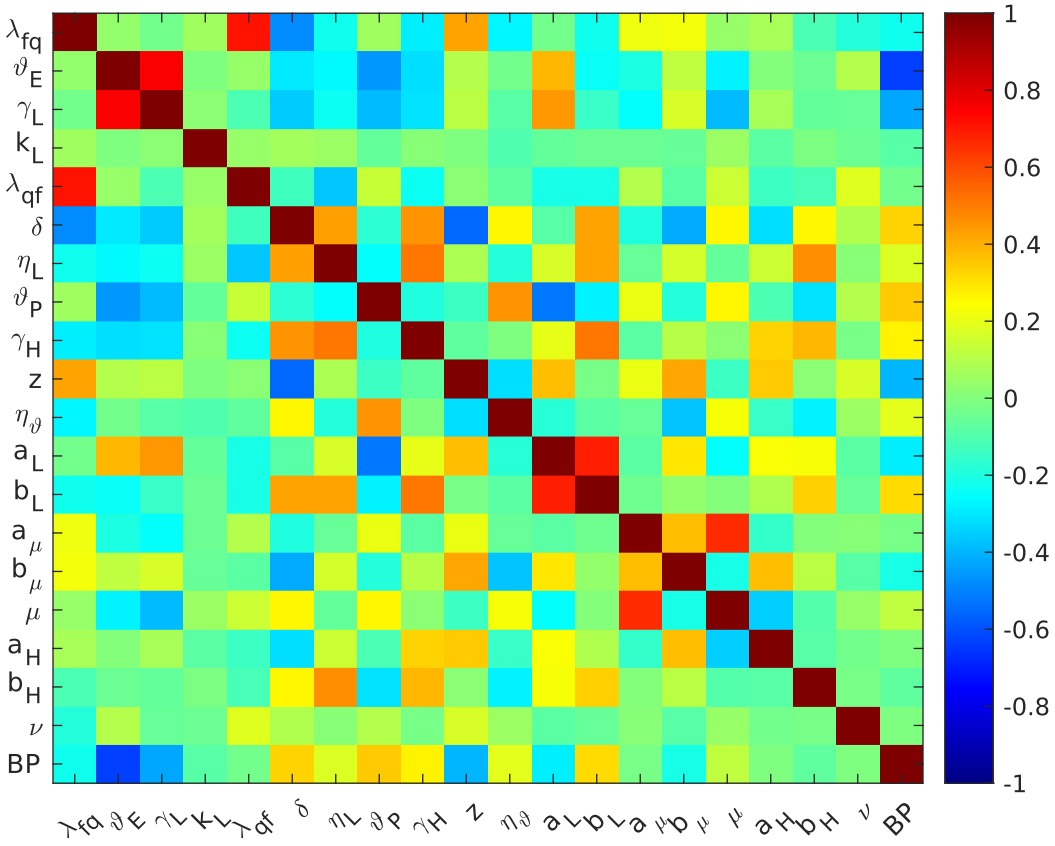
4.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4491'	'0.5108'	'0.4799'	'0.1159'	'0.117'
\vartheta_E	'0.082'	'0.1046'	'0.0933'	'0.2269'	'0.1149'
\gamma_L	'0.1492'	'0.1945'	'0.1719'	'0.3735'	'0.1151'
k_L	'5.4019'	'5.596'	'5.4989'	'4.0177'	'0.0466'
\lambda_{qf}	'0.4191'	'0.4611'	'0.4401'	'0.0921'	'0.0966'
\delta	'0.0445'	'0.0544'	'0.0495'	'0.0337'	'0.1401'
\eta_L	'0.5376'	'0.5964'	'0.567'	'0.9981'	'0.12'
\vartheta_P	'0.0027'	'0.0035'	'0.0031'	'0'	'0.0954'
\gamma_H	'0.727'	'0.7851'	'0.756'	'0.9927'	'0.133'
z	'7.3486'	'9.3708'	'8.3597'	'29.8635'	'0.1199'
\eta_\vartheta	'0.8248'	'0.8582'	'0.8415'	'0.4417'	'0.0831'
a_L	'6.481'	'7.2093'	'6.8451'	'13.4917'	'0.1357'
b_L	'10.7519'	'11.744'	'11.248'	'14.9557'	'0.1373'
a_\mu	'6.582'	'6.9895'	'6.7857'	'7.6867'	'0.0884'
b_\mu	'8.6579'	'9.2932'	'8.9755'	'14.8119'	'0.0973'
\mu	'0.3472'	'0.3886'	'0.3679'	'0.2284'	'0.1031'
a_H	'5.5355'	'5.9786'	'5.7571'	'8.1667'	'0.0792'
b_H	'10.1439'	'10.7769'	'10.4604'	'14.9403'	'0.0851'
\nu	'276.5886'	'306.5915'	'291.5901'	'430.4729'	'0.0713'
BP	'170.4388'	'170.5612'	'170.5'	'169.5'	'0.09'

4.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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0.2
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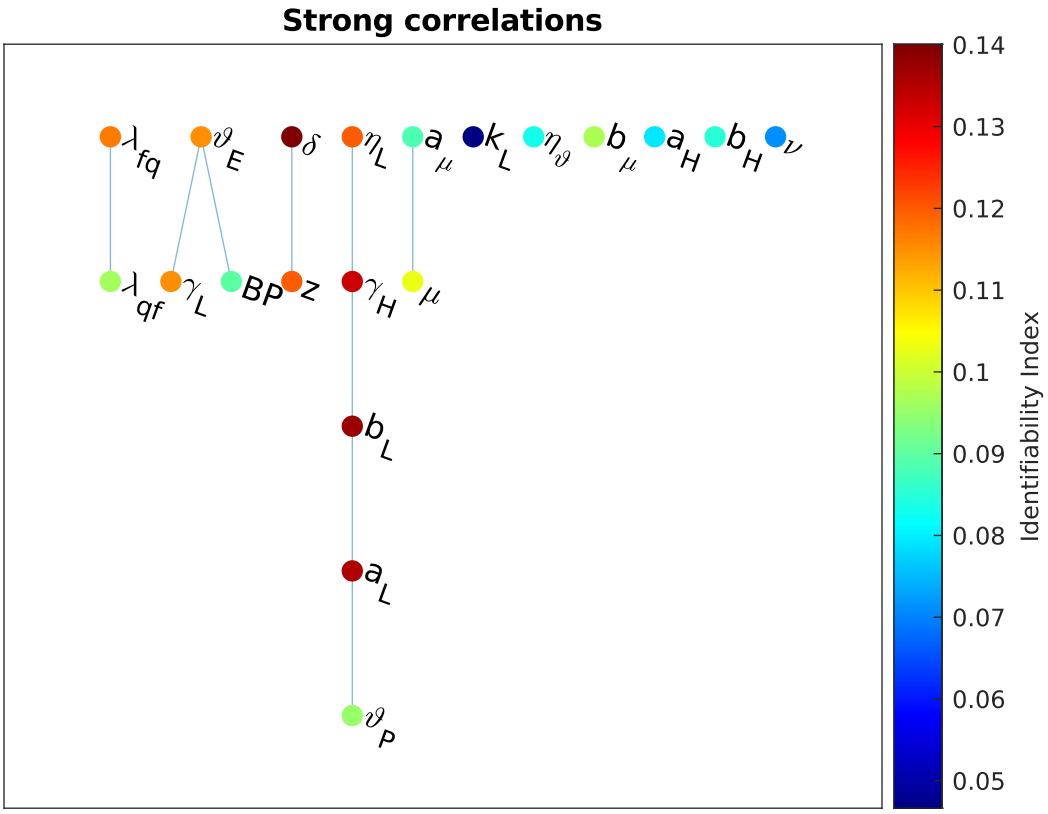
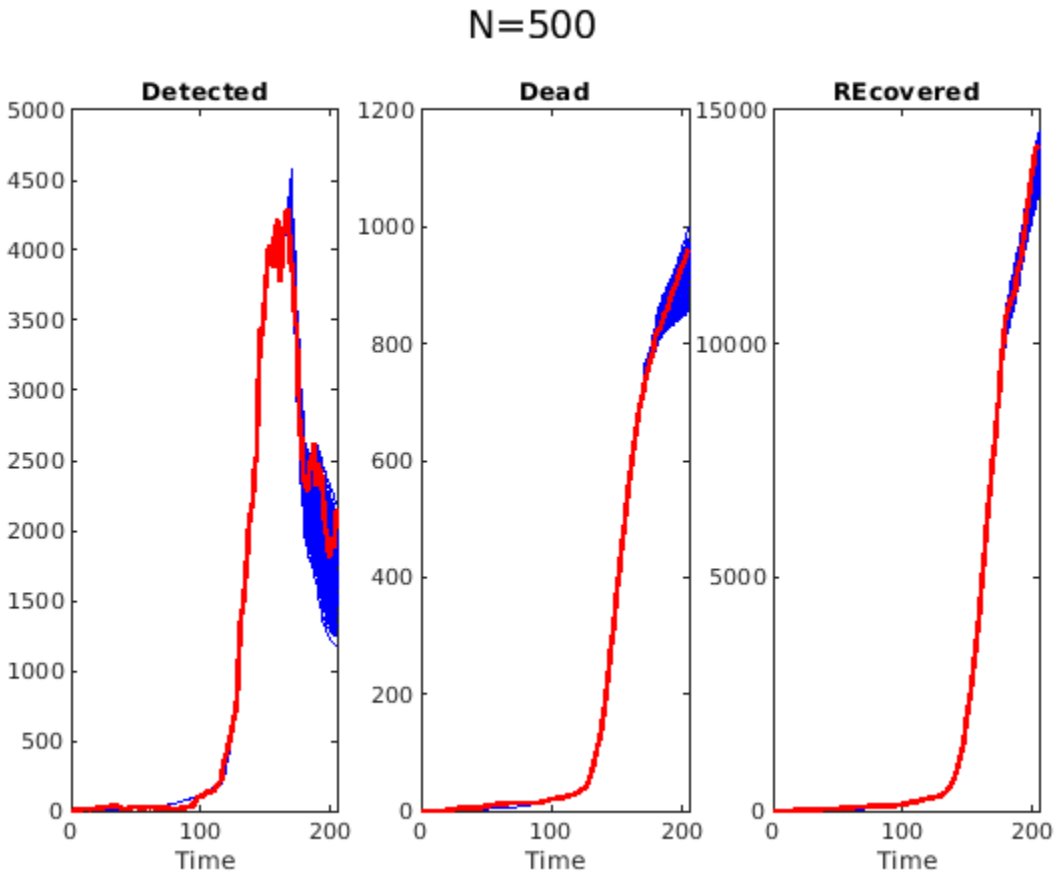
-0.4
-0.6
-0.8
-1


Strong correlations
λ_{fq}
ϑ_E
δ
η_L
a_μ
k_L
η_ϑ
b_μ
a_H
b_H
ν
λ_{qf}
γ_L
BP
z
γ_H
μ
b_L
a_L
ϑ_P
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
Identifiability Index

4.4. Uncertainty analisys



Chapter 5. Extension number5

5.1. Basic information

The extension to be validated consists of the time series from the data206 to the 250. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

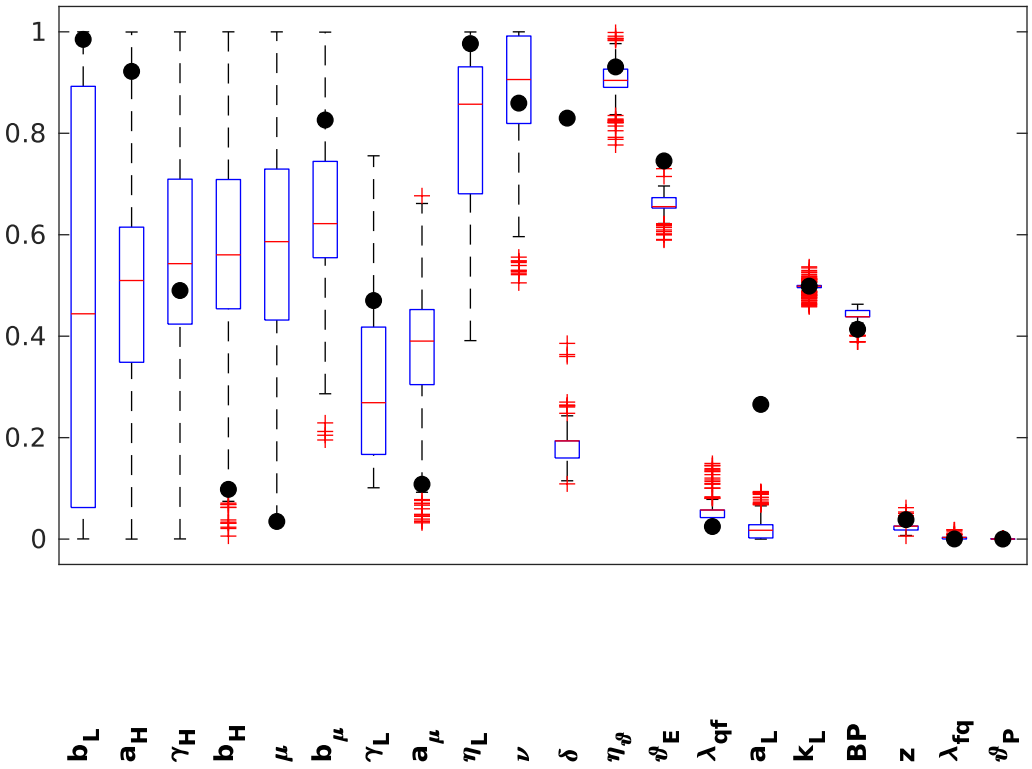
5.2. Estimated parameters with their intervals

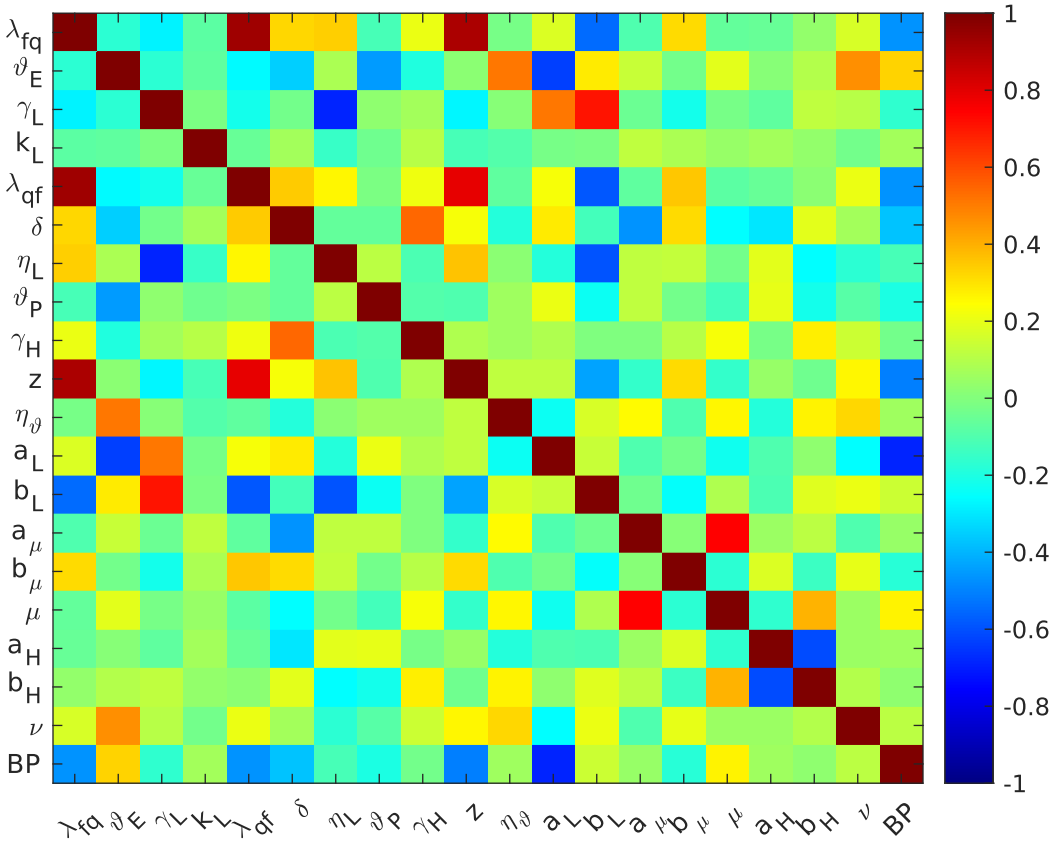
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0005'	'0.0034'	'0.0003'	'0.1597'
\vartheta_E	'0.5604'	'0.7593'	'0.6554'	'0.7455'	'0.1323'
\gamma_L	'0.3685'	'0.5938'	'0.2699'	'0.4703'	'0.1421'
k_L	'1.45'	'10'	'5.4876'	'5.4878'	'0.0574'
\lambda_{qf}	'0.0197'	'0.0298'	'0.0574'	'0.0248'	'0.165'
\delta	'0.003'	'0.15'	'0.0291'	'0.1245'	'0.15'
\eta_L	'0.5447'	'1'	'0.857'	'0.9767'	'0.1383'
\vartheta_P	'0'	'0.0003'	'0.0002'	'0.0001'	'0.0564'
\gamma_H	'0'	'0.95'	'0.543'	'0.49'	'0.1115'
z	'0.9999'	'1.4137'	'0.7713'	'1.1494'	'0.1647'
\eta_\vartheta	'0.4639'	'0.978'	'0.9043'	'0.9308'	'0.1003'
a_L	'1.3915'	'4.7518'	'1.2443'	'4.7175'	'0.1395'
b_L	'10.005'	'15'	'7.218'	'14.7918'	'0.2013'
a_\mu	'1.5607'	'13.6'	'6.4573'	'2.5142'	'0.0983'
b_\mu	'1'	'14.3'	'9.7061'	'12.5661'	'0.0939'
\mu	'0.0054'	'0.0718'	'0.5864'	'0.0348'	'0.1251'
a_H	'2.9393'	'15'	'8.1365'	'13.9087'	'0.106'
b_H	'1'	'14.44'	'8.8449'	'2.373'	'0.1189'
\nu	'289.5554'	'461.753'	'452.6563'	'429.7225'	'0.1013'
BP	'201.7174'	'215.0878'	'204.5'	'202.5'	'0.1072'

5.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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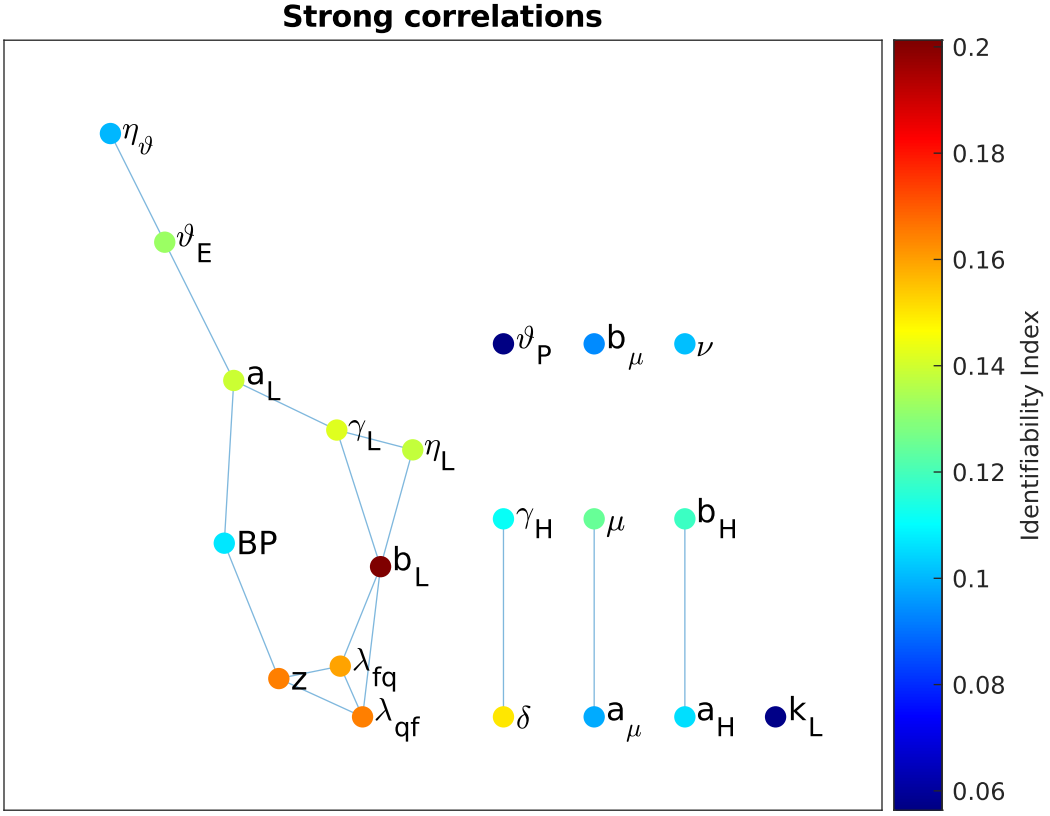
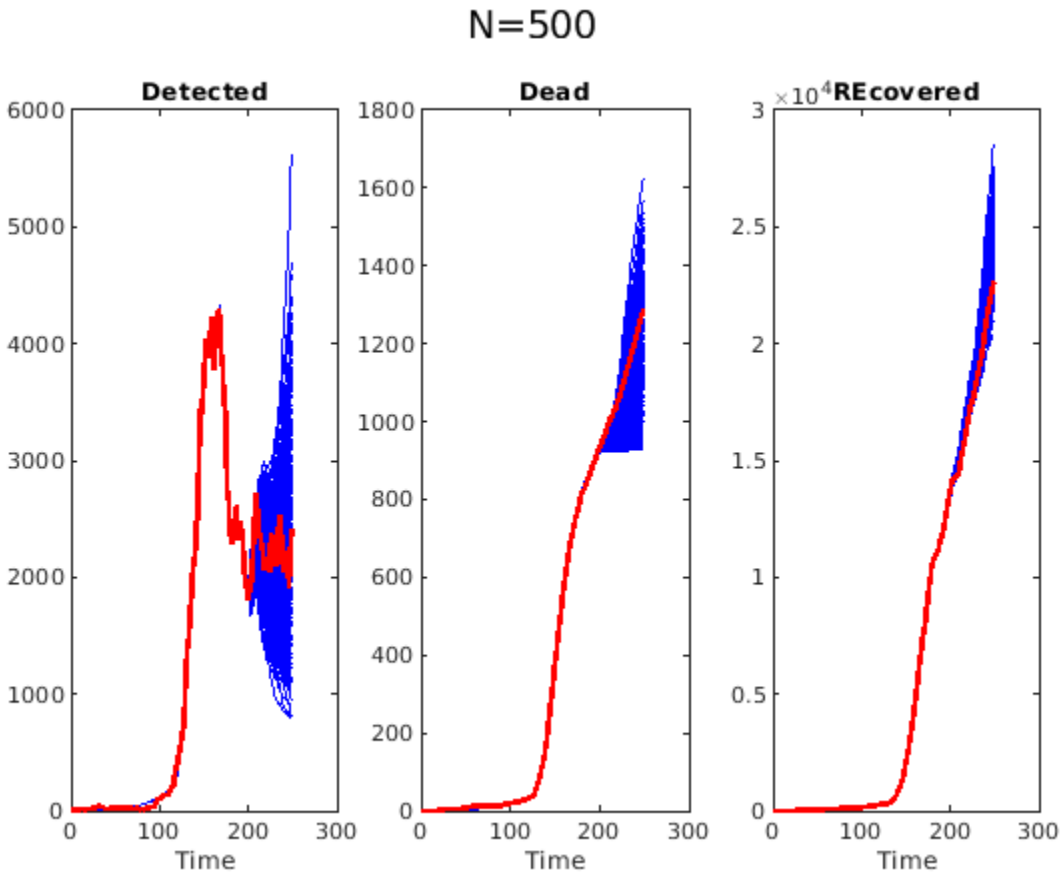
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
η_ϑ
ϑ_E
a_L
γ_L
η_L
BP
b_L
z
λ_{fq}
λ_{qf}
ϑ_P
b_μ
ν
γ_H
μ
b_H
δ
a_μ
a_H
k_L
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
Identifiability Index

5.4. Uncertainty analisys



Chapter 6. Extension number6

6.1. Basic information

The extension to be validated consists of the time series from the data250 to the 286. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

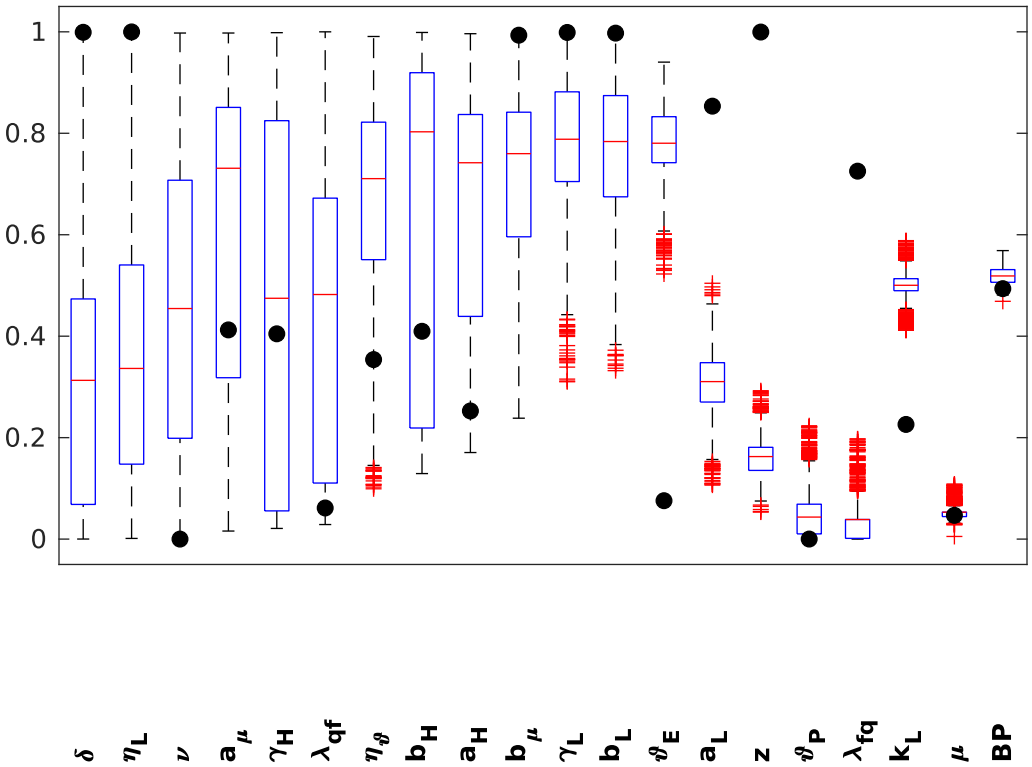
6.2. Estimated parameters with their intervals

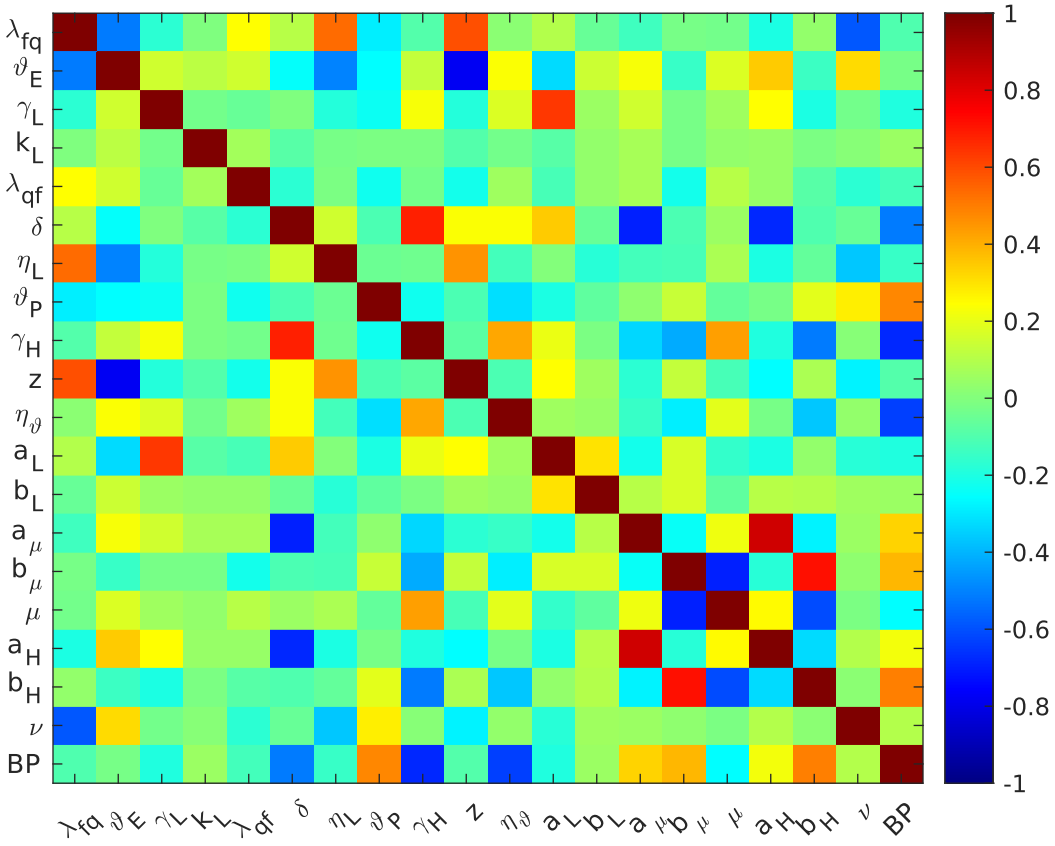
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.6855'	'0.7936'	'0.0387'	'0.7253'	'0.1461'
\vartheta_E	'0.05'	'0.1596'	'0.7802'	'0.0757'	'0.1243'
\gamma_L	'0.3847'	'1'	'0.788'	'0.9988'	'0.0924'
k_L	'1'	'10'	'5.5031'	'3.0344'	'0.0416'
\lambda_{qf}	'0.0587'	'0.0714'	'0.4822'	'0.0613'	'0.0756'
\delta	'0.0725'	'0.15'	'0.0469'	'0.1499'	'0.1569'
\eta_L	'0.8857'	'1'	'0.3364'	'0.9998'	'0.1008'
\vartheta_P	'0.0001'	'0.0006'	'0.0434'	'0.0001'	'0.0796'
\gamma_H	'0.0463'	'1'	'0.4747'	'0.4047'	'0.1525'
z	'25.1841'	'30'	'4.8809'	'29.9867'	'0.1153'
\eta_\vartheta	'0.3501'	'0.421'	'0.7104'	'0.3539'	'0.1016'
a_L	'10.1269'	'13.6989'	'5.3466'	'12.9483'	'0.0934'
b_L	'11.5076'	'15'	'11.9721'	'14.9638'	'0.0603'
a_\mu	'1.28'	'15'	'11.2318'	'6.7736'	'0.1309'
b_\mu	'2.899'	'15'	'11.6356'	'14.9071'	'0.1194'
\mu	'0.002'	'0.1011'	'0.0531'	'0.0468'	'0.1008'
a_H	'1.258'	'13.3966'	'11.3863'	'4.537'	'0.1275'
b_H	'2.5513'	'14.454'	'12.2399'	'6.7351'	'0.1449'
\nu	'0.0016'	'0.0228'	'227.2598'	'0.0105'	'0.0943'
BP	'245.2737'	'256.604'	'247.5'	'245.496'	'0.1269'

6.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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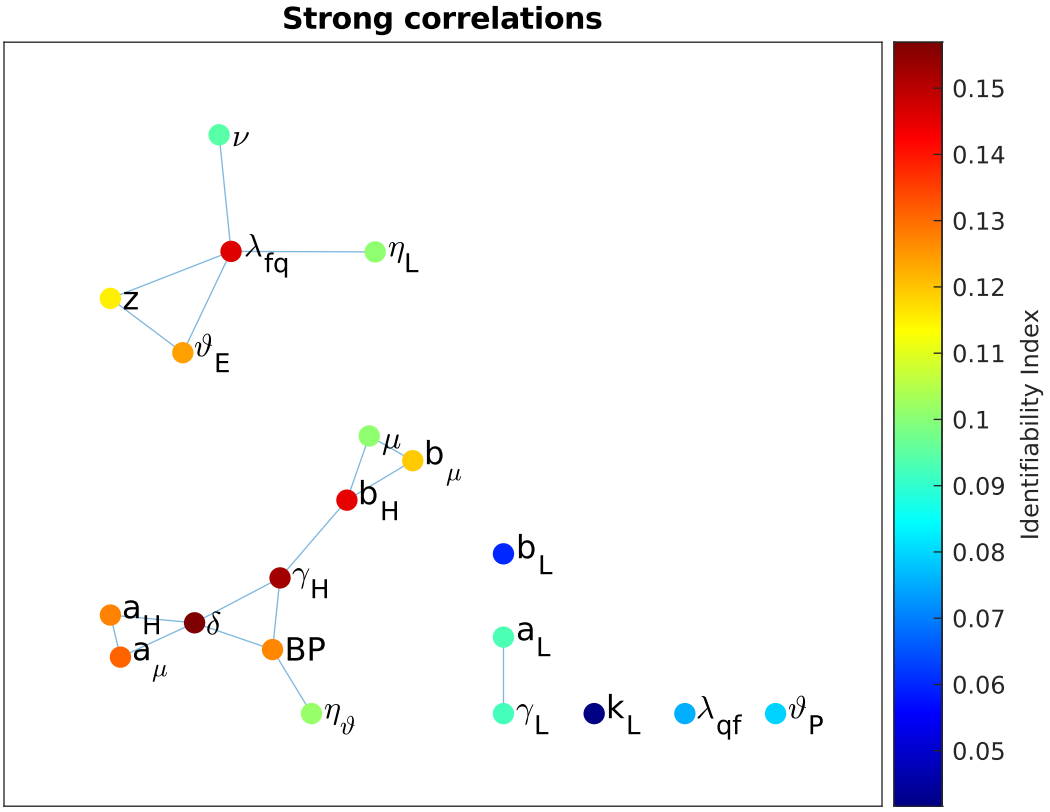
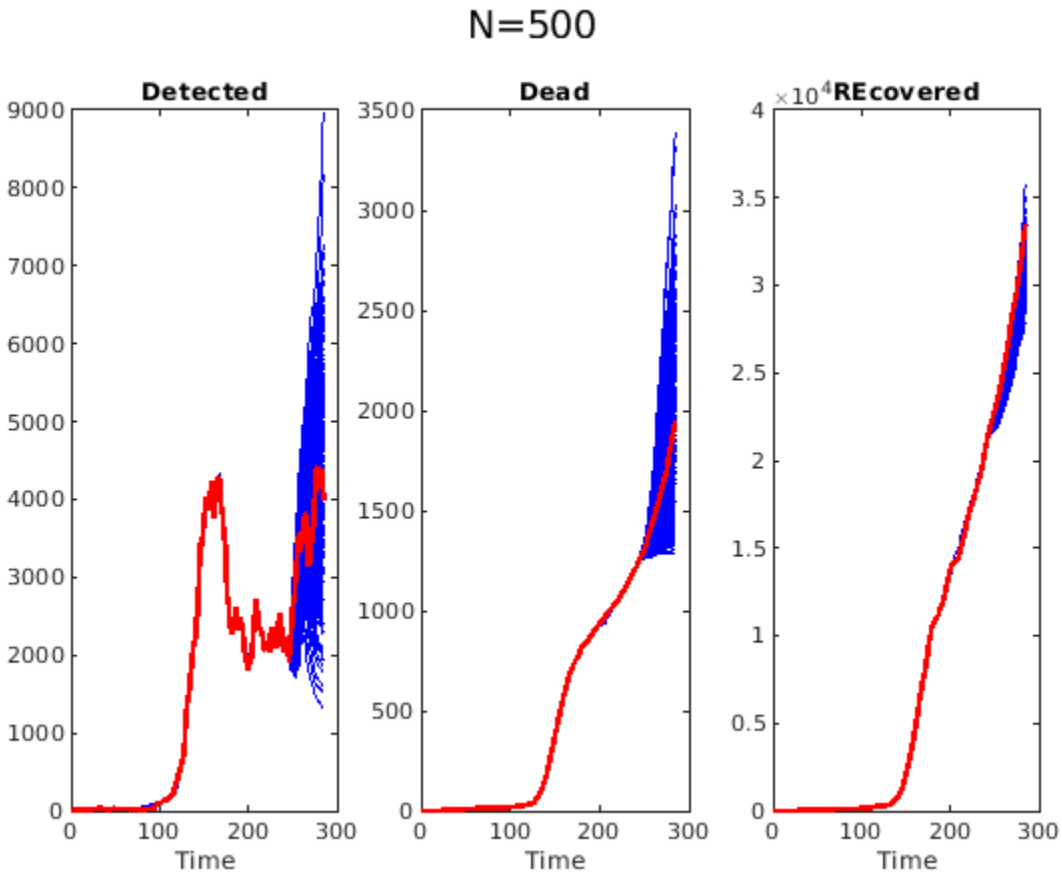
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
ν
λ_{fq}
η_L
z
ϑ_E
μ
b_μ
b_H
b_L
γ_H
a_H
δ
a_μ
BP
a_L
η_ϑ
γ_L
k_L
λ_{qf}
ϑ_P
Identifiability Index
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05

6.4. Uncertainty analisys



Chapter 7. Extension number7

7.1. Basic information

The extension to be validated consists of the time series from the data286 to the 315. The status of the validation is: COMPLETED.

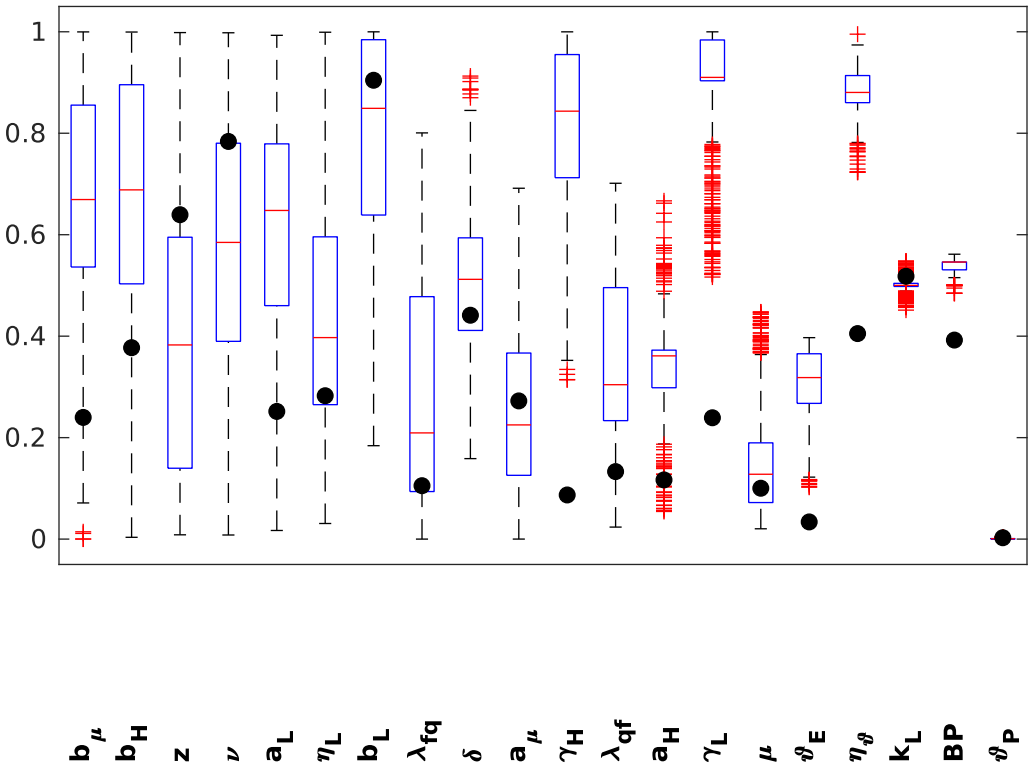
The number of estimations needed to perform the validation was1000.

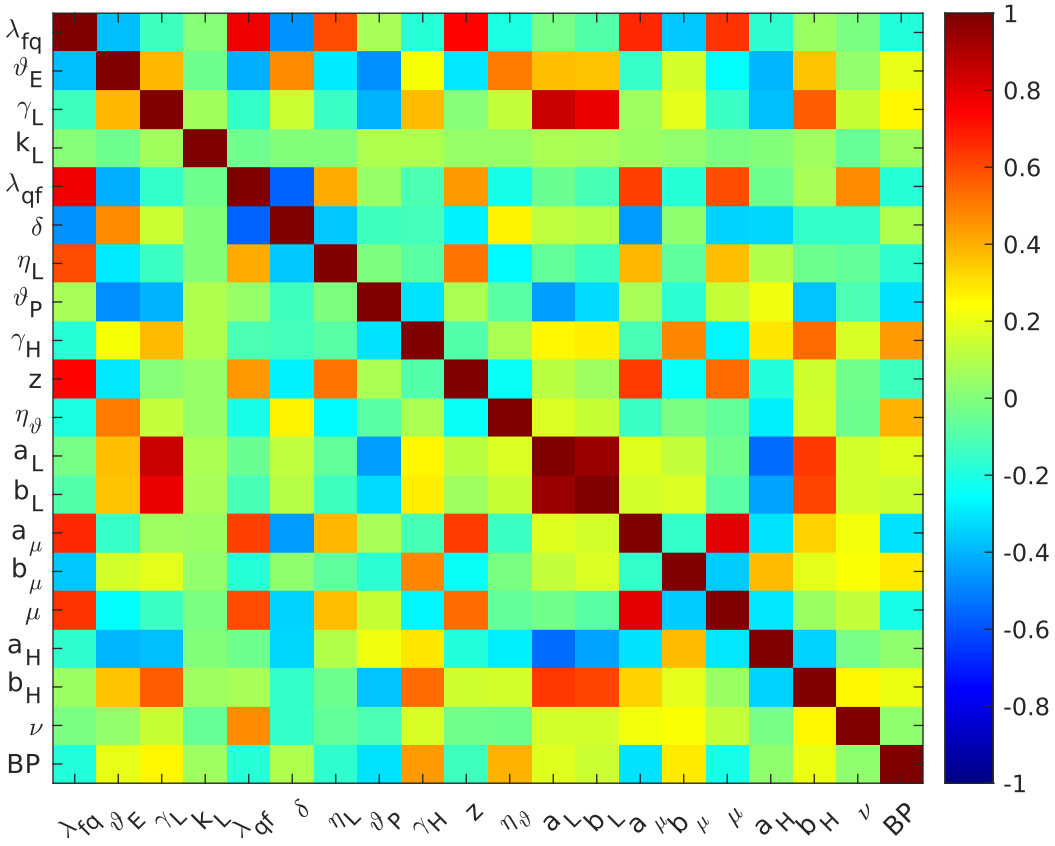
7.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.1869'	'0.2317'	'0.2093'	'0.1053'	'0.1815'
\vartheta_E	'0.3097'	'0.3271'	'0.3184'	'0.0339'	'0.1183'
\gamma_L	'0.8814'	'0.9387'	'0.9101'	'0.2392'	'0.1574'
k_L	'5.4359'	'5.5664'	'5.5011'	'5.6627'	'0.0429'
\lambda_{qf}	'0.2868'	'0.3219'	'0.3043'	'0.1331'	'0.1606'
\delta	'0.0745'	'0.0791'	'0.0768'	'0.0662'	'0.1101'
\eta_L	'0.3733'	'0.4211'	'0.3972'	'0.2826'	'0.1242'
\vartheta_P	'0.0002'	'0.0012'	'0.0007'	'0.0027'	'0.0734'
\gamma_H	'0.8236'	'0.8634'	'0.8435'	'0.087'	'0.1135'
z	'10.5845'	'12.3783'	'11.4814'	'19.1826'	'0.1653'
\eta_\vartheta	'0.8672'	'0.8936'	'0.8804'	'0.4051'	'0.0935'
a_L	'9.6535'	'10.4847'	'10.0691'	'4.5236'	'0.1715'
b_L	'12.3892'	'13.3845'	'12.8869'	'13.6619'	'0.1627'
a_\mu	'3.902'	'4.4003'	'4.1512'	'4.8134'	'0.1655'
b_\mu	'10.0539'	'10.6866'	'10.3703'	'4.3582'	'0.0953'
\mu	'0.107'	'0.1487'	'0.1278'	'0.1003'	'0.1623'
a_H	'5.7067'	'6.4059'	'6.0563'	'2.6331'	'0.1216'
b_H	'10.2581'	'11.0162'	'10.6372'	'6.2822'	'0.1665'
\nu	'279.1129'	'305.6931'	'292.403'	'391.9088'	'0.0823'
BP	'285.3102'	'285.6872'	'285.4987'	'275.5'	'0.0753'

7.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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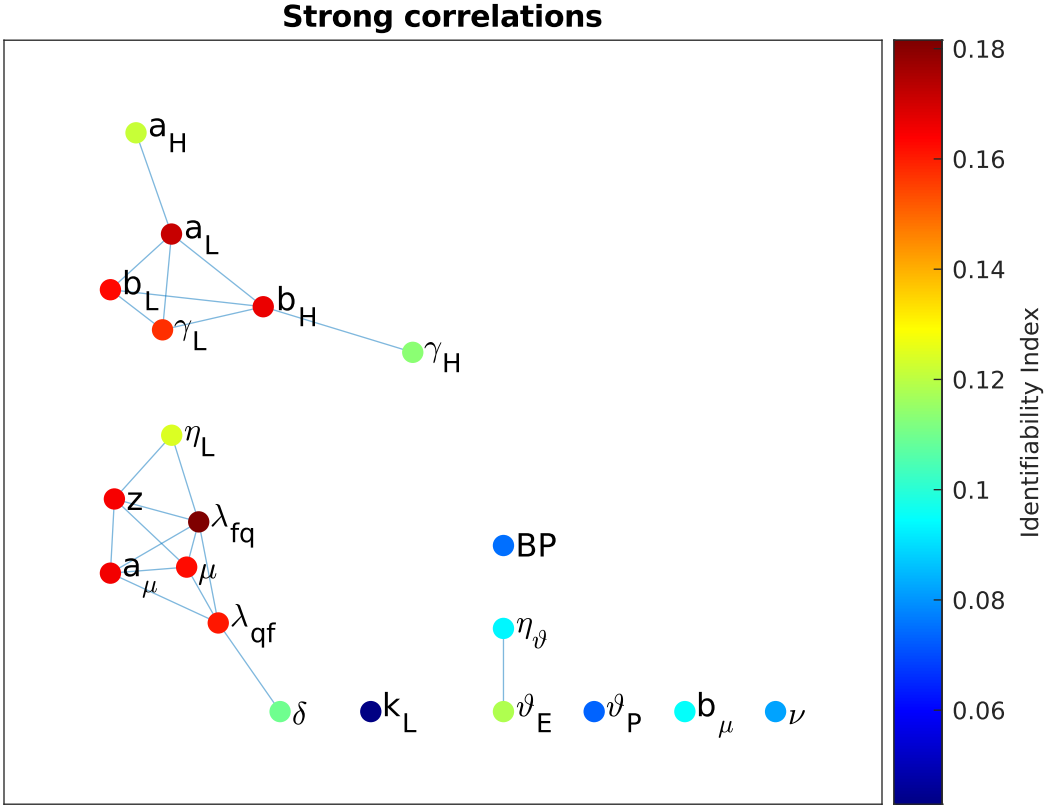
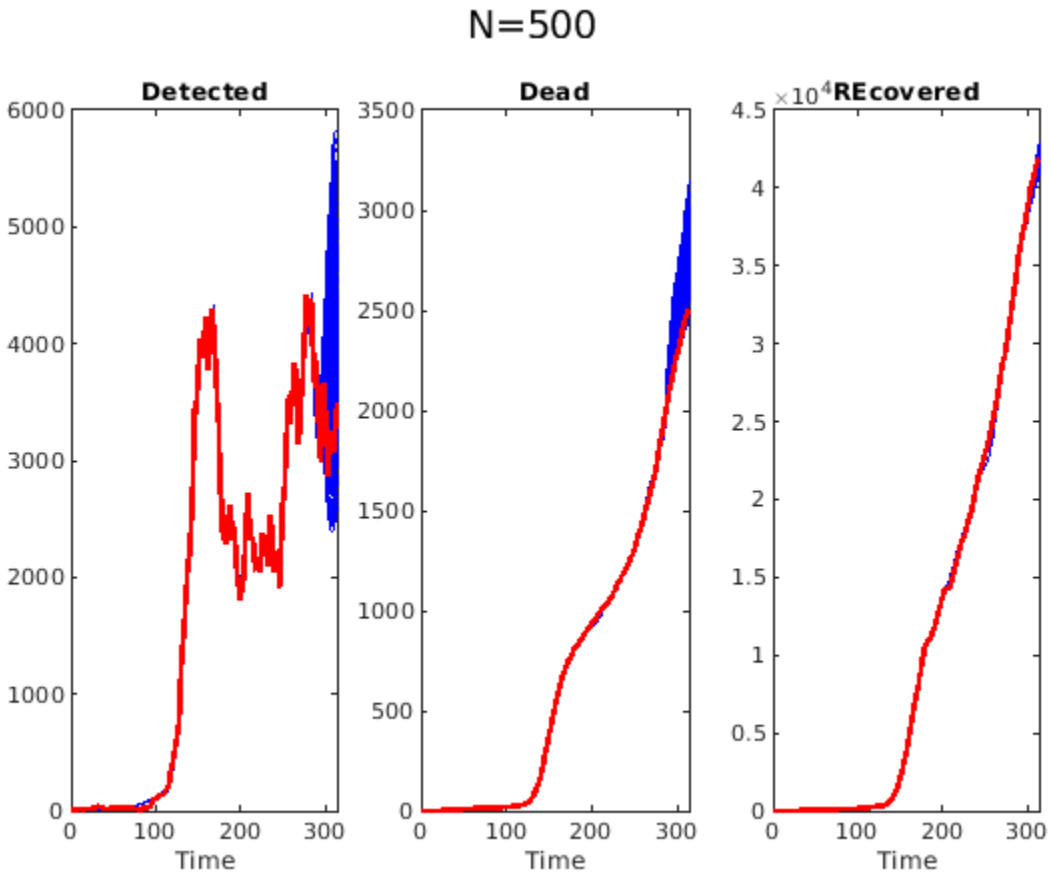
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
a_H
a_L
b_L
b_H
γ_L
γ_H
η_L
z
λ_{fq}
a_μ
μ
λ_{qf}
δ
k_L
BP
η_ϑ
ϑ_E
ϑ_P
b_μ
ν
0.18
0.16
0.14
0.12
0.1
0.08
0.06
Identifiability Index

7.4. Uncertainty analisys



Chapter 8. Extension number8

8.1. Basic information

The extension to be validated consists of the time series from the data315 to the 352. The status of the validation is: COMPLETED.

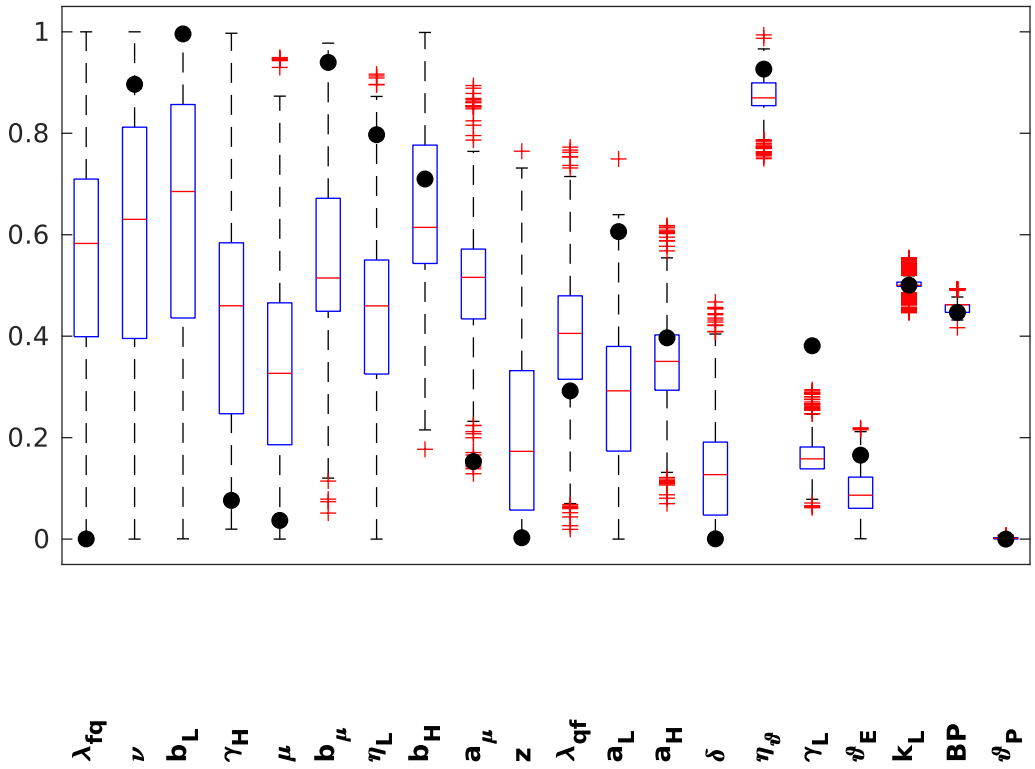
The number of estimations needed to perform the validation was1000.

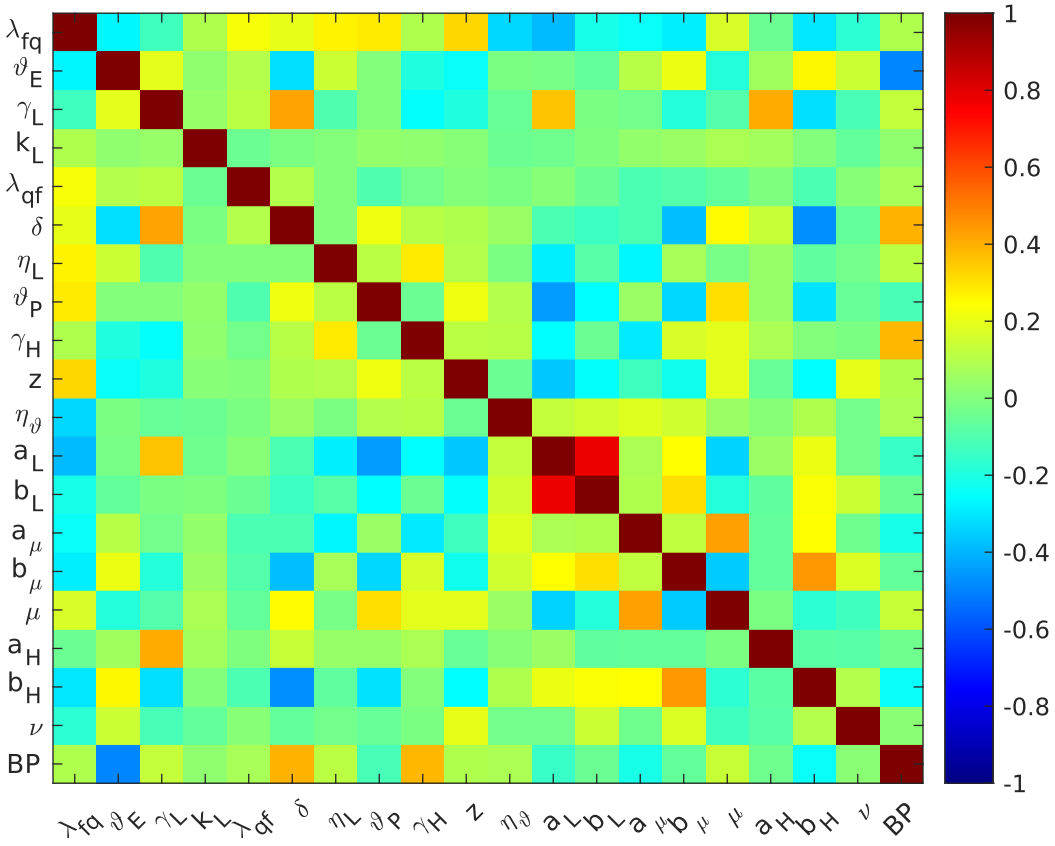
8.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.5549'	'0.6108'	'0.5828'	'0.0003'	'0.1043'
\vartheta_E	'0.081'	'0.0921'	'0.0865'	'0.1654'	'0.0682'
\gamma_L	'0.1414'	'0.175'	'0.1582'	'0.3811'	'0.0809'
k_L	'5.4259'	'5.5777'	'5.5018'	'5.5052'	'0.0419'
\lambda_{qf}	'0.3891'	'0.4219'	'0.4055'	'0.2921'	'0.0569'
\delta	'0.0171'	'0.0211'	'0.0191'	'0.0001'	'0.083'
\eta_L	'0.4416'	'0.4778'	'0.4597'	'0.7972'	'0.0685'
\vartheta_P	'0.0013'	'0.0018'	'0.0015'	'0'	'0.0632'
\gamma_H	'0.4352'	'0.4847'	'0.46'	'0.0763'	'0.0832'
z	'4.6653'	'5.7503'	'5.2078'	'0.0813'	'0.0818'
\eta_\vartheta	'0.8585'	'0.881'	'0.8697'	'0.9265'	'0.0567'
a_L	'4.8746'	'5.3082'	'5.0914'	'9.4859'	'0.1066'
b_L	'10.2386'	'10.9476'	'10.5931'	'14.9425'	'0.1013'
a_\mu	'7.9569'	'8.4897'	'8.2233'	'3.1406'	'0.0794'
b_\mu	'7.9175'	'8.4952'	'8.2064'	'14.1561'	'0.0946'
\mu	'0.308'	'0.3457'	'0.3268'	'0.0369'	'0.0858'
a_H	'5.7122'	'6.0957'	'5.904'	'6.5551'	'0.0562'
b_H	'9.3137'	'9.8906'	'9.6022'	'10.9384'	'0.0946'
\nu	'302.4337'	'327.8865'	'315.1601'	'448.2671'	'0.0705'
BP	'316.3859'	'316.6141'	'316.5'	'315.4996'	'0.0627'

8.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
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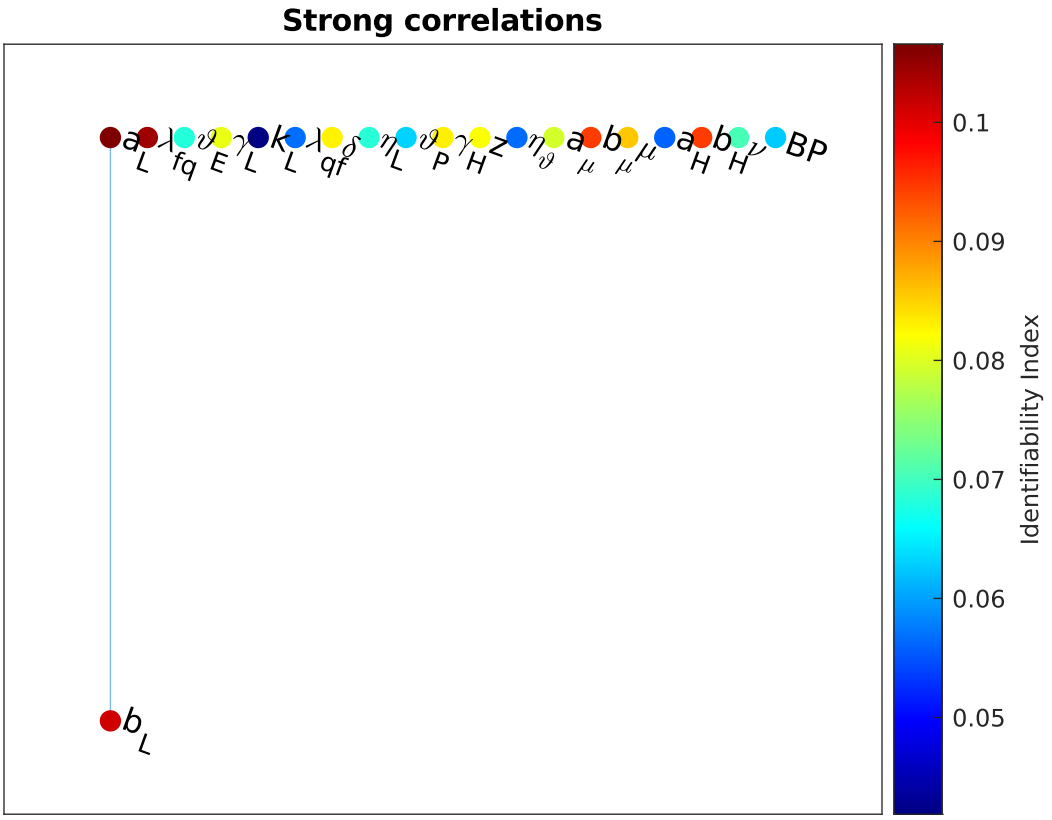
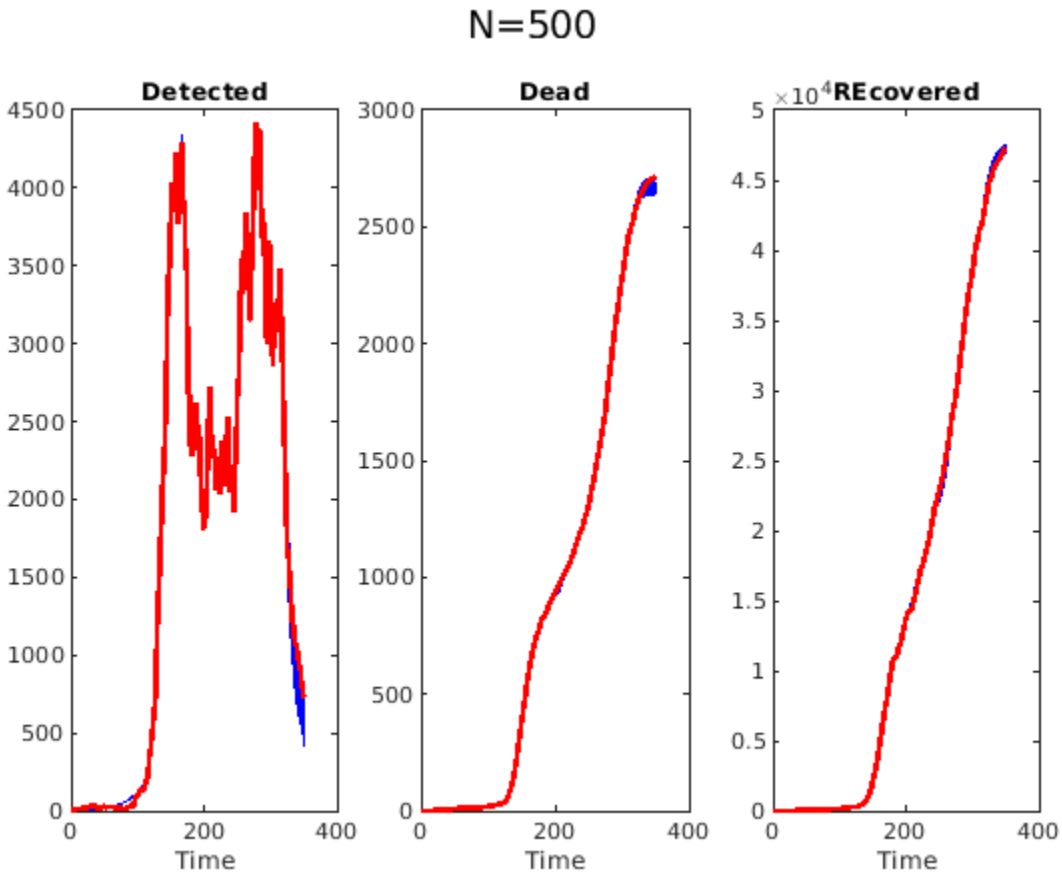
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
Identifiability Index
0.1
0.09
0.08
0.07
0.06
0.05

8.4. Uncertainty analisys



Chapter 9. Extension number9

9.1. Basic information

The extension to be validated consists of the time series from the data352 to the 435. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

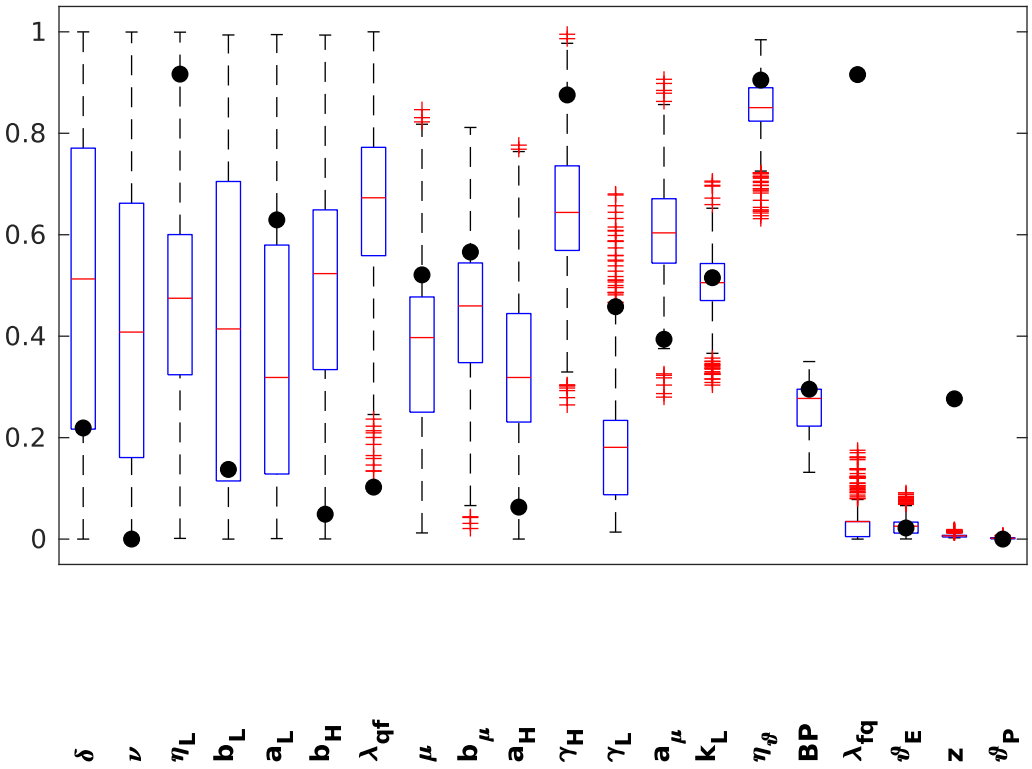
9.2. Estimated parameters with their intervals

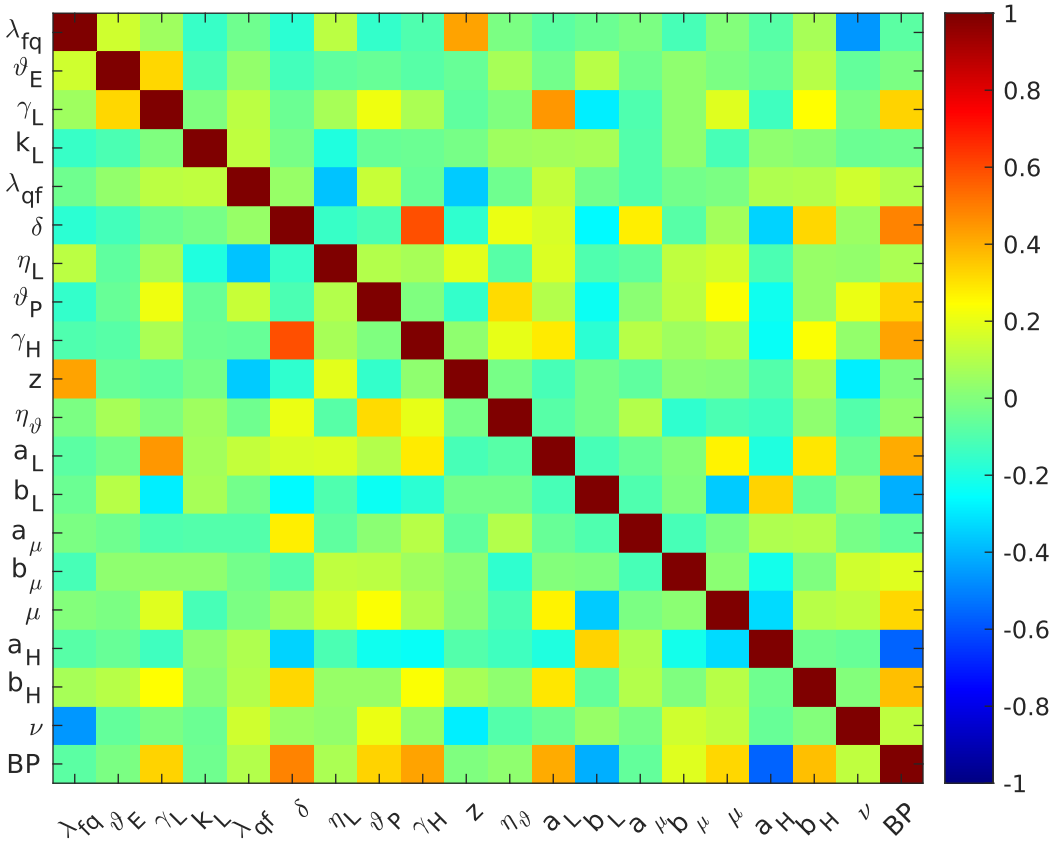
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

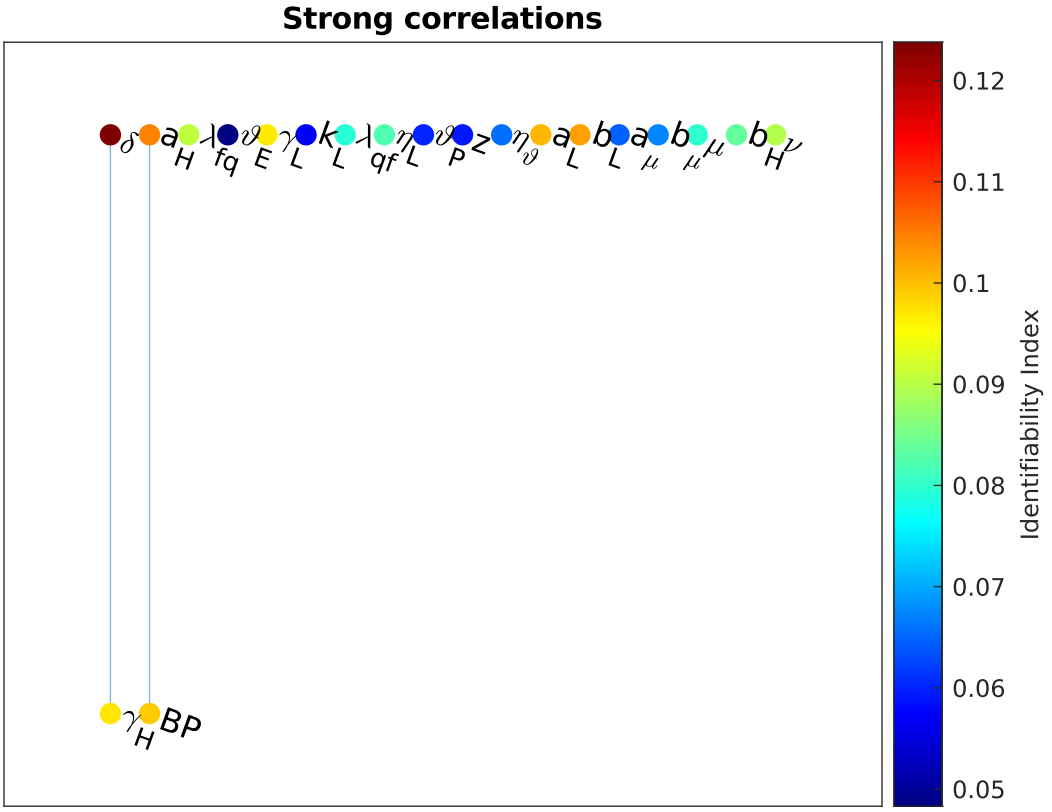
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.8664'	'0.9236'	'0.0346'	'0.9157'	'0.0907'
\vartheta_E	'0.0168'	'0.0247'	'0.0254'	'0.0219'	'0.0483'
\gamma_L	'0.2513'	'0.7612'	'0.1809'	'0.4582'	'0.0967'
k_L	'1.225'	'8.9751'	'5.5496'	'5.6379'	'0.057'
\lambda_{qf}	'0.0956'	'0.1033'	'0.6728'	'0.1025'	'0.0795'
\delta	'0.0071'	'0.0497'	'0.0769'	'0.0329'	'0.1238'
\eta_L	'0.892'	'0.9522'	'0.4748'	'0.9166'	'0.0823'
\vartheta_P	'0'	'0.0001'	'0.0017'	'0'	'0.0602'
\gamma_H	'0.2864'	'1'	'0.644'	'0.8756'	'0.097'
z	'7.5973'	'8.5027'	'0.1936'	'8.2952'	'0.0594'
\eta_\vartheta	'0.7508'	'0.9544'	'0.8505'	'0.9049'	'0.0658'
a_L	'9.4756'	'13.6602'	'5.461'	'9.8106'	'0.1007'
b_L	'1.9148'	'3.4693'	'6.8001'	'2.9227'	'0.1023'
a_\mu	'6.113'	'15'	'9.4513'	'6.5144'	'0.0646'
b_\mu	'2.4874'	'15'	'7.4354'	'8.9232'	'0.0676'
\mu	'0.0426'	'0.8059'	'0.3973'	'0.5209'	'0.08'
a_H	'1.1659'	'2.5623'	'5.4604'	'1.8825'	'0.1044'
b_H	'1.3486'	'8.5343'	'8.3271'	'1.6869'	'0.0838'
\nu	'0.0036'	'0.0375'	'204.0547'	'0.0167'	'0.0896'
BP	'346.6951'	'352.4565'	'345.4997'	'347.5'	'0.0992'

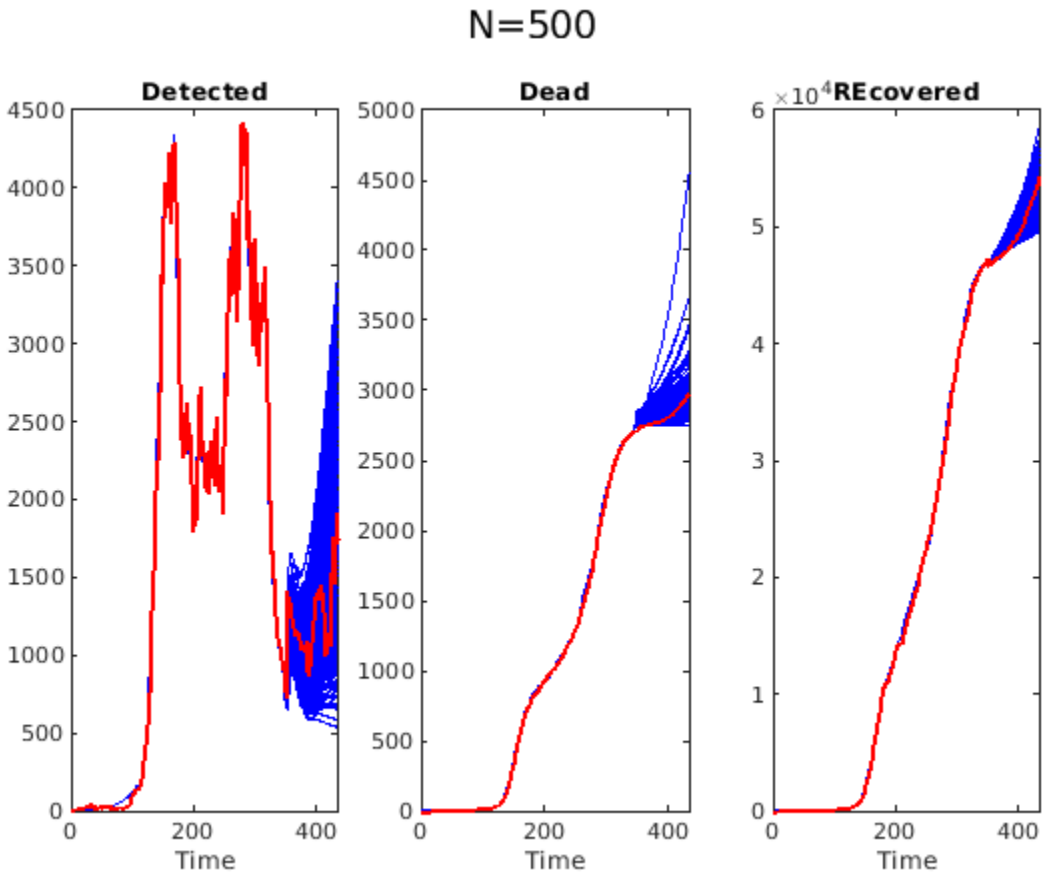
9.3. Identifiability analisys




λ_{fq}
ϑ_E
γ_L
k_L
λ_{qf}
δ
η_L
ϑ_P
γ_H
z
η_ϑ
a_L
b_L
a_μ
b_μ
μ
a_H
b_H
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
Identifiability Index
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05

9.4. Uncertainty analisys



Chapter 10. Extension number10

10.1. Basic information

The extension to be validated consists of the time series from the data435 to the 456. The status of the validation is: COMPLETED.

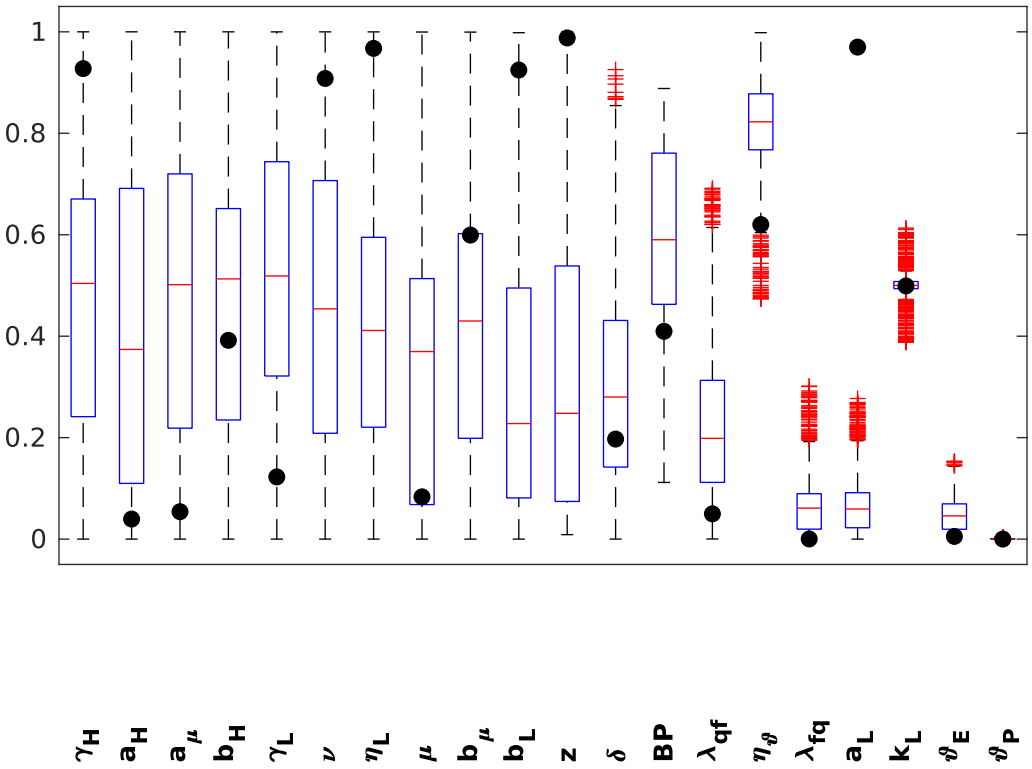
The number of estimations needed to perform the validation was1000.

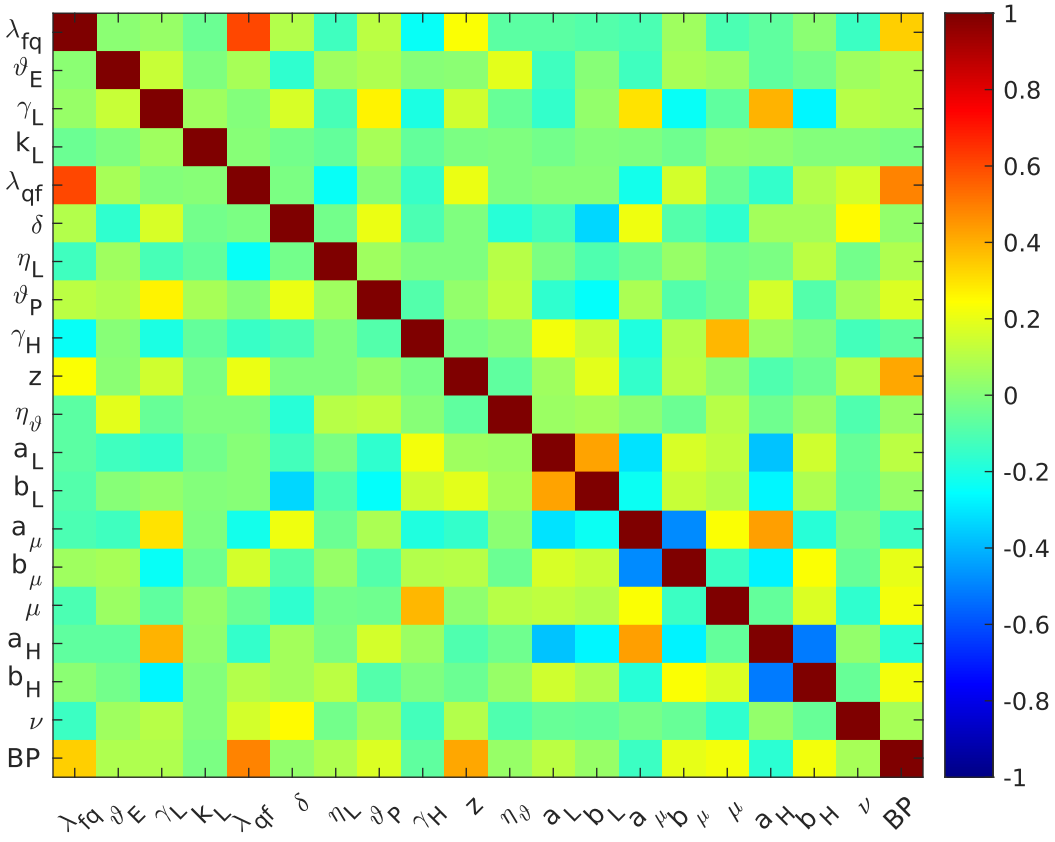
10.2. Estimated parameters with their intervals

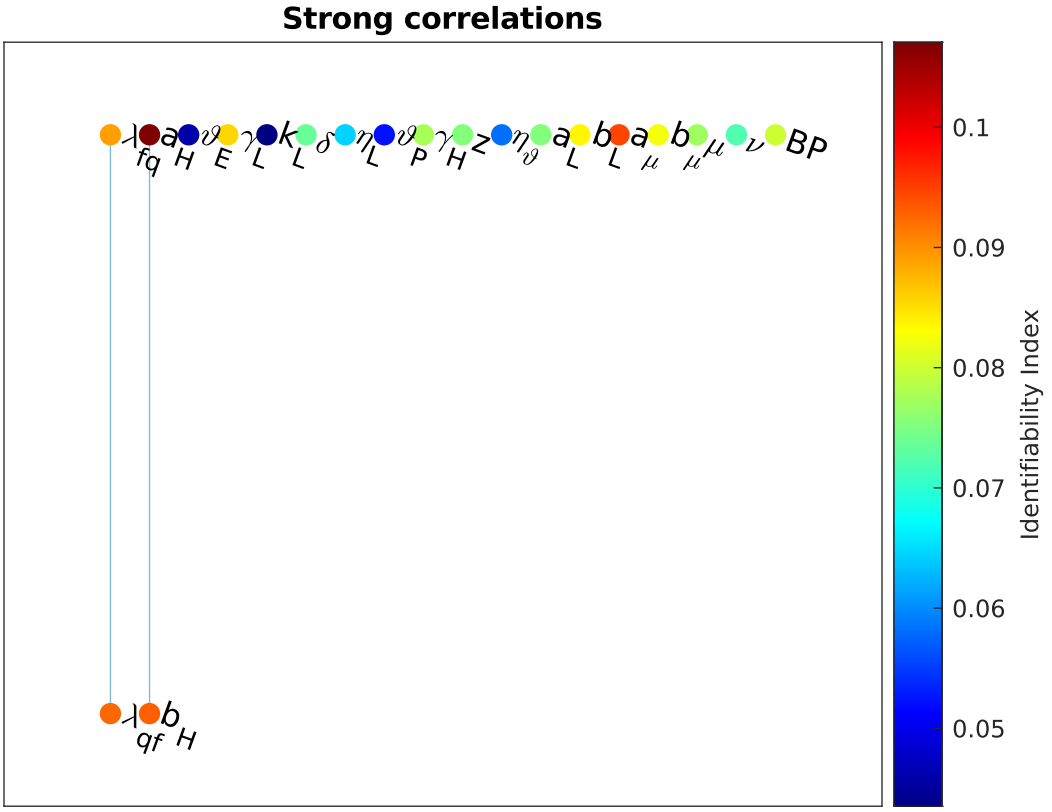
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.042'	'0.0806'	'0.0613'	'0.0003'	'0.0892'
\vartheta_E	'0.0423'	'0.0492'	'0.0458'	'0.0053'	'0.0461'
\gamma_L	'0.4938'	'0.5436'	'0.5187'	'0.1226'	'0.0855'
k_L	'5.3907'	'5.6094'	'5.5'	'5.4914'	'0.0435'
\lambda_{qf}	'0.1769'	'0.2206'	'0.1987'	'0.0498'	'0.0925'
\delta	'0.0392'	'0.045'	'0.0421'	'0.0296'	'0.0737'
\eta_L	'0.3875'	'0.4351'	'0.4113'	'0.9673'	'0.0644'
\vartheta_P	'0.0002'	'0.0011'	'0.0006'	'0.0001'	'0.0525'
\gamma_H	'0.4782'	'0.5299'	'0.5041'	'0.9275'	'0.0777'
z	'6.653'	'8.2233'	'7.4382'	'29.6394'	'0.0755'
\eta_\vartheta	'0.8055'	'0.8397'	'0.8226'	'0.6201'	'0.0584'
a_L	'1.6074'	'2.0588'	'1.8331'	'14.5782'	'0.0754'
b_L	'3.8188'	'4.5584'	'4.1886'	'13.9458'	'0.0835'
a_\mu	'7.6557'	'8.389'	'8.0223'	'1.7561'	'0.0947'
b_\mu	'6.695'	'7.343'	'7.019'	'9.3907'	'0.0823'
\mu	'0.3457'	'0.3936'	'0.3697'	'0.0833'	'0.0772'
a_H	'5.8301'	'6.6385'	'6.2343'	'1.5538'	'0.1071'
b_H	'7.8237'	'8.538'	'8.1808'	'6.4856'	'0.093'
\nu	'213.5195'	'240.374'	'226.9468'	'454.0241'	'0.0723'
BP	'405.8873'	'409.0581'	'407.4727'	'390.4987'	'0.0798'

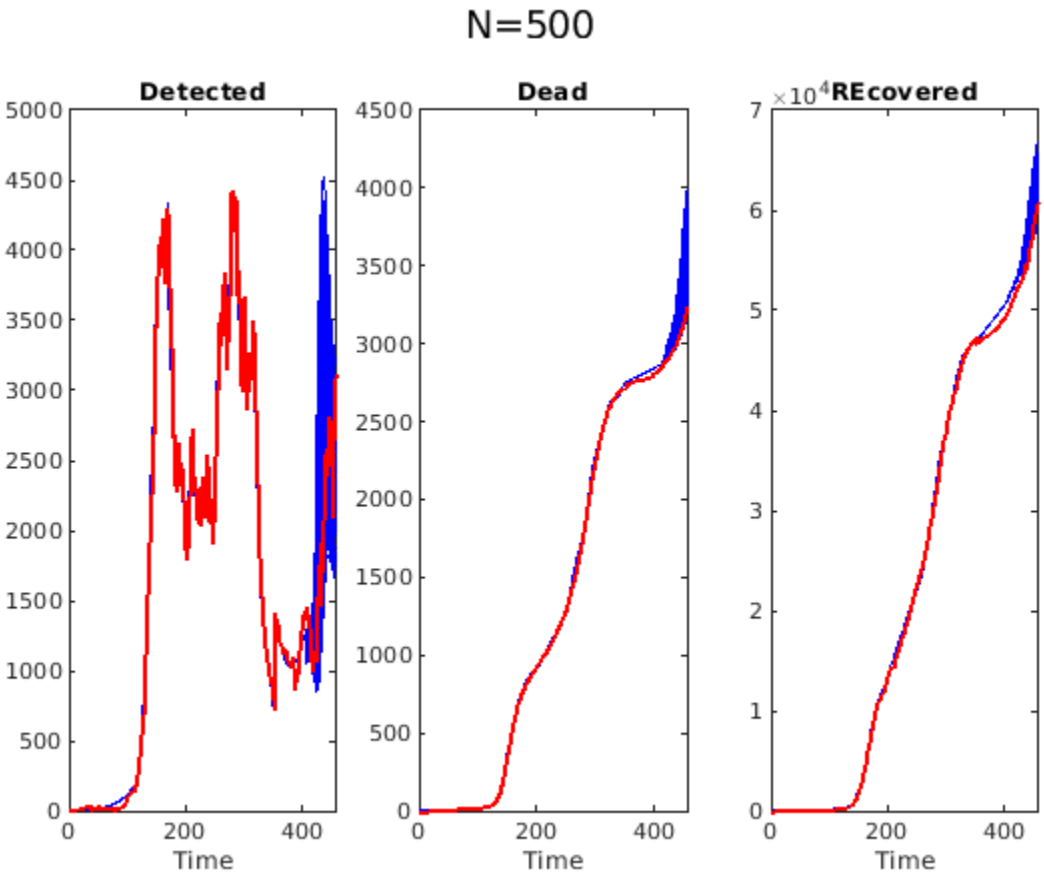
10.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
Identifiability Index
0.1
0.09
0.08
0.07
0.06
0.05

10.4. Uncertainty analisys



Chapter 11. Extension number11

11.1. Basic information

The extension to be validated consists of the time series from the data456 to the 468. The status of the validation is: COMPLETED.

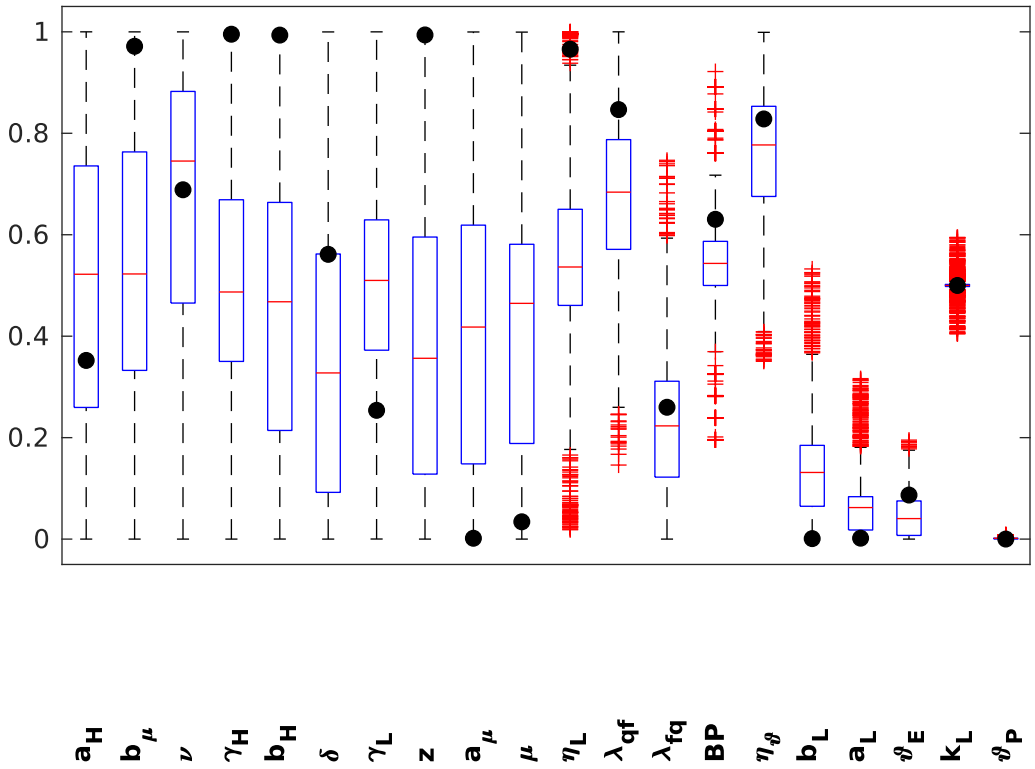
The number of estimations needed to perform the validation was1000.

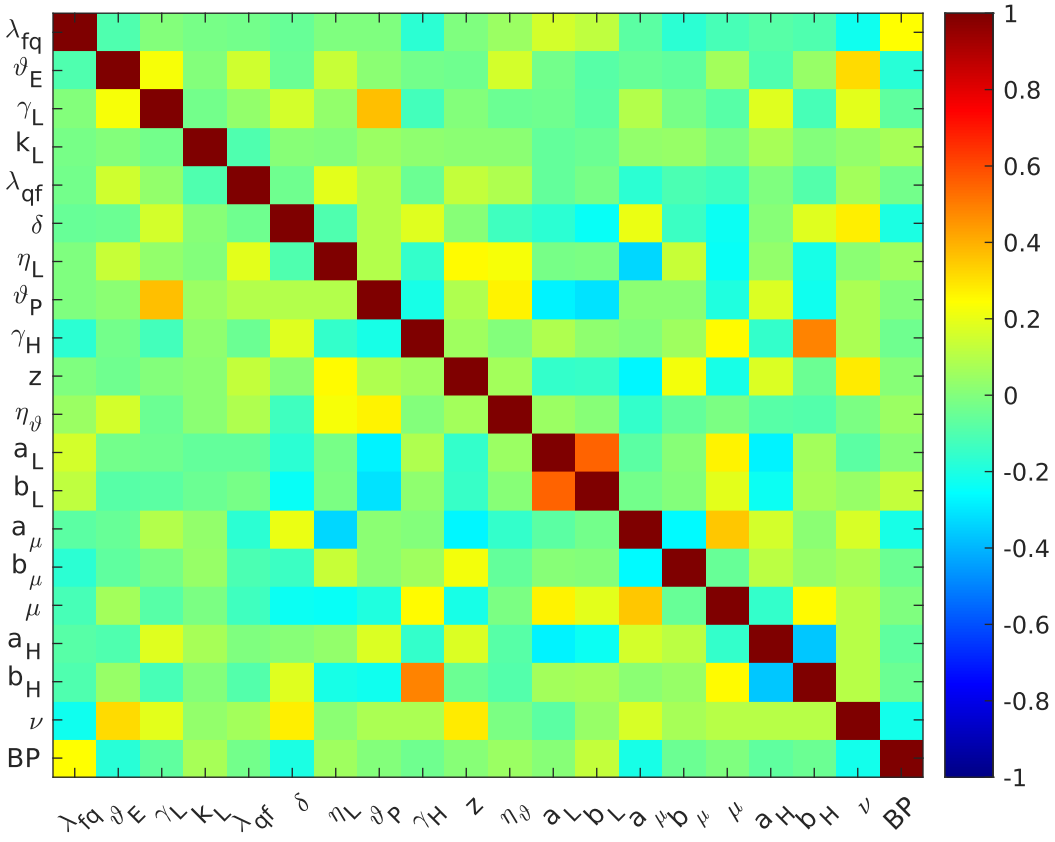
11.2. Estimated parameters with their intervals

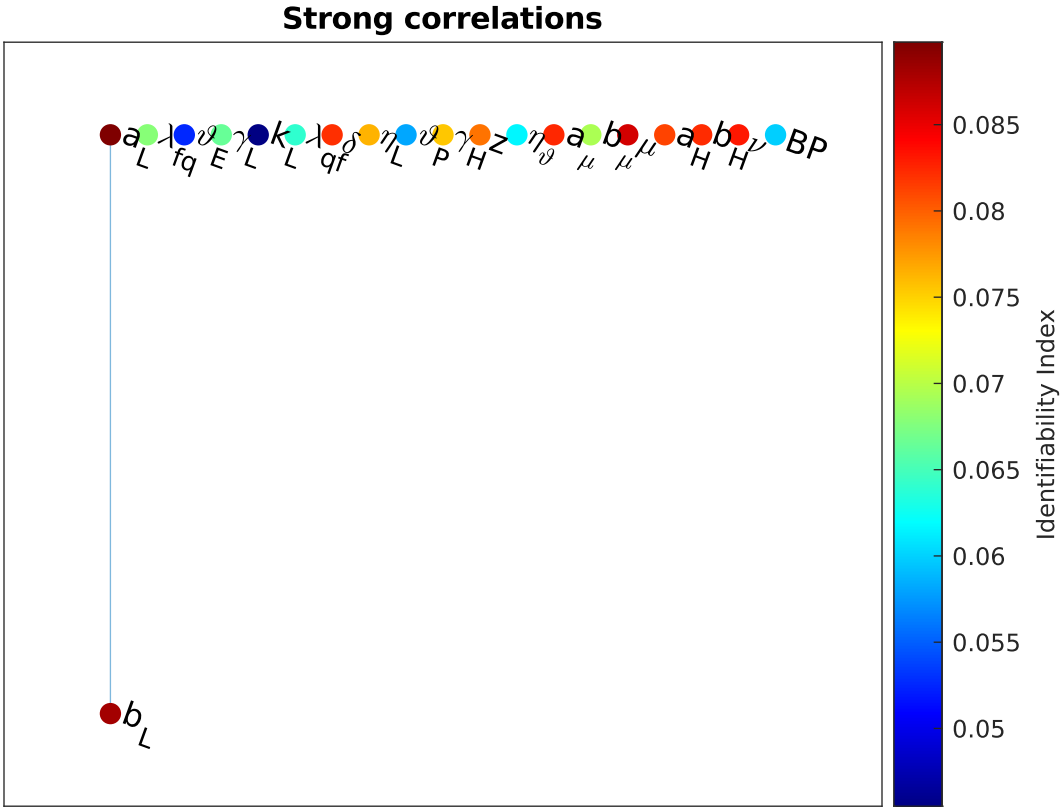
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.2017'	'0.245'	'0.2233'	'0.2599'	'0.0679'
\vartheta_E	'0.0355'	'0.0455'	'0.0405'	'0.0868'	'0.0527'
\gamma_L	'0.4919'	'0.5279'	'0.5099'	'0.2539'	'0.0665'
k_L	'5.3893'	'5.6107'	'5.5'	'5.5'	'0.0455'
\lambda_{qf}	'0.6642'	'0.7033'	'0.6837'	'0.8467'	'0.0641'
\delta	'0.0452'	'0.0531'	'0.0491'	'0.0842'	'0.0821'
\eta_L	'0.5131'	'0.5595'	'0.5363'	'0.9658'	'0.0764'
\vartheta_P	'0.0009'	'0.0023'	'0.0016'	'0.0001'	'0.0581'
\gamma_H	'0.4637'	'0.5105'	'0.4871'	'0.9953'	'0.0756'
z	'9.8867'	'11.4999'	'10.6933'	'29.816'	'0.0791'
\eta_\vartheta	'0.7599'	'0.7936'	'0.7767'	'0.8282'	'0.0617'
a_L	'1.5663'	'2.1771'	'1.8717'	'1.0256'	'0.0898'
b_L	'2.5391'	'3.1433'	'2.8412'	'1.0132'	'0.0882'
a_\mu	'6.5167'	'7.1874'	'6.852'	'1.0232'	'0.0824'
b_\mu	'7.98'	'8.655'	'8.3175'	'14.6008'	'0.0695'
\mu	'0.4402'	'0.4892'	'0.4647'	'0.0341'	'0.086'
a_H	'7.965'	'8.654'	'8.3095'	'5.9311'	'0.0813'
b_H	'7.1949'	'7.9051'	'7.55'	'14.9099'	'0.0822'
\nu	'359.0902'	'386.1604'	'372.6253'	'344.3239'	'0.0831'
BP	'447.1751'	'447.8249'	'447.5'	'449.5'	'0.06'

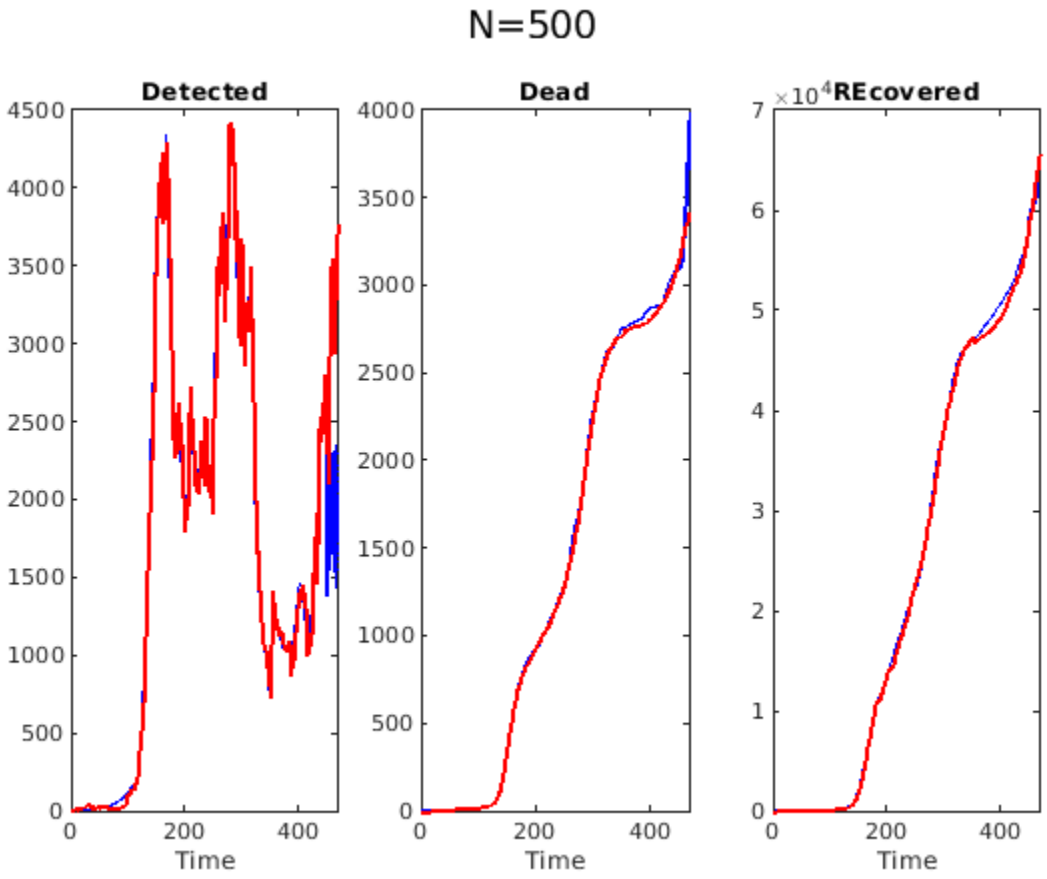
11.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
a_{L} λ_{fq} ϑ_{E} γ_{L} k_{L} λ_{qf} δ η_{L} ϑ_{P} γ_{H} z η_{ϑ} a_{μ} b_{μ} μ a_{H} b_{H} ν BP
b_{L}
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
Identifiability Index

11.4. Uncertainty analisys



Chapter 12. Extension number12

12.1. Basic information

The extension to be validated consists of the time series from the data468 to the 524. The status of the validation is: COMPLETED.

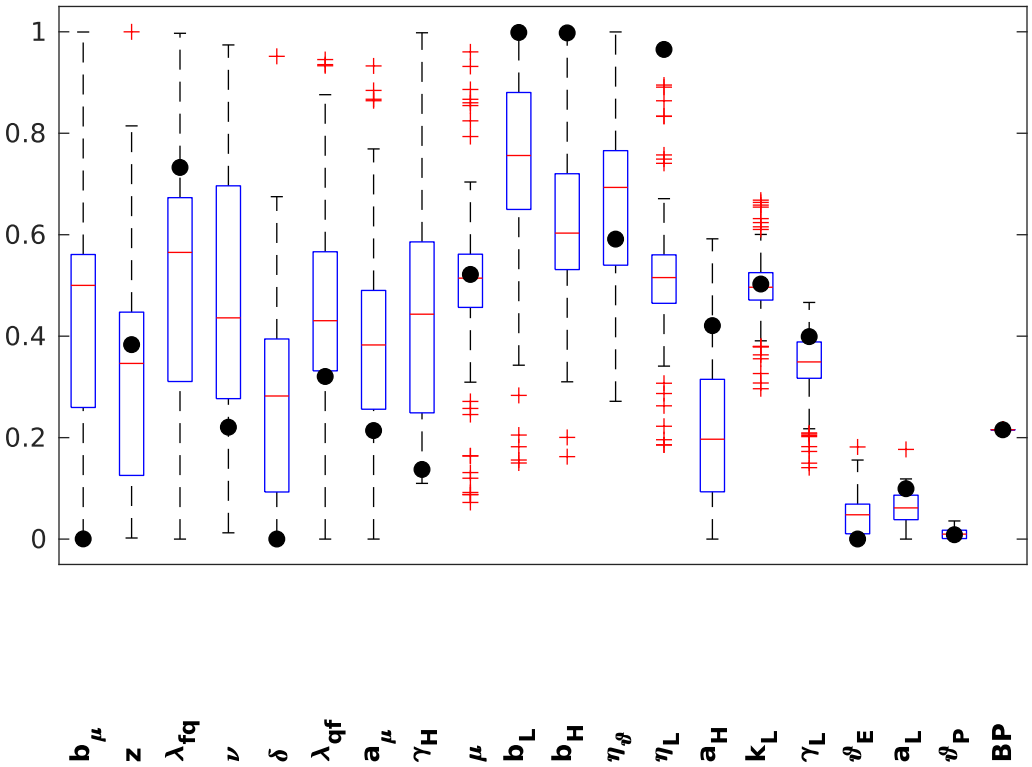
The number of estimations needed to perform the validation was1000.

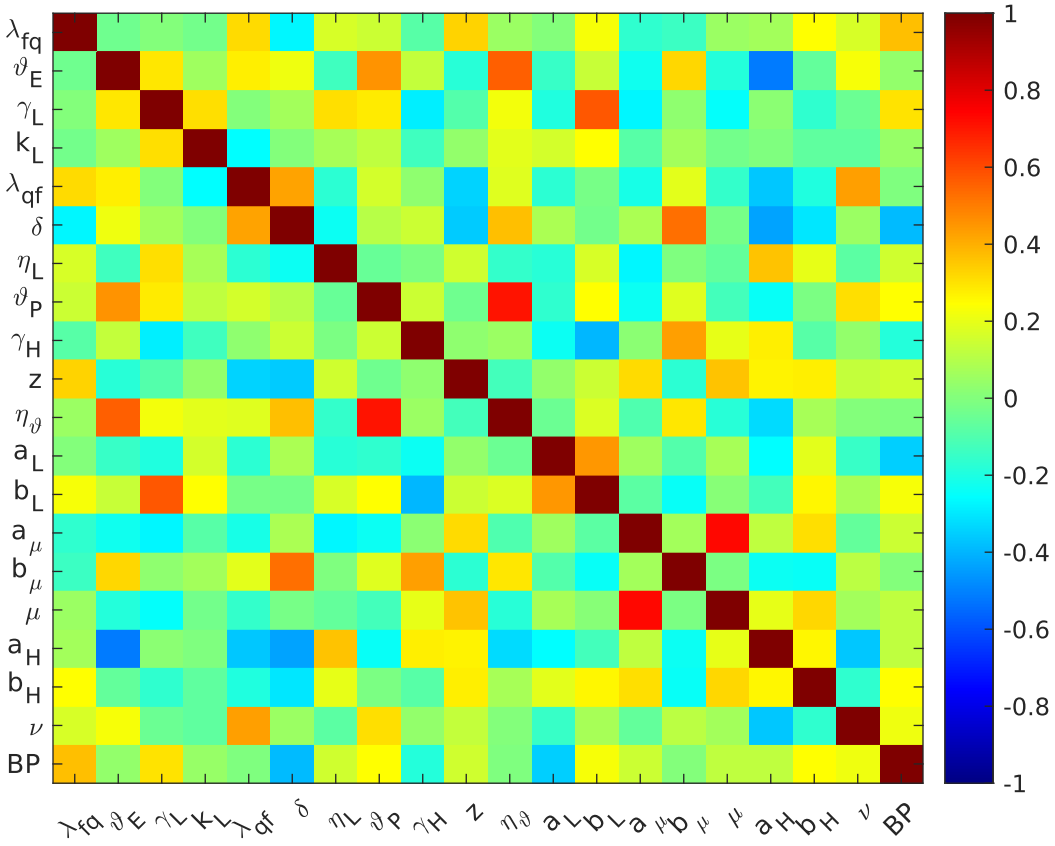
12.2. Estimated parameters with their intervals

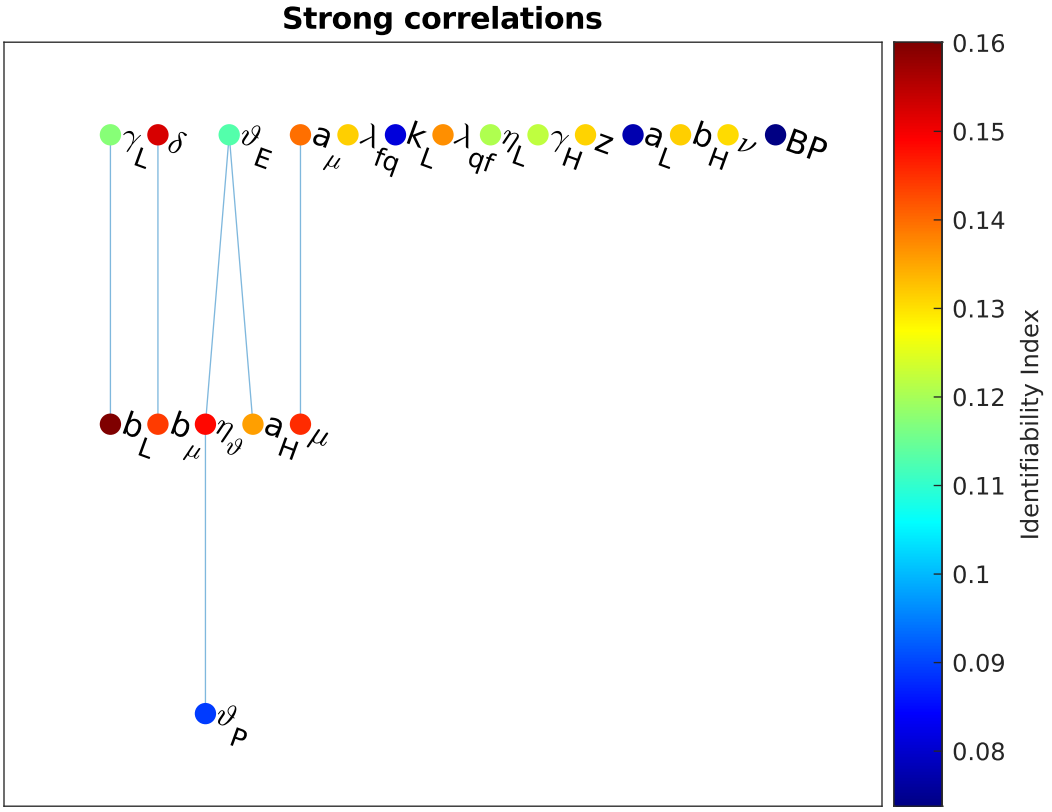
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4944'	'0.6358'	'0.5651'	'0.7326'	'0.1316'
\vartheta_E	'0.0372'	'0.0586'	'0.0479'	'0.0002'	'0.1132'
\gamma_L	'0.3156'	'0.3829'	'0.3492'	'0.3991'	'0.1175'
k_L	'5.181'	'5.7554'	'5.4682'	'5.5252'	'0.0813'
\lambda_{qf}	'0.3722'	'0.4994'	'0.4358'	'0.3205'	'0.1371'
\delta	'0.0331'	'0.0521'	'0.0426'	'0'	'0.1525'
\eta_L	'0.4558'	'0.5753'	'0.5155'	'0.9652'	'0.121'
\vartheta_P	'0.0073'	'0.0123'	'0.0098'	'0.0086'	'0.0894'
\gamma_H	'0.3821'	'0.5046'	'0.4433'	'0.1373'	'0.1223'
z	'8.5244'	'12.253'	'10.3887'	'11.5004'	'0.1312'
\eta_\vartheta	'0.6413'	'0.7433'	'0.6923'	'0.5913'	'0.1485'
a_L	'1.6516'	'2.0767'	'1.8641'	'2.3908'	'0.0778'
b_L	'10.5216'	'12.6192'	'11.5704'	'14.9816'	'0.1601'
a_\mu	'5.5562'	'7.1931'	'6.3747'	'3.9957'	'0.1398'
b_\mu	'7.0957'	'8.908'	'8.0018'	'1.0054'	'0.1441'
\mu	'0.4457'	'0.5831'	'0.5144'	'0.5217'	'0.1454'
a_H	'3.202'	'4.3577'	'3.7799'	'6.8912'	'0.1356'
b_H	'8.5859'	'10.2828'	'9.4343'	'14.9696'	'0.1316'
\nu	'182.3235'	'253.7811'	'218.0523'	'110.2862'	'0.1307'
BP	'468.0742'	'468.9258'	'468.5'	'468.4998'	'0.0738'

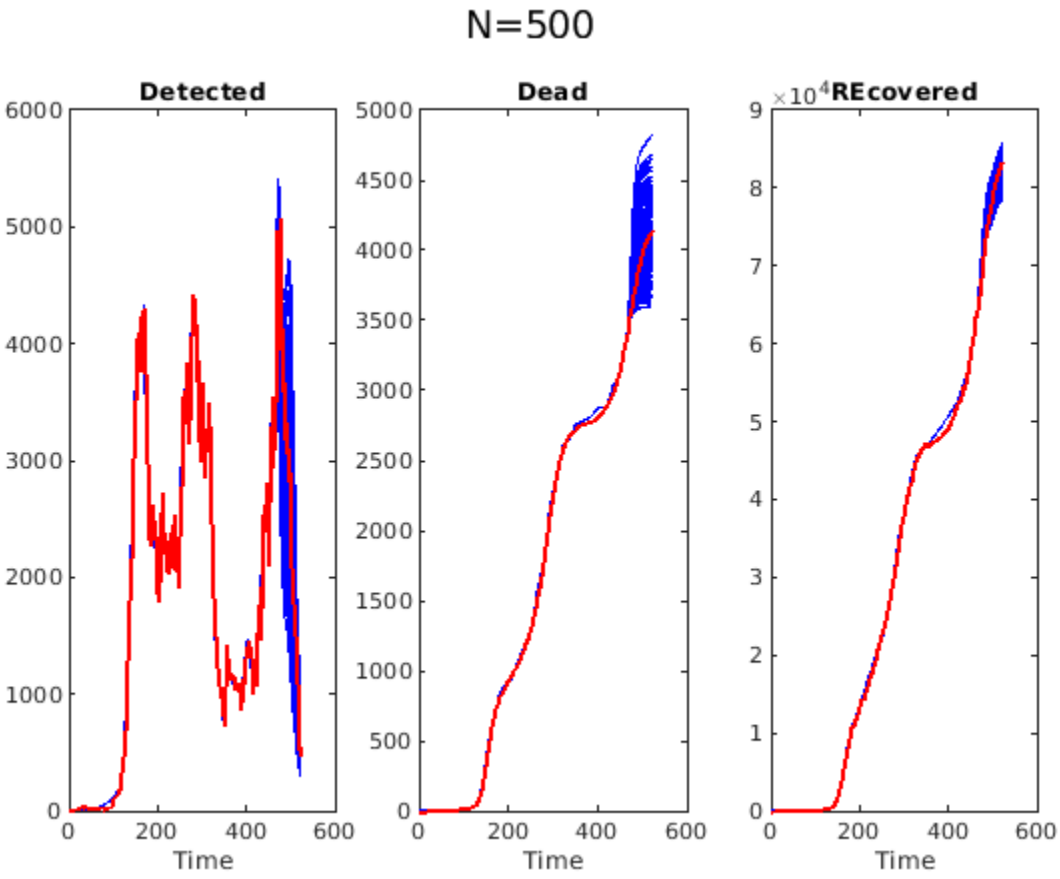
12.3. Identifiability analisys




λ_{fq}
ϑ_E
γ_L
k_L
λ_{qf}
δ
η_L
ϑ_P
γ_H
z
η_ϑ
a_L
b_L
a_μ
b_μ
μ
a_H
b_H
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
γ_L δ ϑ_E a_μ λ_{fq} k_L λ_{qf} η_L γ_H z a_L b_H ν BP
b_L b_μ η_ϑ a_H μ
ϑ_P
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
Identifiability Index

12.4. Uncertainty analisys



Chapter 13. Extension number13

13.1. Basic information

The extension to be validated consists of the time series from the data524 to the 719. The status of the validation is: COMPLETED.

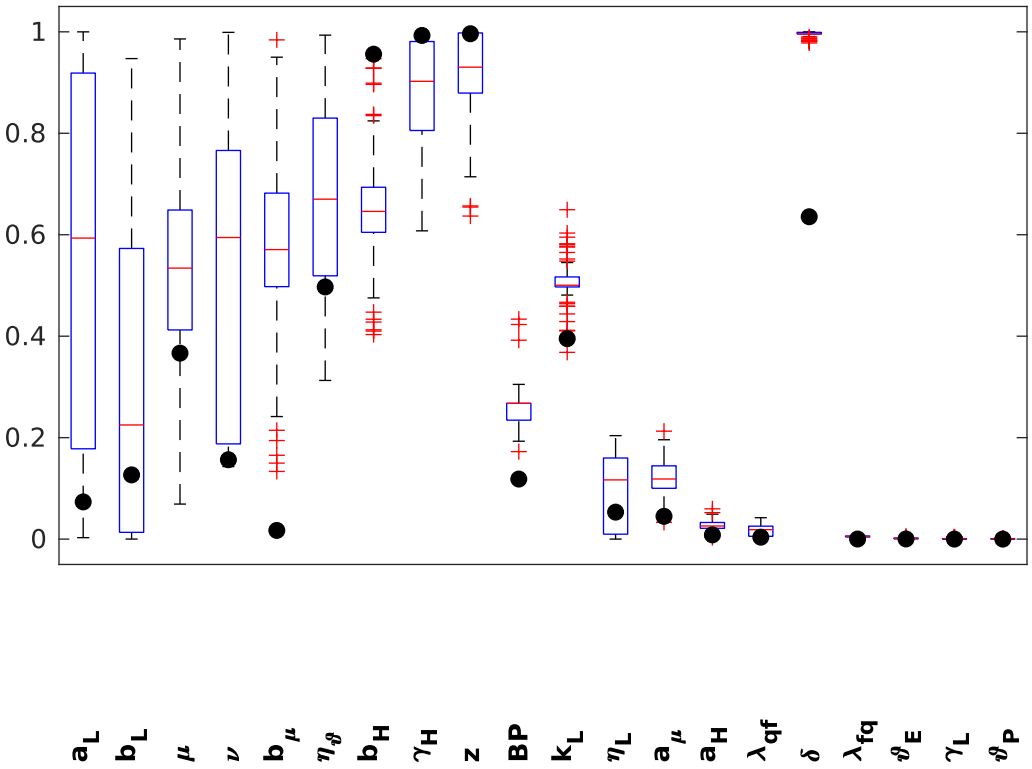
The number of estimations needed to perform the validation was3000.

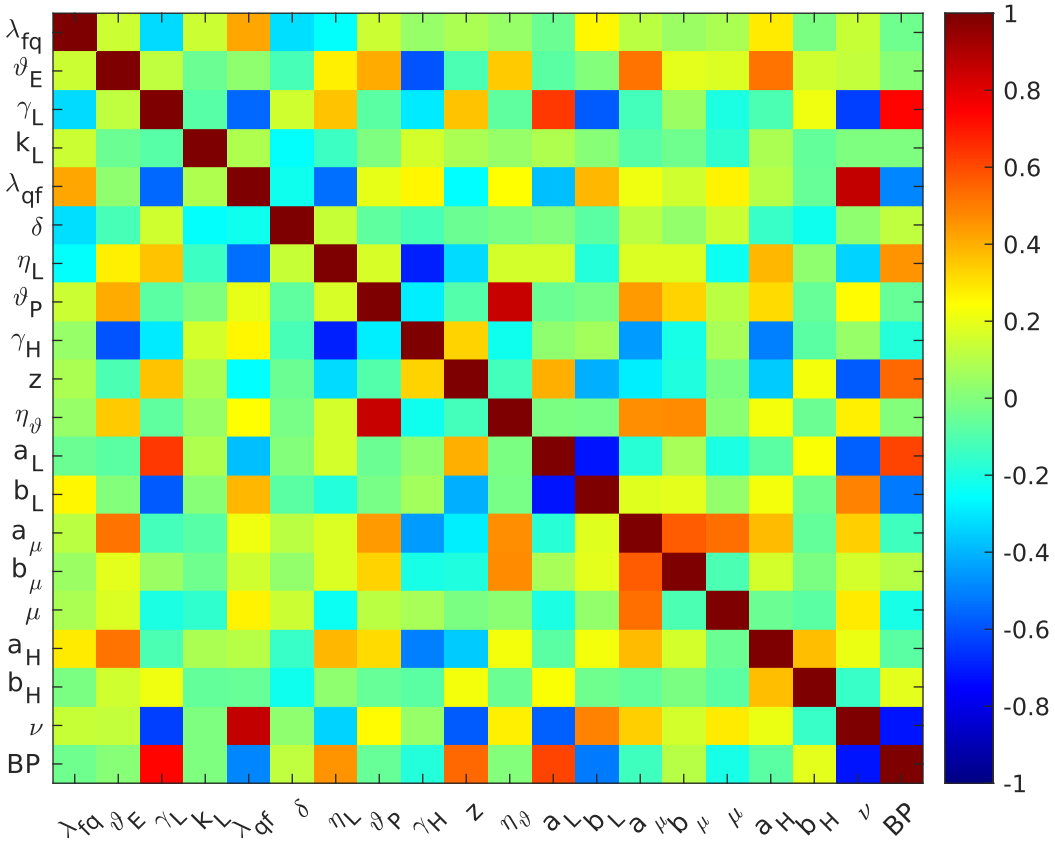
13.2. Estimated parameters with their intervals

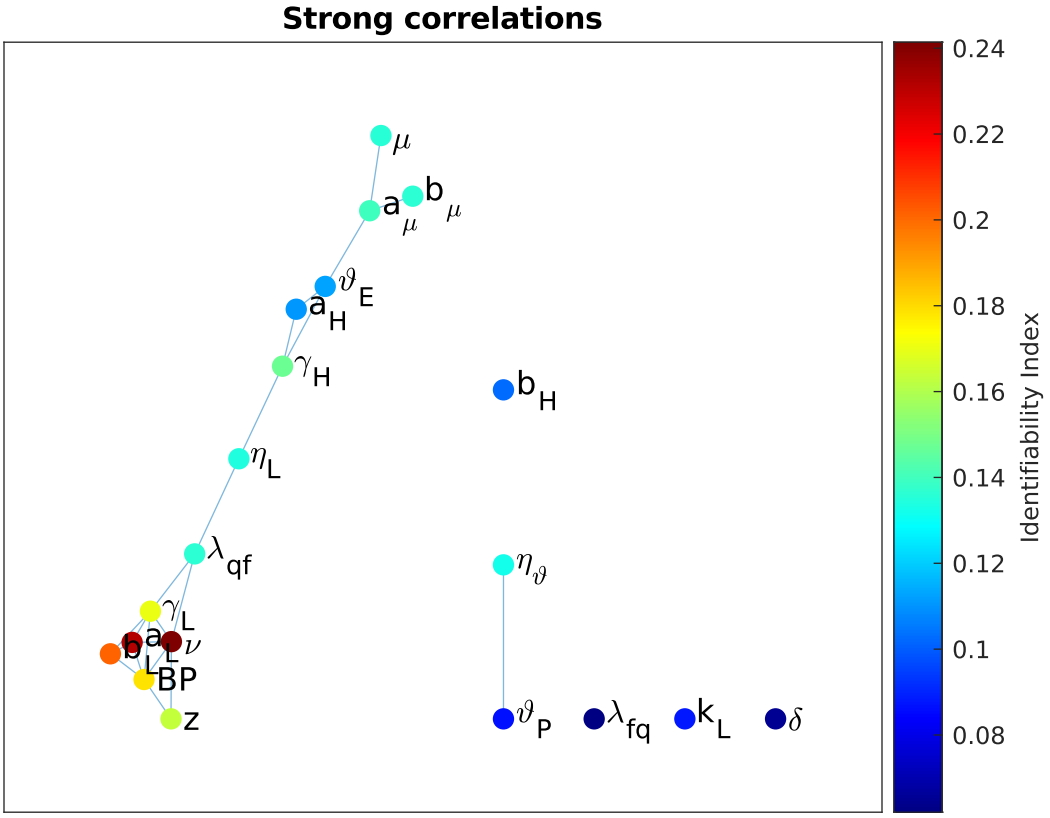
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.0046'	'0.0057'	'0.0052'	'0.0001'	'0.062'
\vartheta_E	'0.0006'	'0.0019'	'0.0012'	'0.0003'	'0.1126'
\gamma_L	'0'	'0.0245'	'0.001'	'0'	'0.1704'
k_L	'5.108'	'5.9001'	'5.504'	'4.5563'	'0.0885'
\lambda_{qf}	'0.0156'	'0.0215'	'0.0186'	'0.0038'	'0.1369'
\delta	'0.1465'	'0.15'	'0.1493'	'0.0953'	'0.0655'
\eta_L	'0.097'	'0.1364'	'0.1167'	'0.0532'	'0.1342'
\vartheta_P	'0'	'0.0006'	'0.0003'	'0'	'0.0868'
\gamma_H	'0.8744'	'0.9305'	'0.9025'	'0.9929'	'0.1482'
z	'26.3153'	'29.5033'	'27.9093'	'29.8859'	'0.163'
\eta_\vartheta	'0.6209'	'0.7193'	'0.6701'	'0.4971'	'0.1323'
a_L	'7.9027'	'10.7122'	'9.3075'	'2.0264'	'0.232'
b_L	'2.9769'	'5.3233'	'4.1501'	'2.7725'	'0.2014'
a_\mu	'2.5034'	'2.8142'	'2.6588'	'1.6284'	'0.1405'
b_\mu	'8.1722'	'9.8072'	'8.9897'	'1.2395'	'0.1369'
\mu	'0.473'	'0.5954'	'0.5342'	'0.3666'	'0.1357'
a_H	'1.3072'	'1.4177'	'1.3625'	'1.1172'	'0.1109'
b_H	'9.3428'	'10.7444'	'10.0436'	'14.3831'	'0.1032'
\nu	'258.9173'	'335.6077'	'297.2625'	'78.2381'	'0.2414'
BP	'526.139'	'538.861'	'532.5'	'496.5243'	'0.1786'

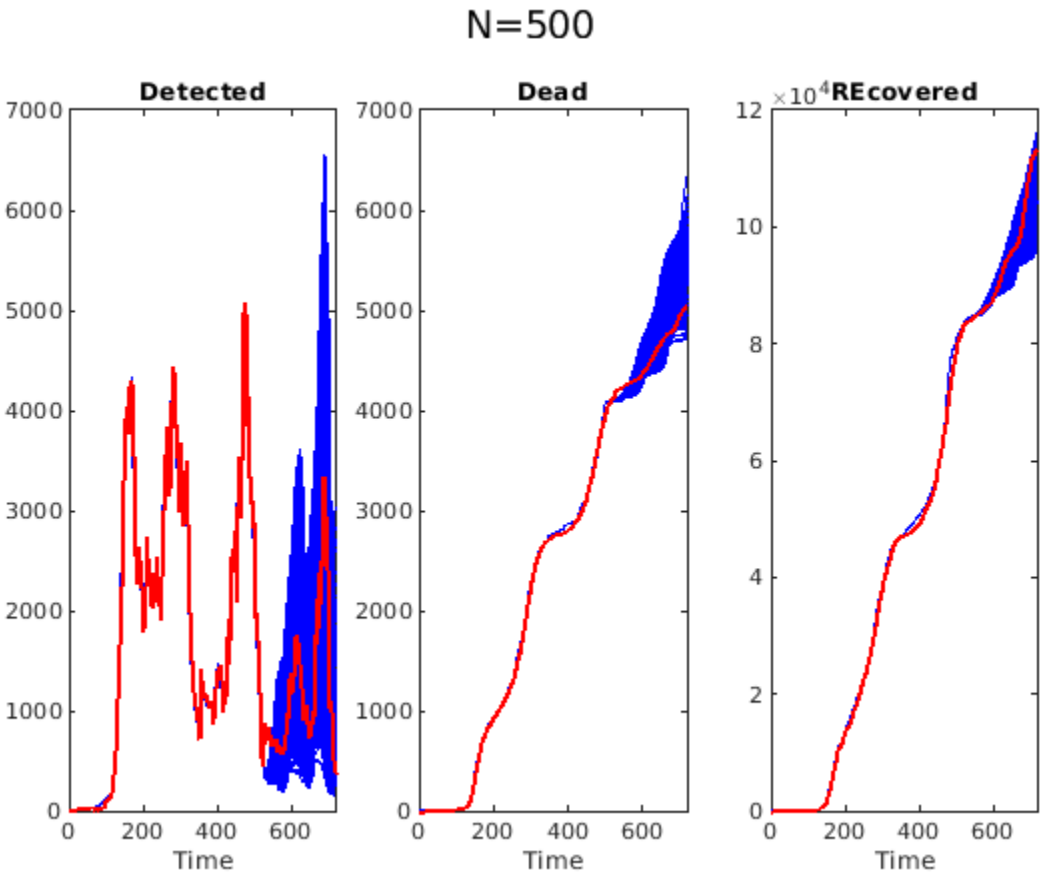
13.3. Identifiability analisys




λ_{fq}
ϑ_E
γ_L
k_L
λ_{qf}
δ
η_L
ϑ_P
γ_H
z
η_ϑ
a_L
b_L
a_μ
b_μ
μ
a_H
b_H
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
μ
a μ
b μ
ϑ E
a H
γ H
b H
η L
λ qf
η ϑ
γ L
a L
ν
b L
BP
z
ϑ P
λ fq
k L
δ
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
Identifiability Index

13.4. Uncertainty analisys



Chapter 14. Extension number14

14.1. Basic information

The extension to be validated consists of the time series from the data719 to the 735. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

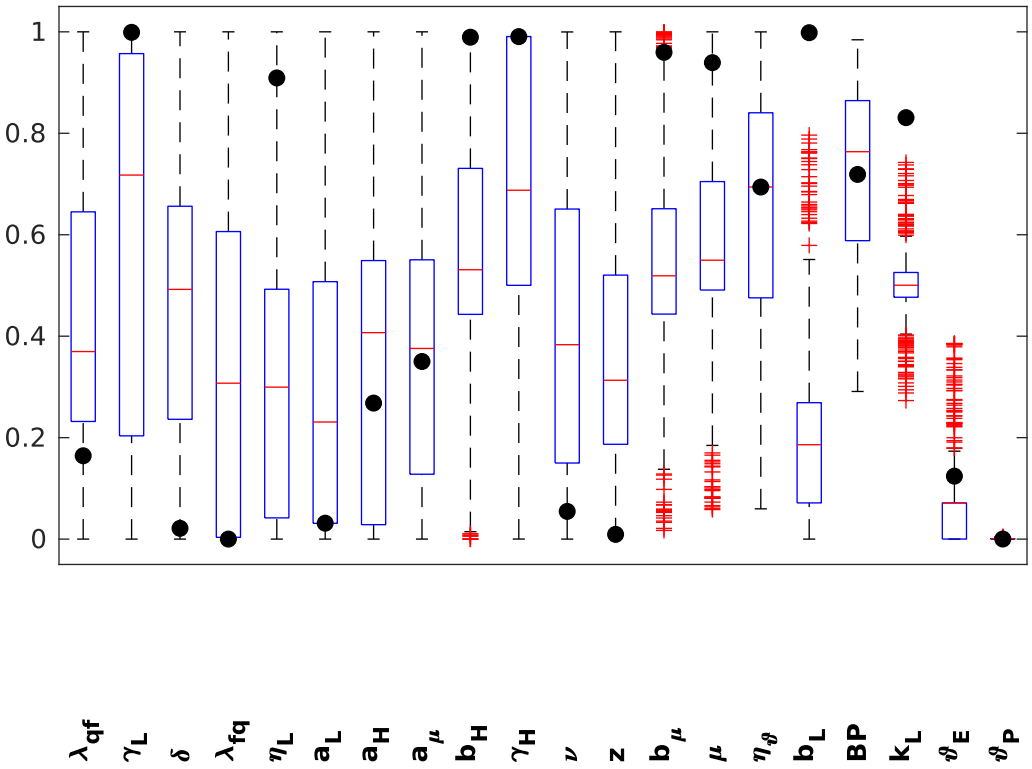
14.2. Estimated parameters with their intervals

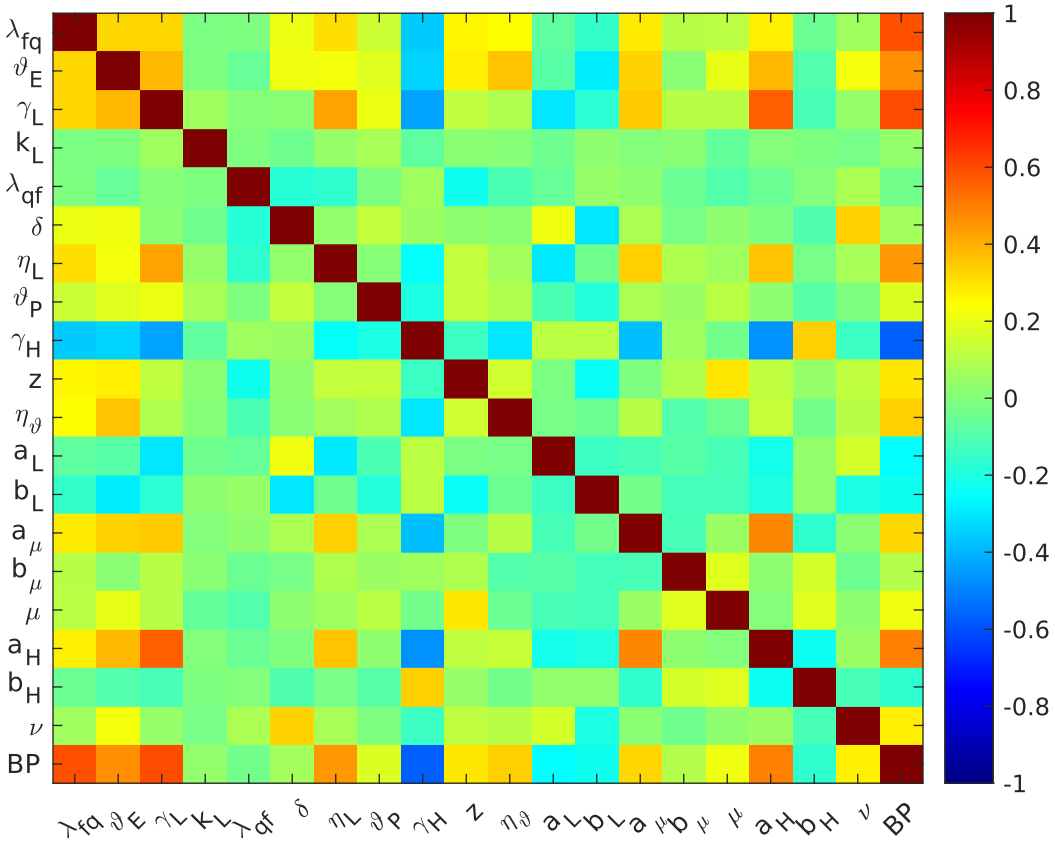
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

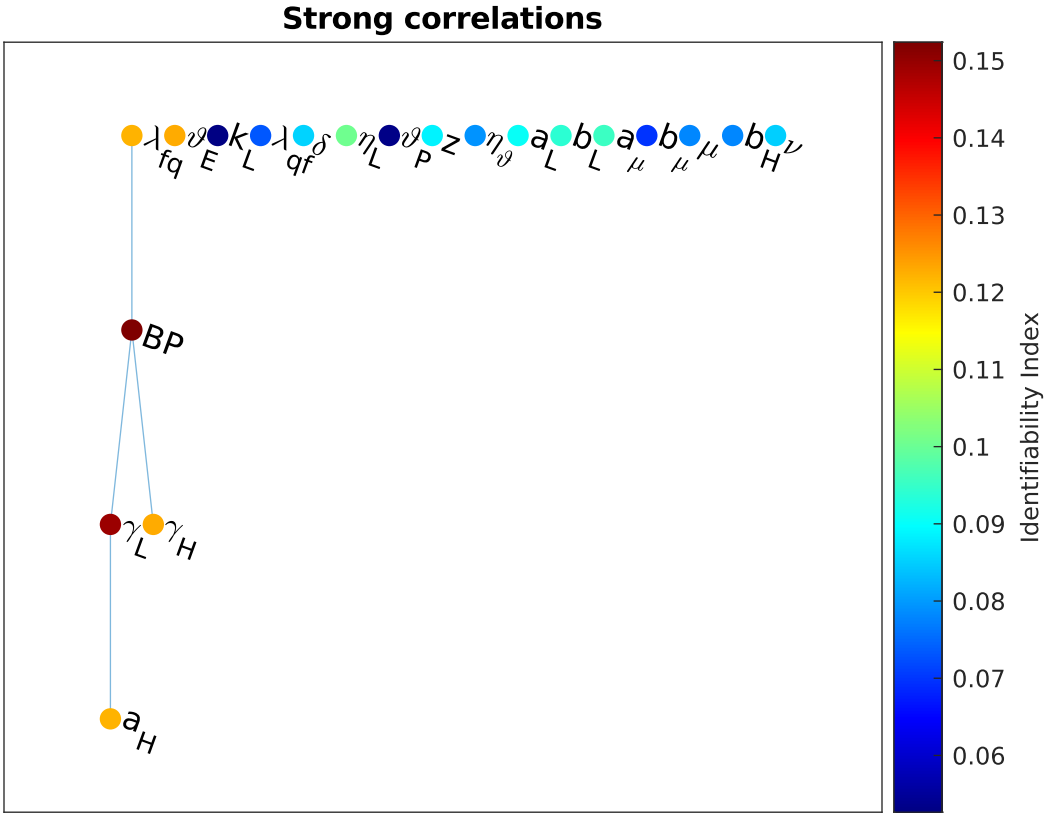
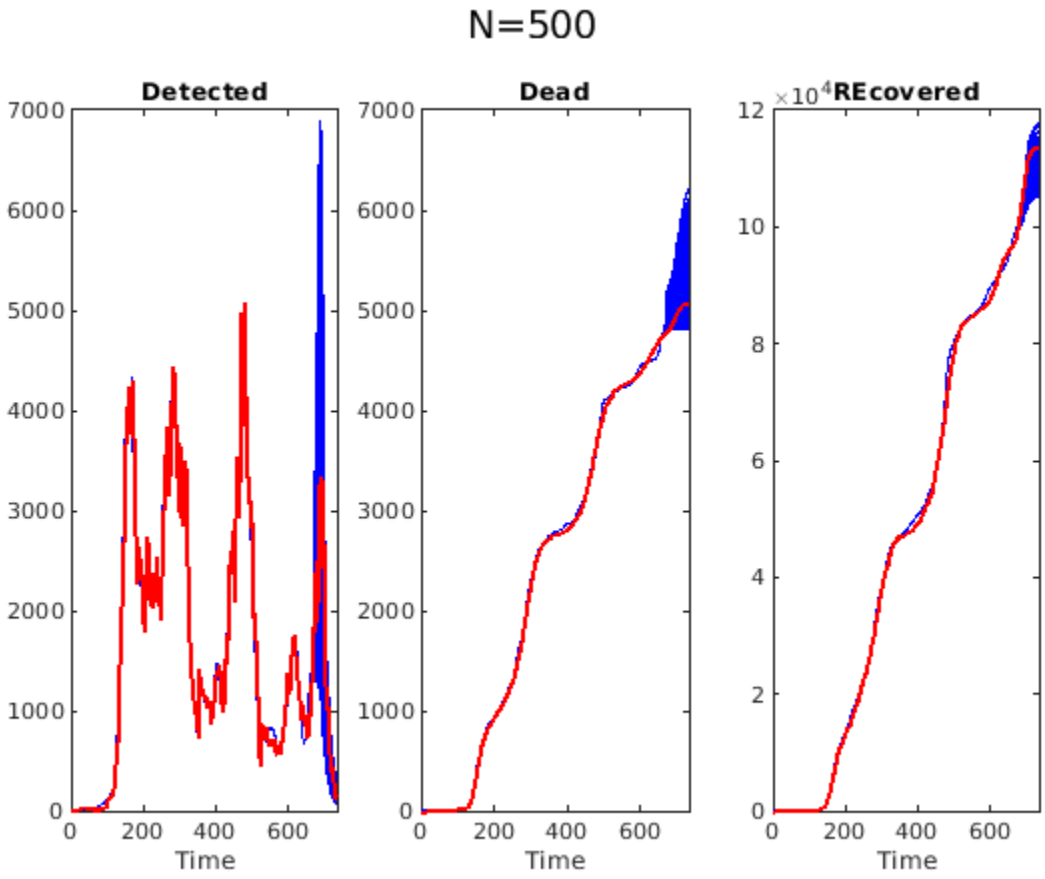
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0001'	'0.3074'	'0'	'0.1223'
\vartheta_E	'0.0991'	'0.148'	'0.0712'	'0.1241'	'0.1229'
\gamma_L	'0.8376'	'1'	'0.7176'	'0.999'	'0.1493'
k_L	'1'	'10'	'5.5042'	'8.4774'	'0.0526'
\lambda_{qf}	'0.1115'	'0.1803'	'0.3697'	'0.1643'	'0.0734'
\delta	'0.0017'	'0.0195'	'0.0738'	'0.0032'	'0.0857'
\eta_L	'0.696'	'0.9185'	'0.2995'	'0.9091'	'0.1008'
\vartheta_P	'0'	'0.0003'	'0.0008'	'0.0002'	'0.0533'
\gamma_H	'0.1664'	'1'	'0.6877'	'0.9905'	'0.1231'
z	'0.2376'	'0.2834'	'9.3934'	'0.2795'	'0.0886'
\eta_\vartheta	'0.548'	'0.9815'	'0.694'	'0.694'	'0.0793'
a_L	'1.2121'	'2.3303'	'4.2313'	'1.4392'	'0.0907'
b_L	'10.2389'	'15'	'3.6046'	'14.9761'	'0.0941'
a_\mu	'1.5322'	'14.44'	'6.2622'	'5.9015'	'0.0956'
b_\mu	'3.03'	'15'	'8.2671'	'14.4338'	'0.07'
\mu	'0.2081'	'1'	'0.5498'	'0.9392'	'0.0782'
a_H	'1.2072'	'8.9665'	'6.6978'	'4.7535'	'0.1223'
b_H	'4.3858'	'15'	'8.4341'	'14.8513'	'0.078'
\nu	'26.5464'	'53.7604'	'191.6128'	'27.2965'	'0.0854'
BP	'668.4564'	'674.3794'	'677.5'	'668.4997'	'0.1524'

14.3. Identifiability analisys




λfq
ϑE
γL
kL
λqf
δ
ηL
ϑP
γH
z
ηϑ
aL
bL
aμ
bμ
μ
aH
bH
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
BP
Identifiability Index
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06

14.4. Uncertainty analisys