Validation process forSANTANDER

The epidemiology research group, EAFIT

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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 103. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

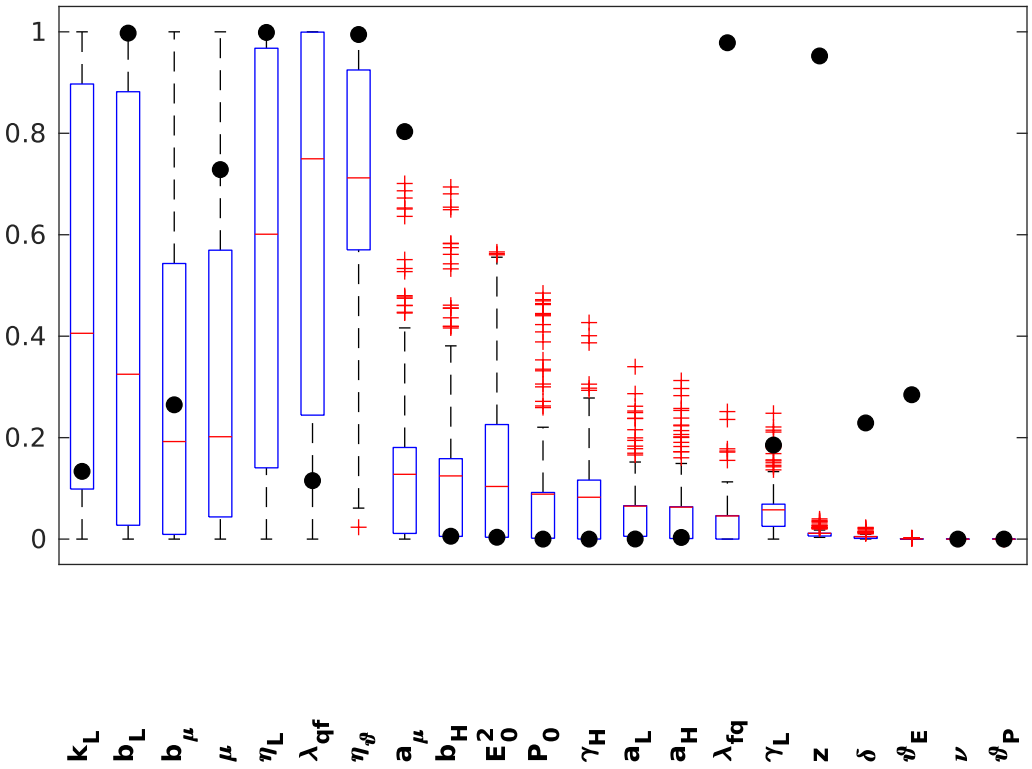
1.2. Estimated parameters with their intervals

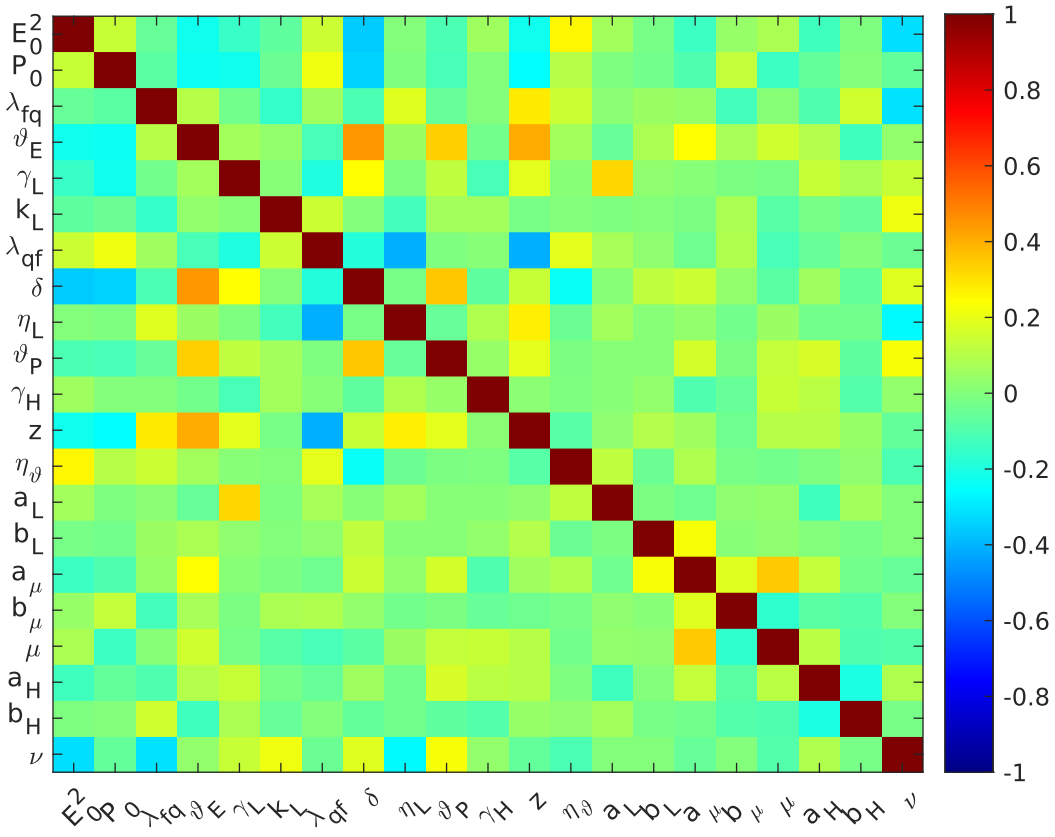
It was necessary to fix 0 parameters of 11 that could be fixed to complete validation.

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

	Rango		Nominal	Mejor	Index
E^2_0	'6.6882'	'8.1042'	'212.8522'	'7.2749'	'0.1155'
P_0	'0'	'0.0003'	'36.7629'	'0.0002'	'0.1261'
\lambda_{fq}	'0.9471'	'0.9795'	'0.0462'	'0.9785'	'0.115'
\vartheta_E	'0.2252'	'0.3042'	'0.0005'	'0.2846'	'0.0714'
\gamma_L	'0.16'	'0.1861'	'0.0578'	'0.1854'	'0.1081'
k_L	'1.4275'	'8.7581'	'4.6514'	'2.2017'	'0.116'
\lambda_{qf}	'0.113'	'0.1172'	'0.7497'	'0.1153'	'0.1288'
\delta	'0.0272'	'0.0399'	'0.0007'	'0.0343'	'0.0876'
\eta_L	'0.9728'	'1'	'0.601'	'0.9988'	'0.1248'
\vartheta_P	'0'	'0'	'0'	'0'	'0.0594'
\gamma_H	'0'	'0'	'0.0833'	'0'	'0.1026'
z	'27.4178'	'28.9512'	'0.3438'	'28.5733'	'0.0854'
\eta_\vartheta	'0.3835'	'1'	'0.7121'	'0.9947'	'0.0911'
a_L	'1'	'1.1297'	'1.9224'	'1.0025'	'0.1029'
b_L	'12.9835'	'15'	'5.5499'	'14.9644'	'0.1162'
a_\mu	'10.0544'	'13.9126'	'2.8225'	'12.2464'	'0.1199'
b_\mu	'3.5419'	'6.3661'	'3.6923'	'4.7064'	'0.1102'
\mu	'0.2459'	'0.8758'	'0.2018'	'0.7284'	'0.1155'
a_H	'1'	'12.34'	'1.8924'	'1.0455'	'0.1136'
b_H	'1'	'12.34'	'2.7973'	'1.0791'	'0.1159'
\nu	'0.0001'	'0.0024'	'0.0019'	'0.0012'	'0.0794'

1.3. Identifiability analisys




E_0^2
P_0
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
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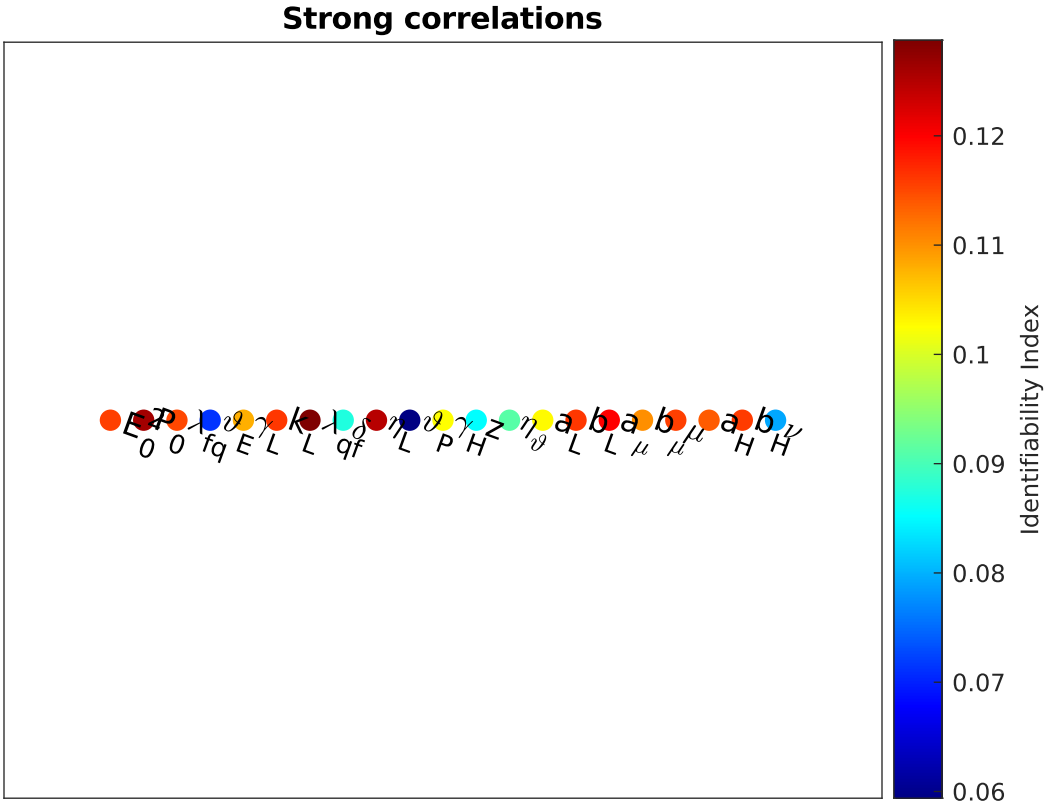
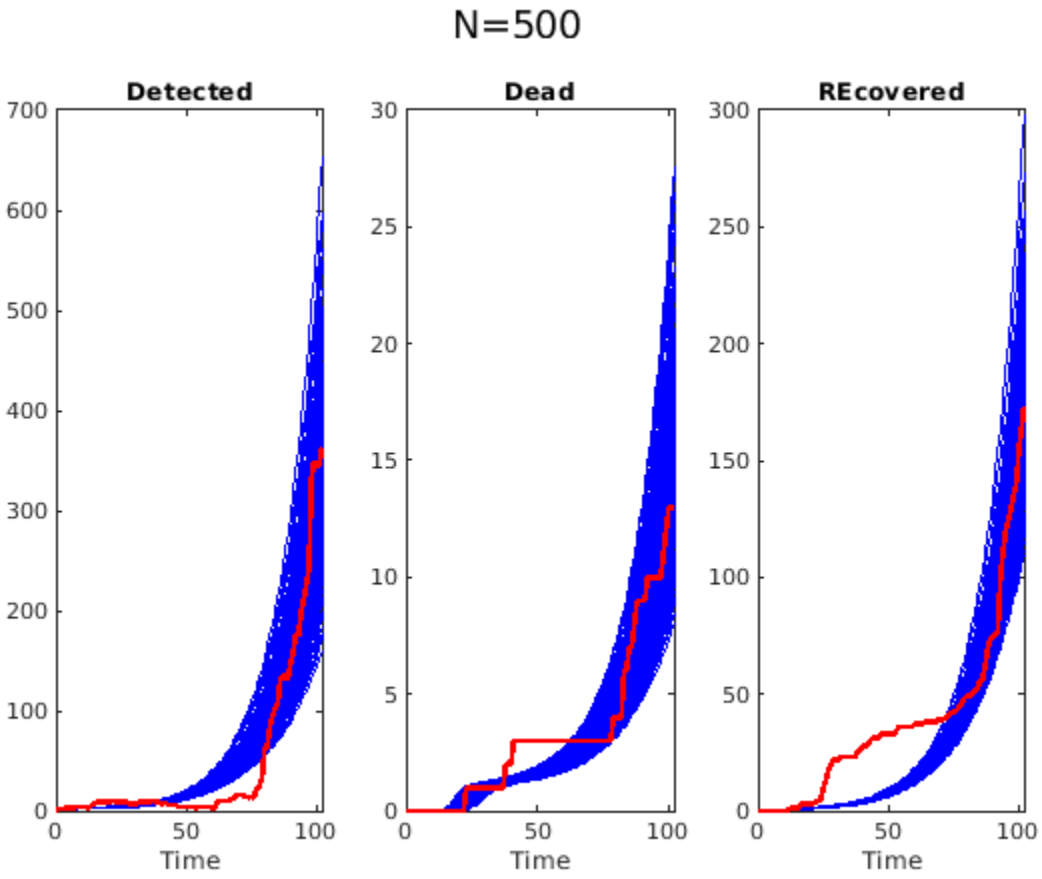
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
0.12
0.11
0.1
0.09
0.08
0.07
0.06
Identifiability Index

1.4. Uncertainty analisys



Chapter 2. Extension number2

2.1. Basic information

The extension to be validated consists of the time series from the data103 to the 135. The status of the validation is: COMPLETED.

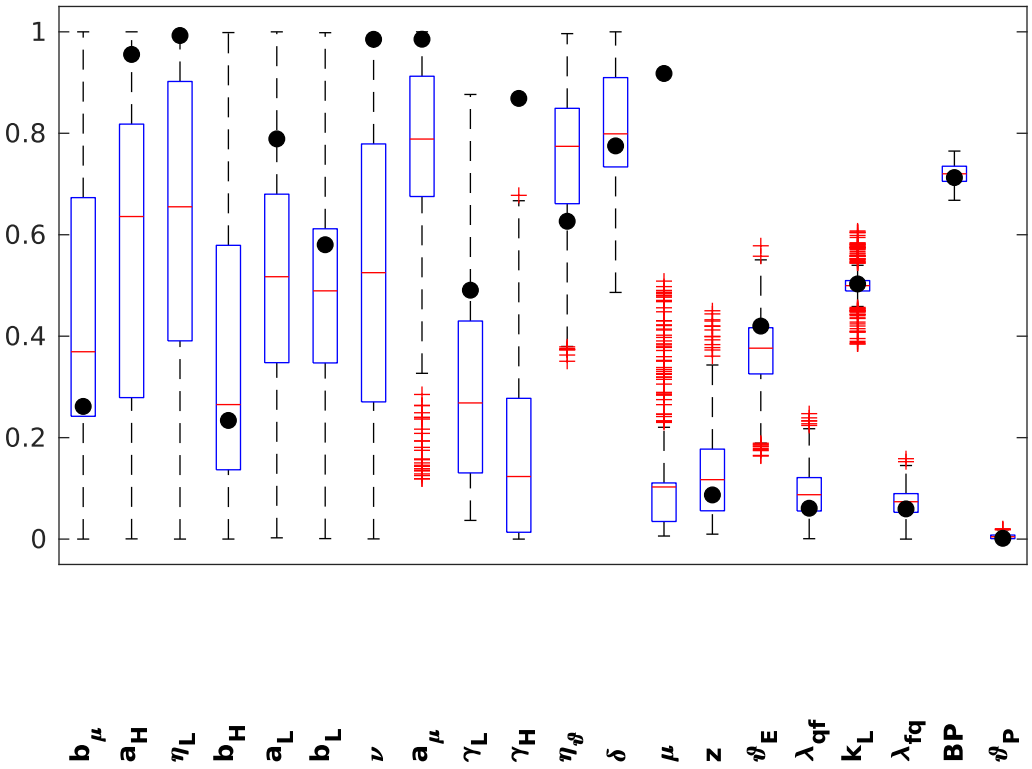
The number of estimations needed to perform the validation was1000.

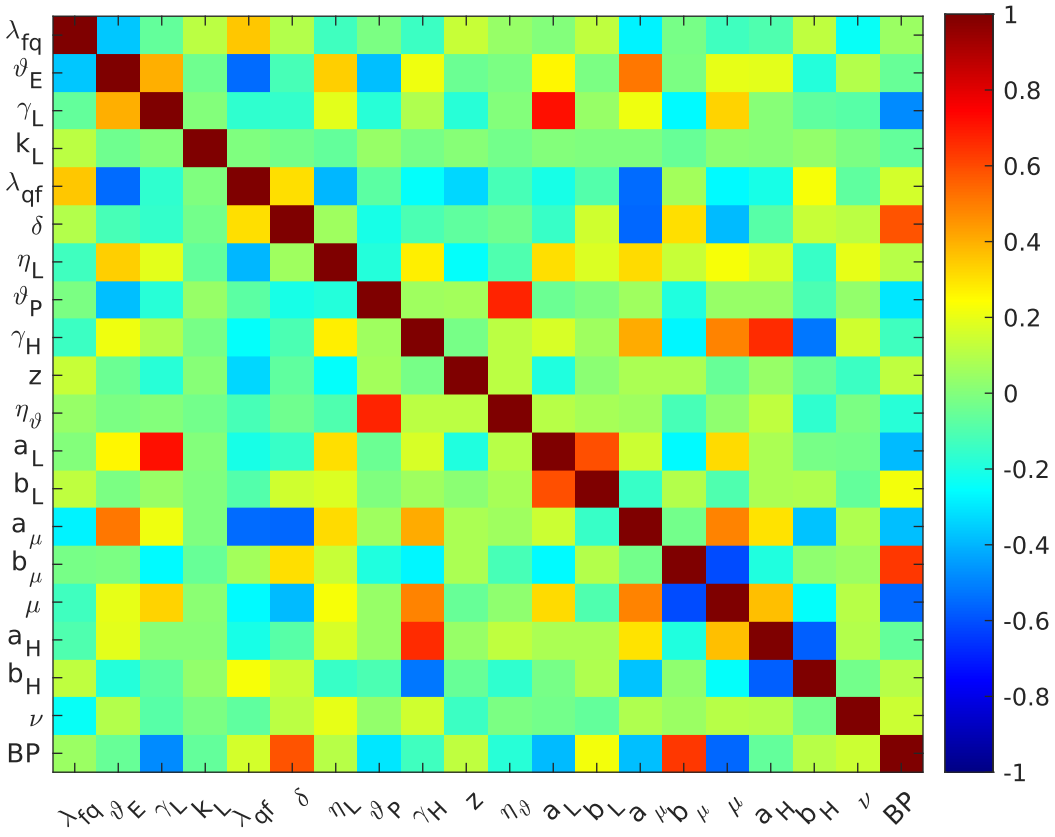
2.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.0576'	'0.0899'	'0.0737'	'0.0595'	'0.0725'
\vartheta_E	'0.3637'	'0.3887'	'0.3762'	'0.4199'	'0.1123'
\gamma_L	'0.2458'	'0.2937'	'0.2697'	'0.4907'	'0.107'
k_L	'5.3443'	'5.6493'	'5.4968'	'5.5271'	'0.0488'
\lambda_{qf}	'0.065'	'0.1103'	'0.0876'	'0.0608'	'0.1274'
\delta	'0.1176'	'0.1221'	'0.1198'	'0.1163'	'0.1105'
\eta_L	'0.6155'	'0.6946'	'0.6551'	'0.9928'	'0.1116'
\vartheta_P	'0.004'	'0.0054'	'0.0047'	'0.0016'	'0.072'
\gamma_H	'0.0847'	'0.166'	'0.1254'	'0.8687'	'0.1425'
z	'2.858'	'4.1888'	'3.5234'	'2.6124'	'0.0719'
\eta_\vartheta	'0.7493'	'0.7988'	'0.774'	'0.6265'	'0.0885'
a_L	'7.8267'	'8.656'	'8.2413'	'12.0457'	'0.1294'
b_L	'7.4661'	'8.2367'	'7.8514'	'9.1242'	'0.0917'
a_\mu	'11.4507'	'12.6114'	'12.031'	'14.7961'	'0.1662'
b_\mu	'5.649'	'6.6925'	'6.1707'	'4.662'	'0.1297'
\mu	'0.0629'	'0.1449'	'0.1039'	'0.9179'	'0.1528'
a_H	'9.3319'	'10.4731'	'9.9025'	'14.3762'	'0.1331'
b_H	'4.1912'	'5.2339'	'4.7125'	'4.2748'	'0.1274'
\nu	'243.4421'	'281.7776'	'262.6099'	'492.6072'	'0.0851'
BP	'97.1415'	'97.8585'	'97.5'	'96.5'	'0.1241'

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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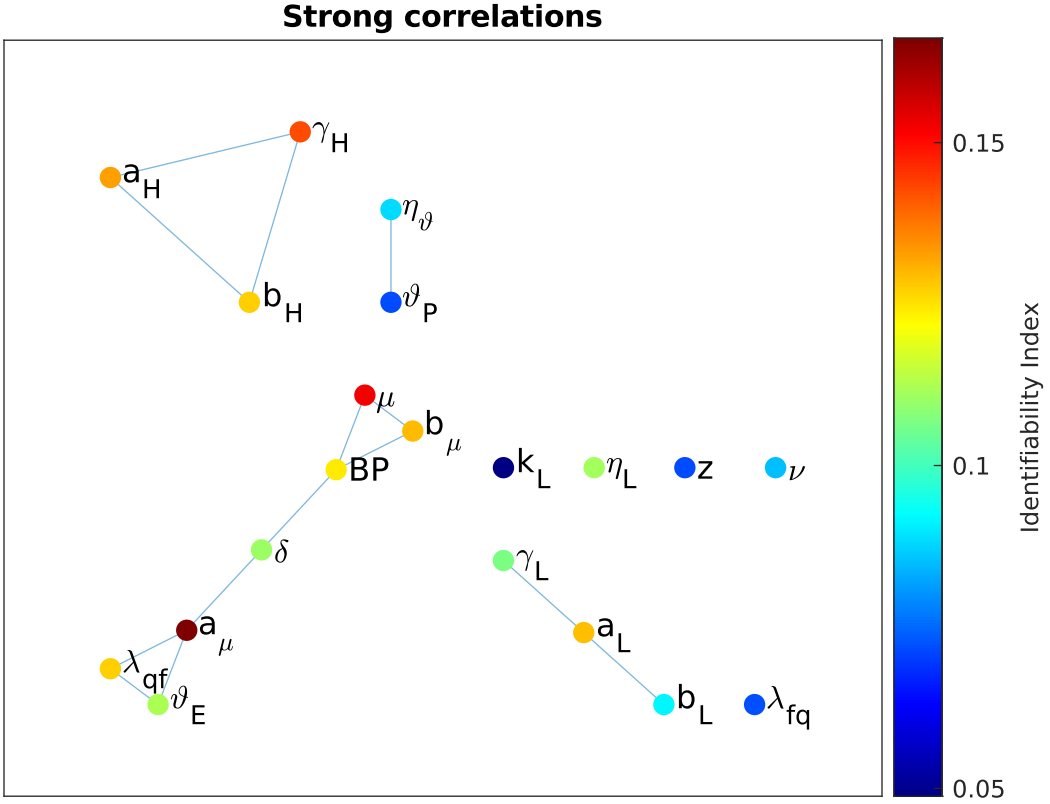
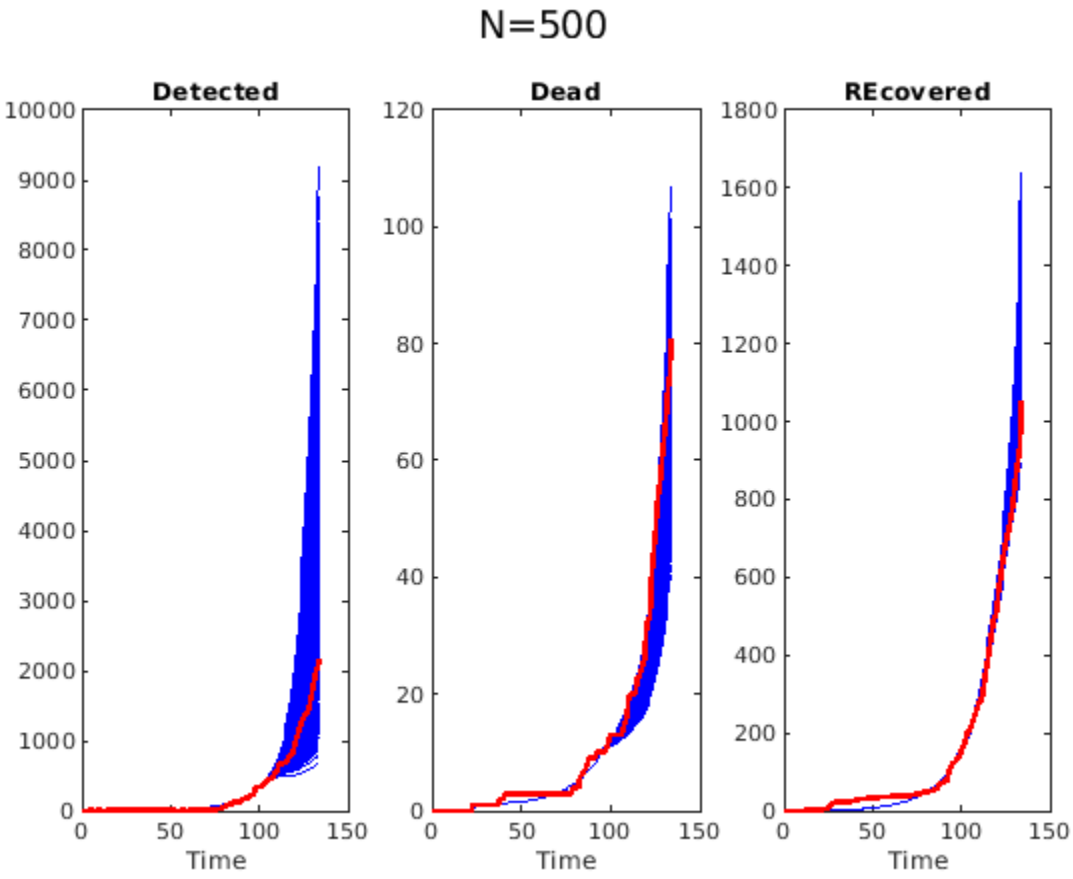
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
γ_H
a_H
η_ϑ
b_H
ϑ_P
μ
b_μ
BP
k_L
η_L
z
ν
δ
γ_L
a_μ
a_L
λ_{qf}
ϑ_E
b_L
λ_{fq}
0.15
0.1
0.05
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 data135 to the 176. The status of the validation is: COMPLETED.

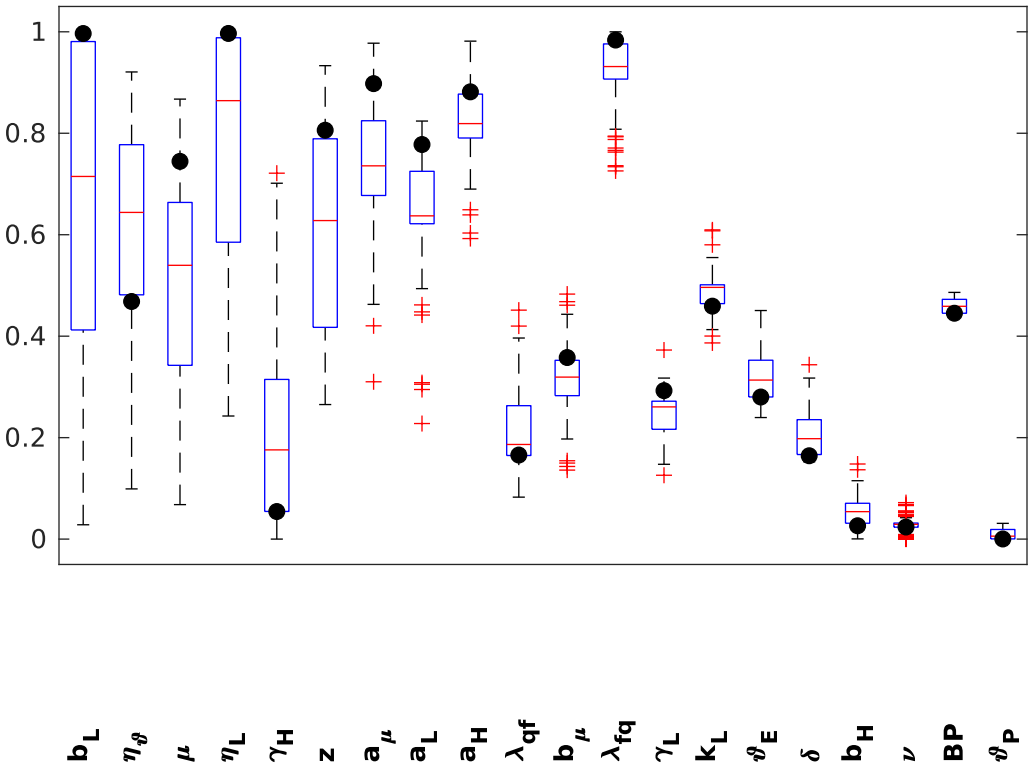
The number of estimations needed to perform the validation was1000.

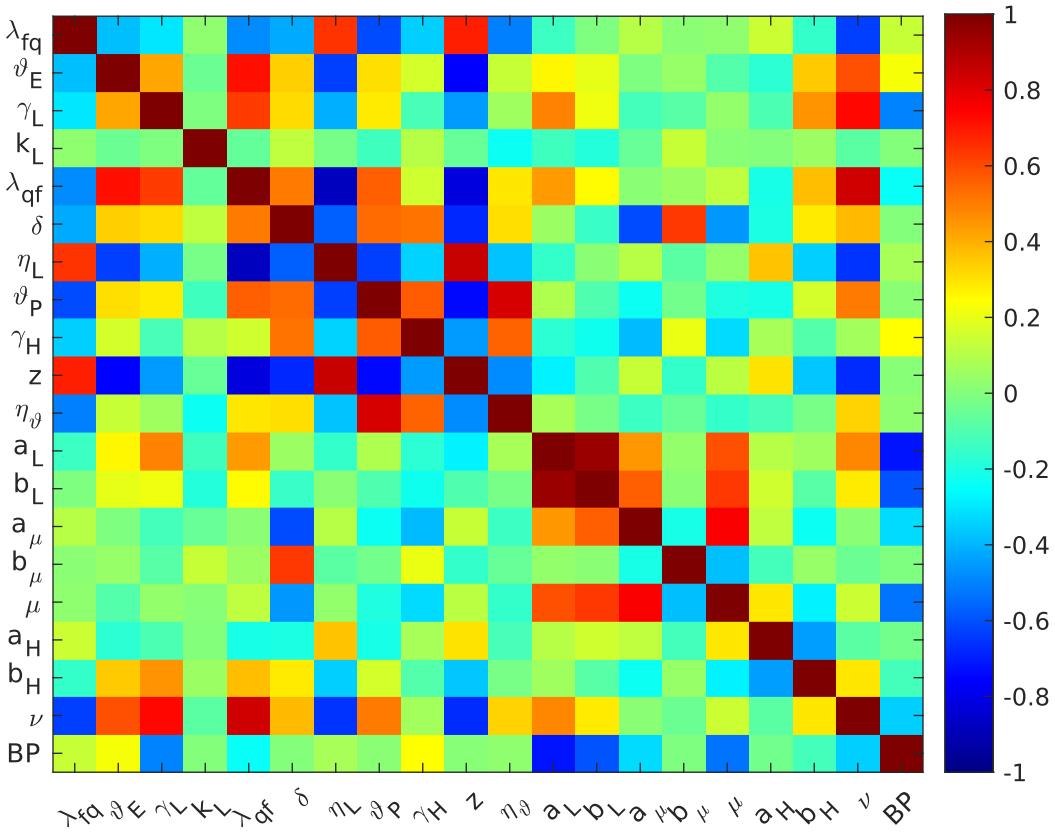
3.2. Estimated parameters with their intervals

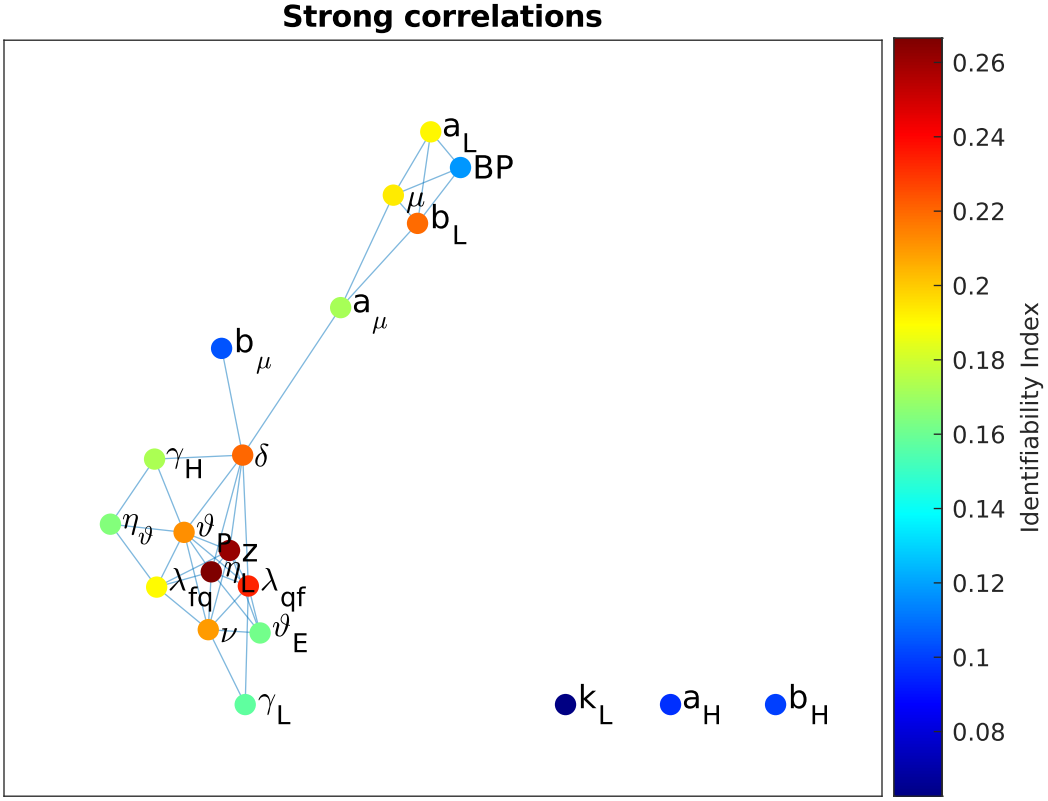
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.9004'	'0.9623'	'0.9313'	'0.9837'	'0.1903'
\vartheta_E	'0.2998'	'0.3273'	'0.3135'	'0.2801'	'0.1614'
\gamma_L	'0.2248'	'0.2968'	'0.2608'	'0.2926'	'0.1575'
k_L	'5.2872'	'5.6442'	'5.4657'	'5.1326'	'0.0626'
\lambda_{qf}	'0.1608'	'0.2123'	'0.1866'	'0.1657'	'0.2337'
\delta	'0.0271'	'0.0327'	'0.0299'	'0.0246'	'0.2198'
\eta_L	'0.7932'	'0.9219'	'0.8575'	'0.9967'	'0.2665'
\vartheta_P	'0.0028'	'0.0092'	'0.006'	'0.0002'	'0.2121'
\gamma_H	'0.1319'	'0.2255'	'0.1787'	'0.0543'	'0.1728'
z	'17.3998'	'20.274'	'18.8369'	'24.1785'	'0.2615'
\eta_\vartheta	'0.5996'	'0.6883'	'0.644'	'0.4684'	'0.1653'
a_L	'9.1055'	'10.7207'	'9.9131'	'11.8892'	'0.1909'
b_L	'9.8211'	'12.1949'	'11.008'	'14.9521'	'0.2189'
a_\mu	'10.5549'	'12.029'	'11.2919'	'13.5695'	'0.1722'
b_\mu	'4.9443'	'5.9968'	'5.4705'	'6.0108'	'0.1043'
\mu	'0.4857'	'0.5937'	'0.5397'	'0.7446'	'0.1935'
a_H	'12.0161'	'12.916'	'12.466'	'13.3431'	'0.0975'
b_H	'1.4443'	'2.0984'	'1.7714'	'1.3681'	'0.1008'
\nu	'10.6086'	'18.5067'	'14.5577'	'11.8915'	'0.2099'
BP	'136.2502'	'136.7498'	'136.5'	'135.4999'	'0.118'

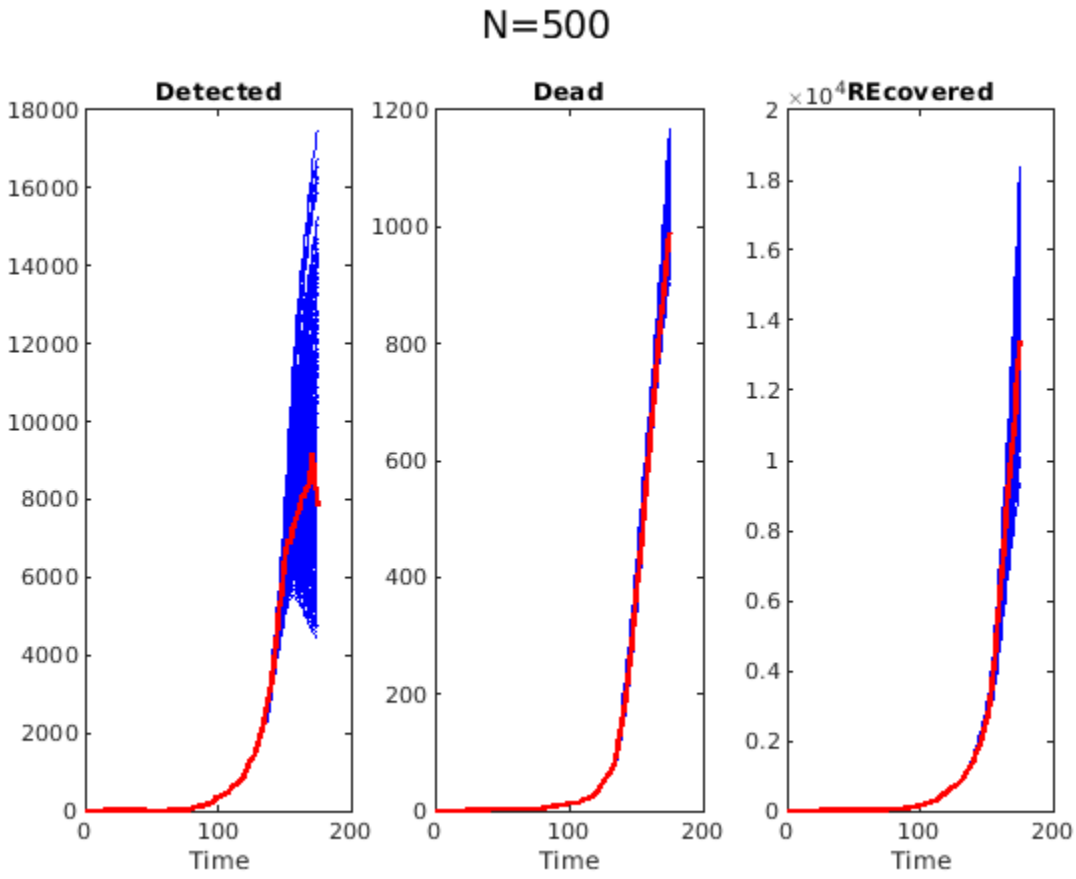
3.3. Identifiability analisys




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
a L
BP
μ
b L
a μ
b μ
γ H
δ
η ϑ
ϑ
P
z
η L
λ fq
λ qf
ν
ϑ E
γ L
k L
a H
b H
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
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 data176 to the 250. The status of the validation is: COMPLETED.

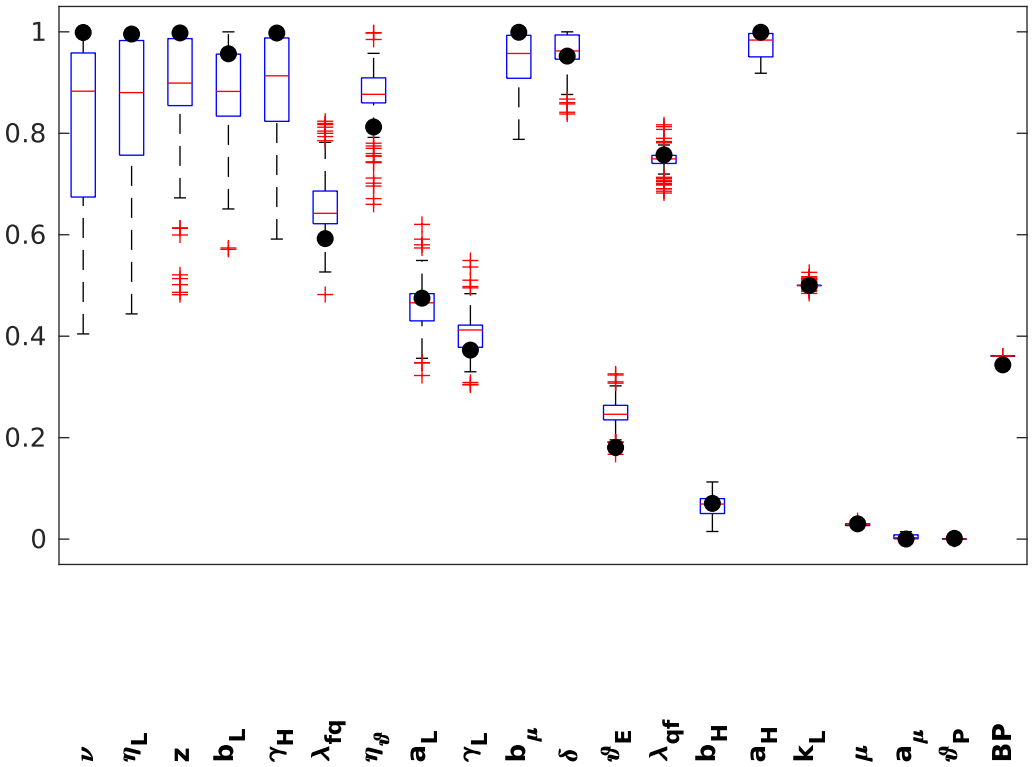
The number of estimations needed to perform the validation was2000.

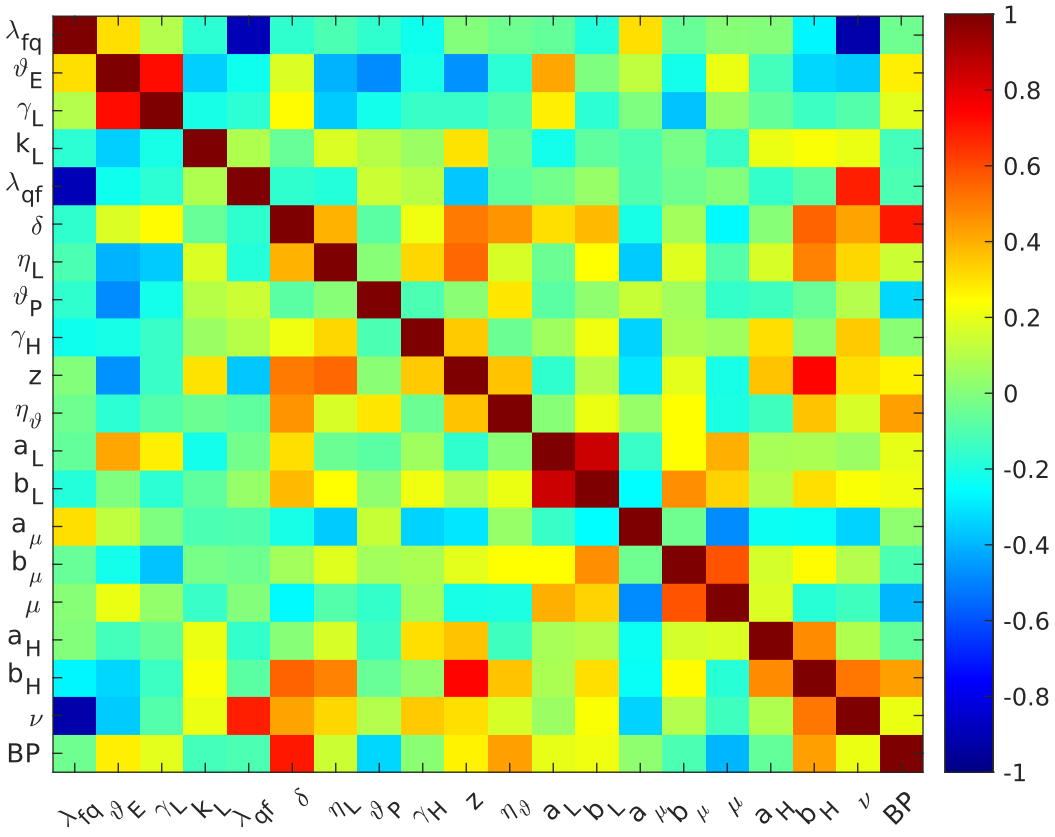
4.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.6131'	'0.6713'	'0.6422'	'0.5924'	'0.1291'
\vartheta_E	'0.2357'	'0.2564'	'0.2461'	'0.1805'	'0.1171'
\gamma_L	'0.3737'	'0.4508'	'0.4123'	'0.3726'	'0.1226'
k_L	'5.1796'	'5.8204'	'5.5'	'5.5'	'0.0963'
\lambda_{qf}	'0.7377'	'0.7614'	'0.7496'	'0.7574'	'0.1073'
\delta	'0.1412'	'0.1475'	'0.1443'	'0.1428'	'0.1505'
\eta_L	'0.8324'	'0.928'	'0.8802'	'0.9956'	'0.144'
\vartheta_P	'0'	'0.0002'	'0'	'0.0015'	'0.0586'
\gamma_H	'0.8832'	'0.9434'	'0.9133'	'0.9976'	'0.0955'
z	'25.0592'	'28.8795'	'26.9694'	'29.9348'	'0.1974'
\eta_\vartheta	'0.8264'	'0.9273'	'0.8768'	'0.8124'	'0.1195'
a_L	'7.1223'	'7.9212'	'7.5218'	'7.6488'	'0.1125'
b_L	'12.5219'	'14.1891'	'13.3555'	'14.3938'	'0.1523'
a_\mu	'1.0087'	'1.0708'	'1.0397'	'1.0012'	'0.0742'
b_\mu	'13.9831'	'14.8231'	'14.4031'	'14.9879'	'0.1107'
\mu	'0.0283'	'0.0306'	'0.0294'	'0.0301'	'0.0893'
a_H	'14.6031'	'14.9424'	'14.7727'	'14.9882'	'0.0746'
b_H	'1.893'	'2.0412'	'1.9671'	'1.9851'	'0.1397'
\nu	'415.2883'	'467.6659'	'441.4771'	'499.3433'	'0.1847'
BP	'176.3198'	'176.6801'	'176.4999'	'174.5016'	'0.0924'

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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0.6
0.4
0.2
0
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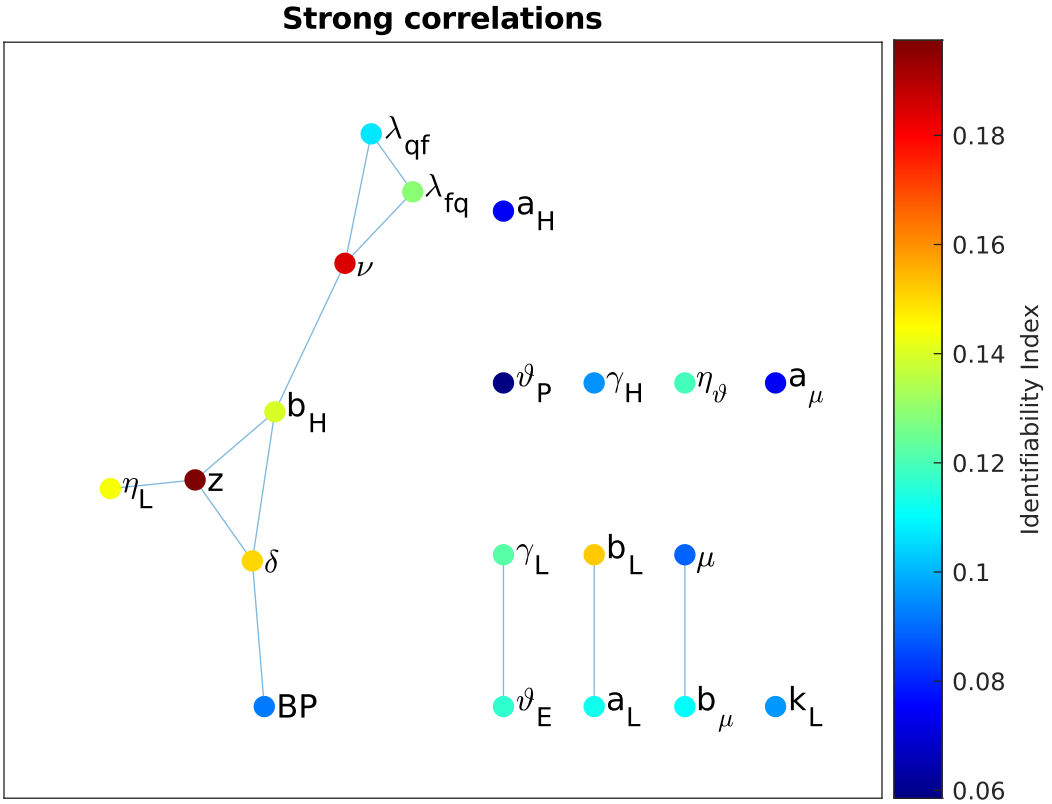
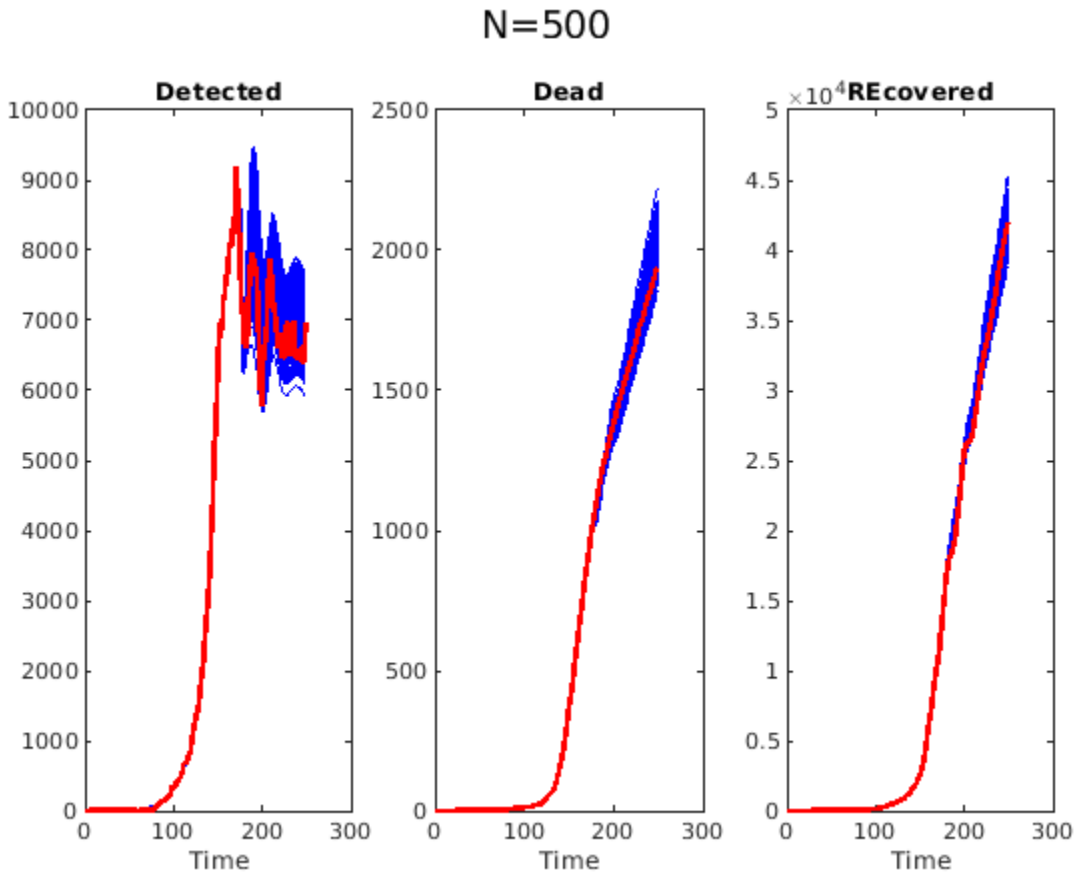
-0.4
-0.6
-0.8
-1


Strong correlations
λ_{qf}
λ_{fq}
a_H
ν
ϑ_P
γ_H
η_ϑ
a_μ
b_H
η_L
z
δ
γ_L
b_L
μ
BP
ϑ_E
a_L
b_μ
k_L
0.18
0.16
0.14
0.12
0.1
0.08
0.06
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 data250 to the 298. The status of the validation is: COMPLETED.

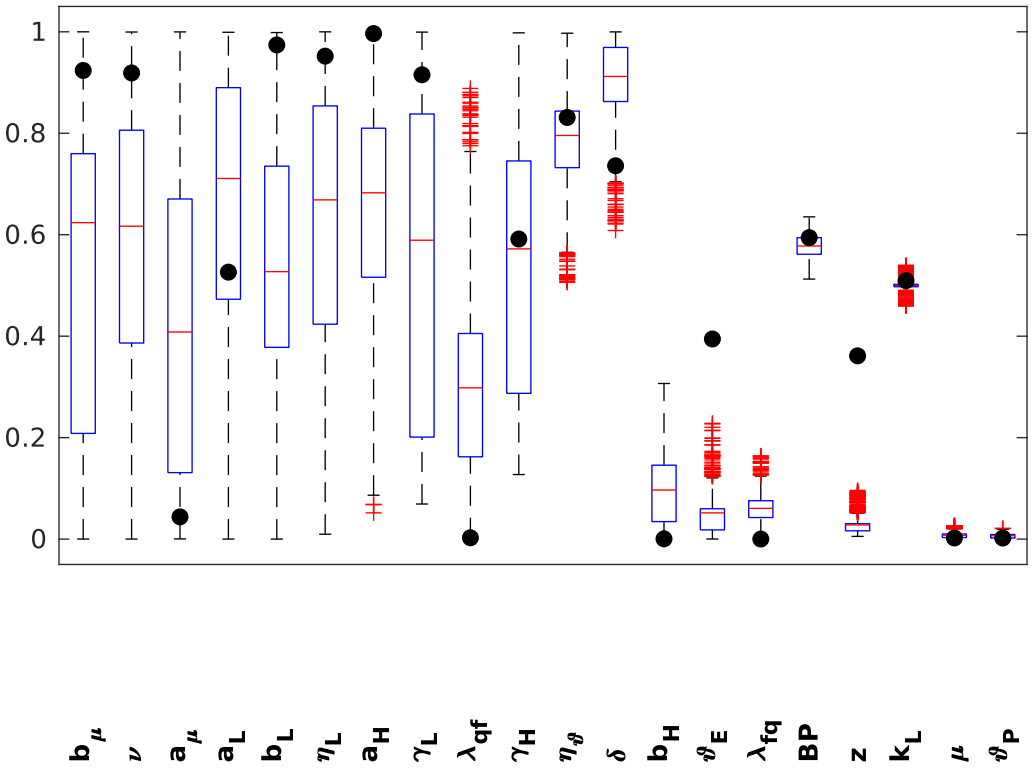
The number of estimations needed to perform the validation was1000.

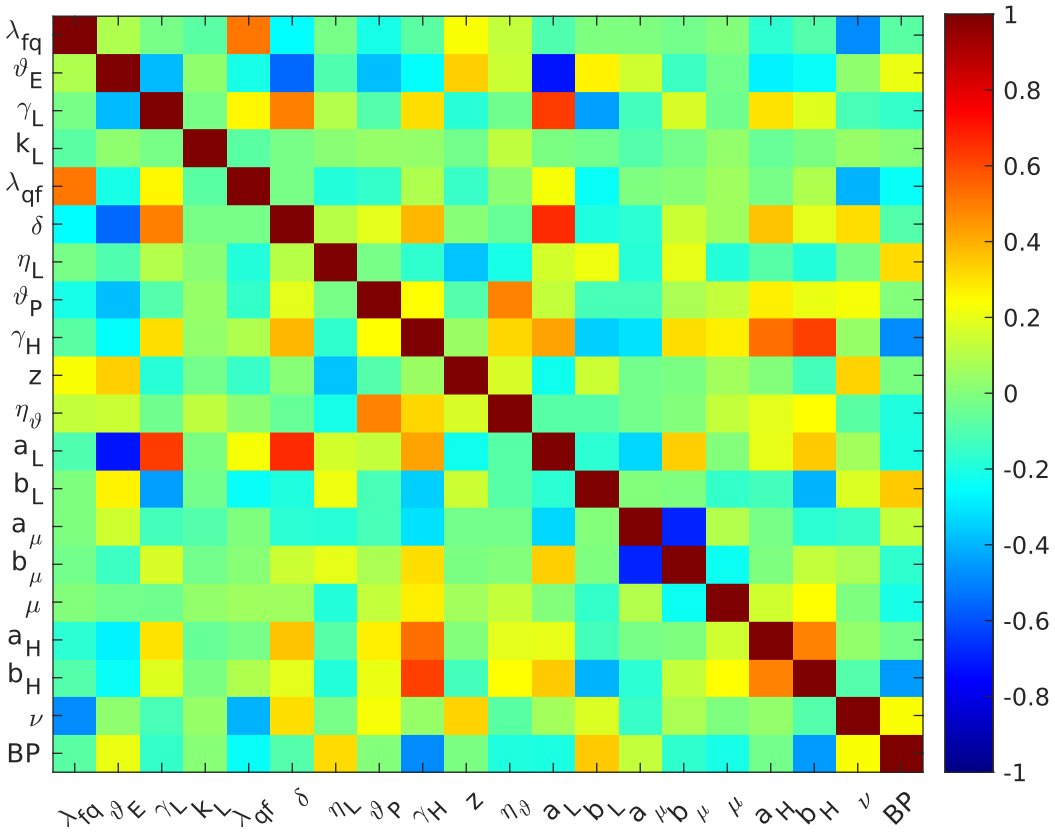
5.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.042'	'0.0792'	'0.0606'	'0.0001'	'0.0883'
\vartheta_E	'0.0359'	'0.0675'	'0.0517'	'0.3945'	'0.1222'
\gamma_L	'0.5607'	'0.6176'	'0.5892'	'0.9153'	'0.1165'
k_L	'5.4322'	'5.5679'	'5.5'	'5.5837'	'0.0422'
\lambda_{qf}	'0.2769'	'0.3194'	'0.2982'	'0.0026'	'0.0961'
\delta	'0.1334'	'0.1401'	'0.1368'	'0.1104'	'0.1256'
\eta_L	'0.6433'	'0.6941'	'0.6687'	'0.9521'	'0.0856'
\vartheta_P	'0.0061'	'0.0071'	'0.0066'	'0.0021'	'0.0654'
\gamma_H	'0.5495'	'0.5946'	'0.5721'	'0.5915'	'0.1382'
z	'0.4643'	'1.2125'	'0.8384'	'10.8383'	'0.0696'
\eta_\vartheta	'0.7819'	'0.8092'	'0.7955'	'0.8312'	'0.0727'
a_L	'10.5954'	'11.3085'	'10.9519'	'8.3672'	'0.1506'
b_L	'8.071'	'8.6906'	'8.3808'	'14.6378'	'0.0902'
a_\mu	'6.3315'	'7.0978'	'6.7146'	'1.6136'	'0.0995'
b_\mu	'9.3404'	'10.1251'	'9.7327'	'13.9331'	'0.0998'
\mu	'0.0059'	'0.0094'	'0.0077'	'0.0022'	'0.053'
a_H	'10.2686'	'10.8448'	'10.5567'	'14.951'	'0.0995'
b_H	'2.2736'	'2.4351'	'2.3544'	'1.0074'	'0.0994'
\nu	'296.1'	'320.7025'	'308.4013'	'459.4524'	'0.0858'
BP	'246.2243'	'246.7757'	'246.5'	'248.4999'	'0.0714'

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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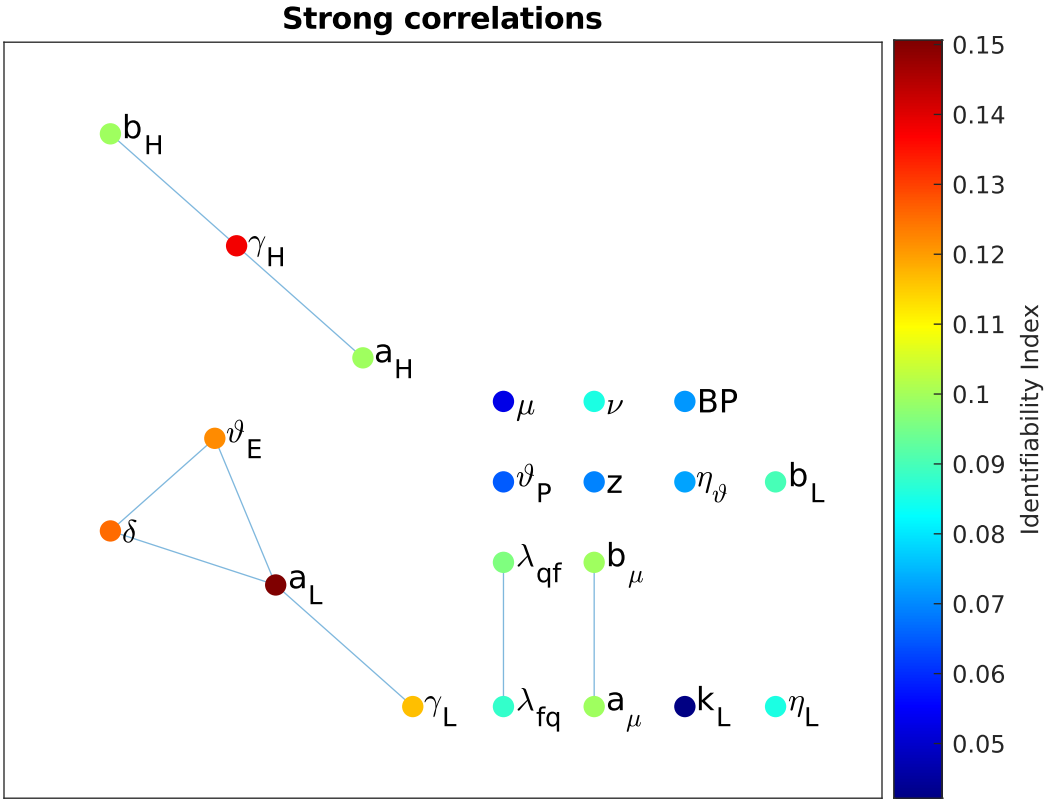
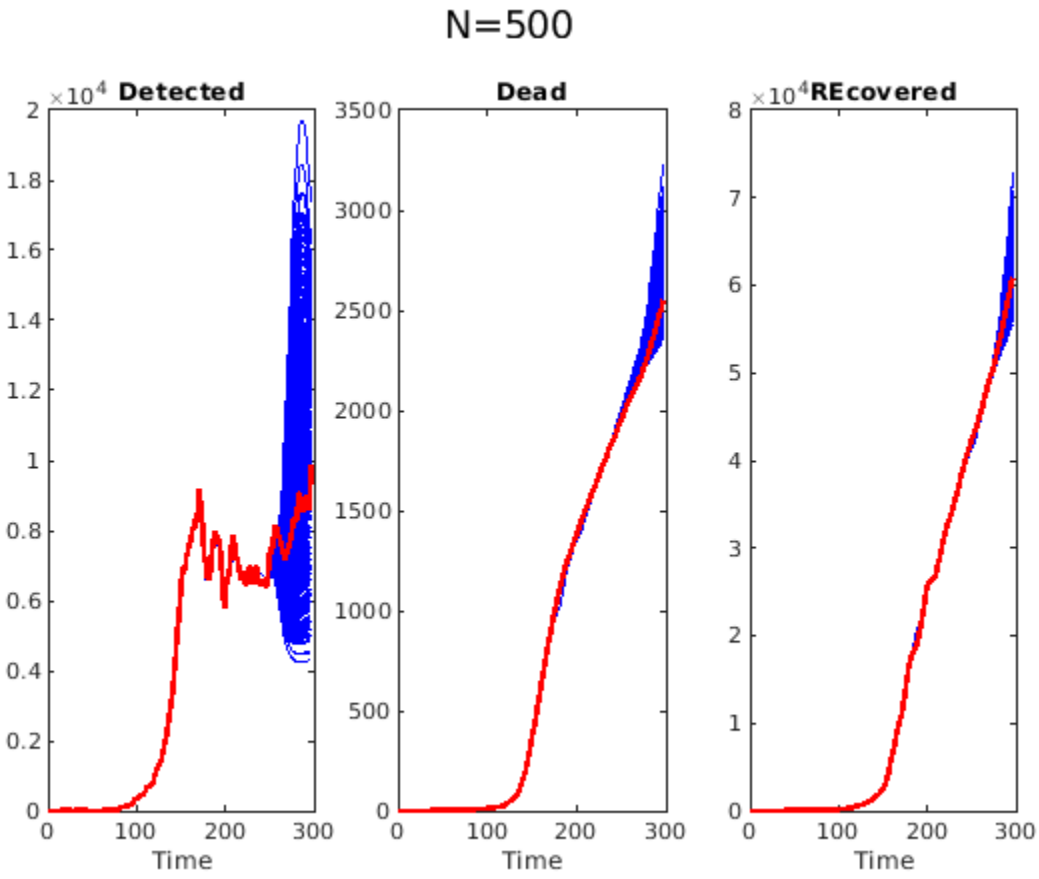
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
b H
γ H
a H
μ
ν
BP
ϑ E
ϑ P
z
η ϑ
b L
δ
λ qf
b μ
a L
γ L
λ fq
a μ
k L
η L
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
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 data298 to the 325. The status of the validation is: COMPLETED.

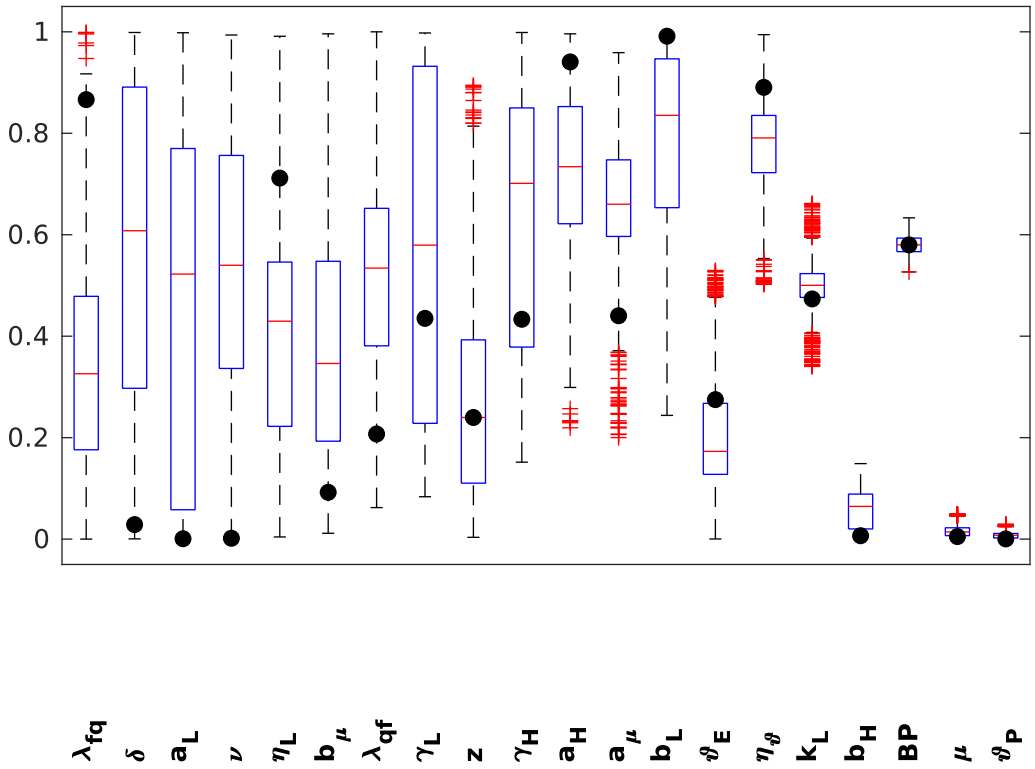
The number of estimations needed to perform the validation was1000.

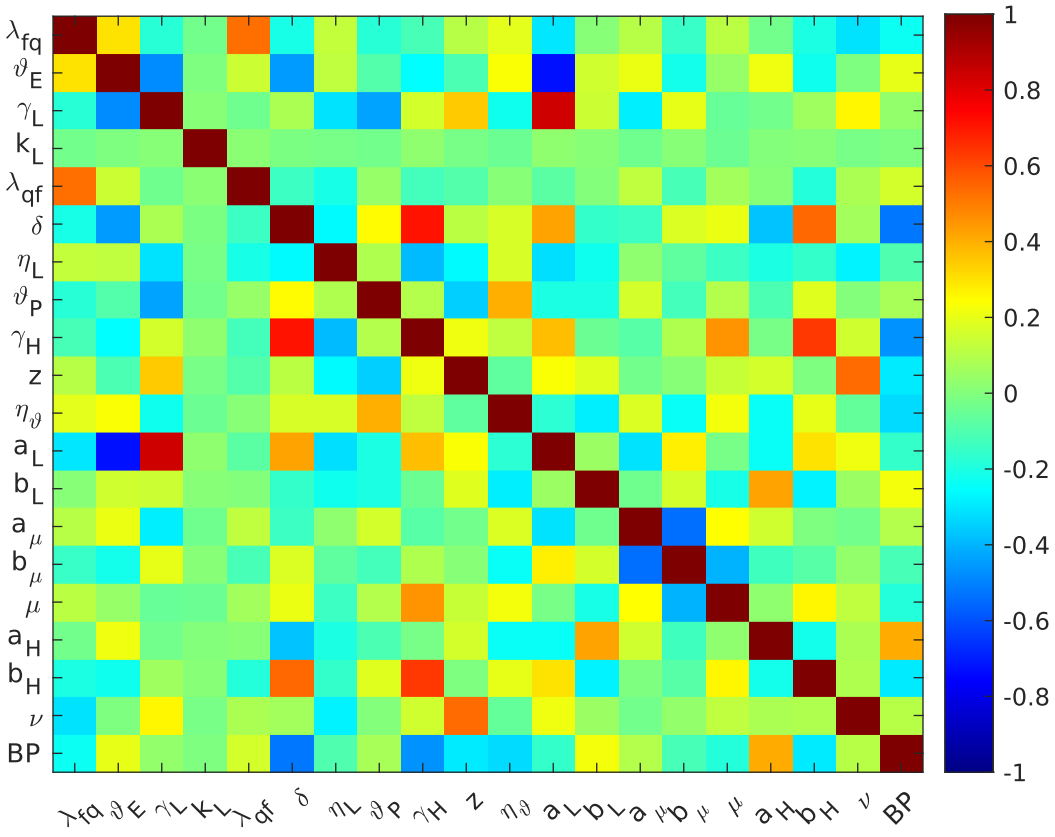
6.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.3066'	'0.3454'	'0.326'	'0.8664'	'0.0993'
\vartheta_E	'0.1564'	'0.1897'	'0.173'	'0.2749'	'0.1062'
\gamma_L	'0.5501'	'0.6089'	'0.5795'	'0.4351'	'0.119'
k_L	'5.4183'	'5.5858'	'5.502'	'5.261'	'0.039'
\lambda_{qf}	'0.5163'	'0.5522'	'0.5342'	'0.2072'	'0.0821'
\delta	'0.0867'	'0.0956'	'0.0912'	'0.0043'	'0.1544'
\eta_L	'0.408'	'0.4512'	'0.4296'	'0.7117'	'0.0897'
\vartheta_P	'0.0066'	'0.0086'	'0.0076'	'0.0004'	'0.0647'
\gamma_H	'0.6774'	'0.7252'	'0.7013'	'0.4334'	'0.1305'
z	'6.5541'	'7.8369'	'7.1955'	'7.1919'	'0.0997'
\eta_\vartheta	'0.7766'	'0.8049'	'0.7908'	'0.8905'	'0.0832'
a_L	'7.8614'	'8.7661'	'8.3138'	'1.01'	'0.148'
b_L	'12.4571'	'12.9245'	'12.6908'	'14.8792'	'0.0772'
a_\mu	'9.9569'	'10.5234'	'10.2401'	'7.1647'	'0.0922'
b_\mu	'5.5416'	'6.1517'	'5.8466'	'2.2909'	'0.0982'
\mu	'0.0125'	'0.0159'	'0.0142'	'0.005'	'0.0647'
a_H	'11.0645'	'11.4867'	'11.2756'	'14.1694'	'0.0782'
b_H	'1.8558'	'1.949'	'1.9024'	'1.0934'	'0.1021'
\nu	'258.4786'	'281.3339'	'269.9062'	'0.8198'	'0.0914'
BP	'293.354'	'293.646'	'293.5'	'293.4984'	'0.0891'

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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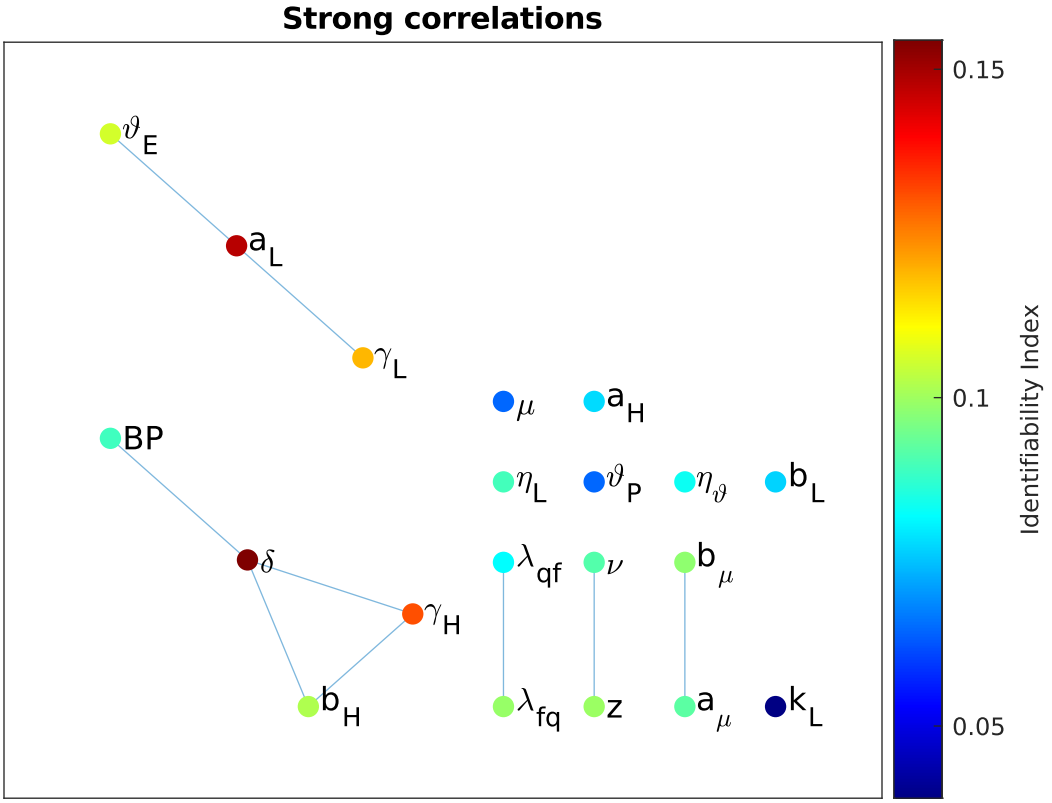
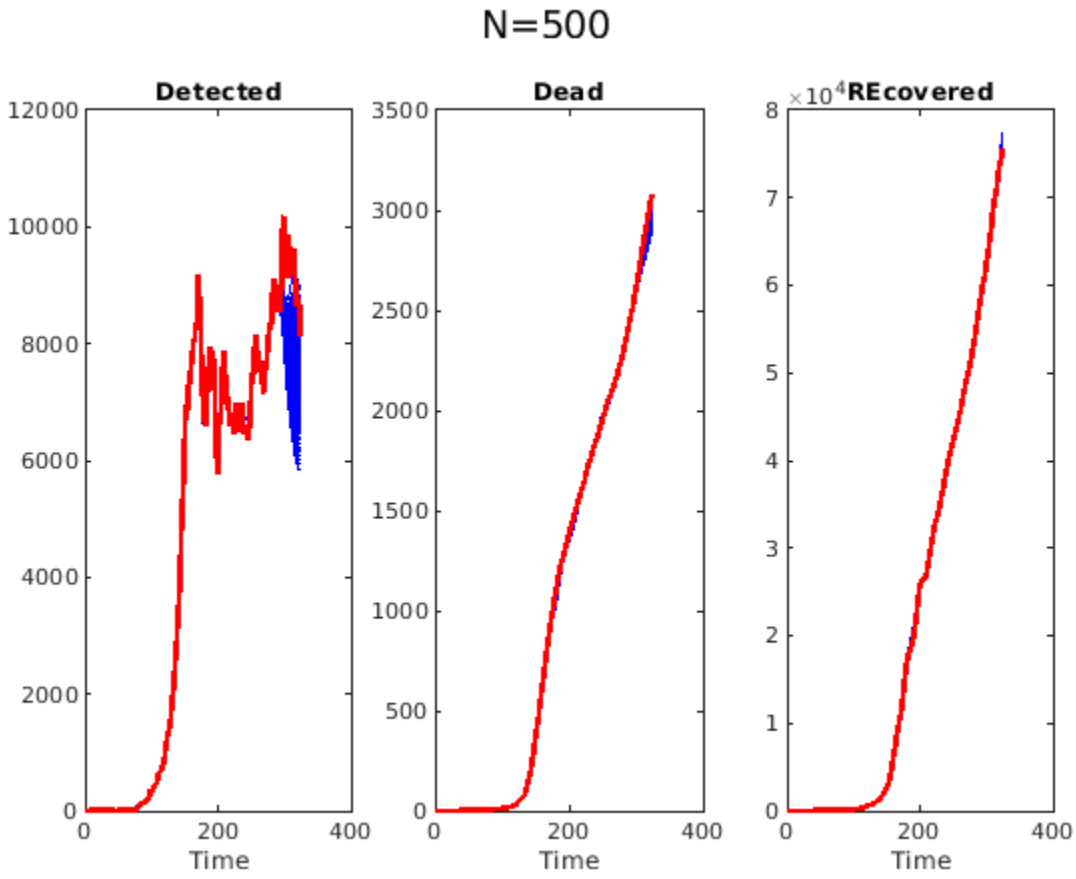
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
ϑ_E
a_L
γ_L
BP
δ
γ_H
b_H
μ
a_H
η_L
ϑ_P
η_ϑ
b_L
λ_{qf}
ν
b_μ
λ_{fq}
z
a_μ
k_L
0.15
0.1
0.05
Identifiability Index

6.4. Uncertainty analisys



Chapter 7. Extension number7

7.1. Basic information

The extension to be validated consists of the time series from the data325 to the 353. The status of the validation is: COMPLETED.

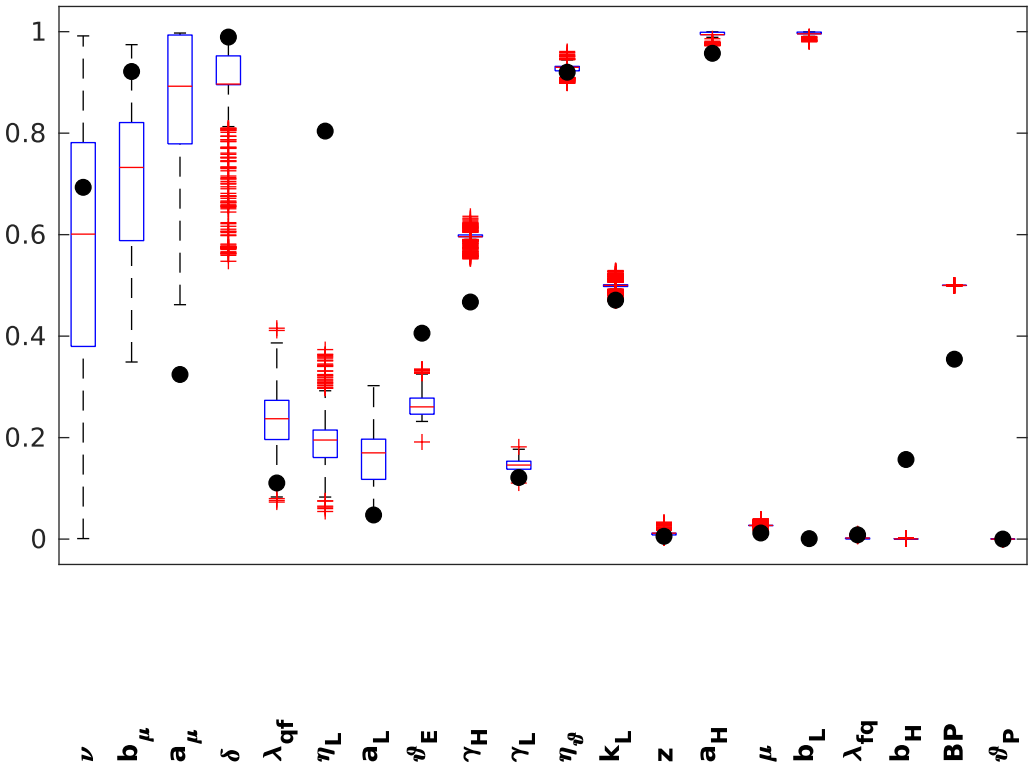
The number of estimations needed to perform the validation was1000.

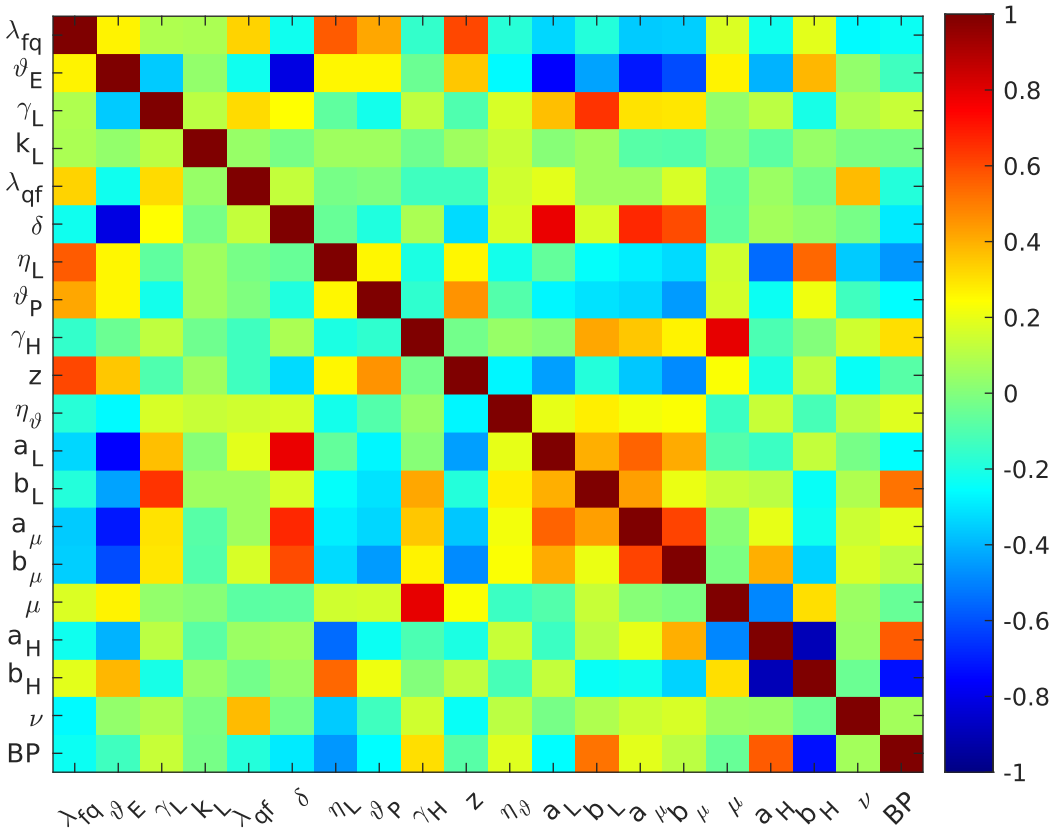
7.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0187'	'0.0021'	'0.0084'	'0.1246'
\vartheta_E	'0.256'	'0.2652'	'0.2606'	'0.4058'	'0.1619'
\gamma_L	'0.1435'	'0.1483'	'0.1459'	'0.1214'	'0.0897'
k_L	'5.4335'	'5.5661'	'5.4998'	'5.2381'	'0.0455'
\lambda_{qf}	'0.228'	'0.2467'	'0.2374'	'0.1106'	'0.0679'
\delta	'0.1293'	'0.1394'	'0.1343'	'0.1484'	'0.1705'
\eta_L	'0.1792'	'0.2115'	'0.1953'	'0.8041'	'0.1402'
\vartheta_P	'0'	'0'	'0'	'0.0001'	'0.0808'
\gamma_H	'0.5884'	'0.6035'	'0.5959'	'0.4672'	'0.0876'
z	'0'	'0.9247'	'0.3516'	'0.1663'	'0.1146'
\eta_\vartheta	'0.9256'	'0.934'	'0.9298'	'0.9201'	'0.0705'
a_L	'3.2653'	'3.4936'	'3.3794'	'1.6654'	'0.1384'
b_L	'14.6288'	'15'	'14.9404'	'1.013'	'0.1272'
a_\mu	'13.2225'	'13.7664'	'13.4944'	'5.5419'	'0.1705'
b_\mu	'11.0567'	'11.427'	'11.2419'	'13.9011'	'0.1524'
\mu	'0.0246'	'0.0293'	'0.0269'	'0.012'	'0.0806'
a_H	'14.6569'	'15'	'14.9176'	'14.403'	'0.1372'
b_H	'1'	'1.0569'	'1.0061'	'3.196'	'0.1243'
\nu	'287.554'	'313.4596'	'300.5068'	'346.634'	'0.0811'
BP	'325.3584'	'325.6416'	'325.5'	'317.5'	'0.1246'

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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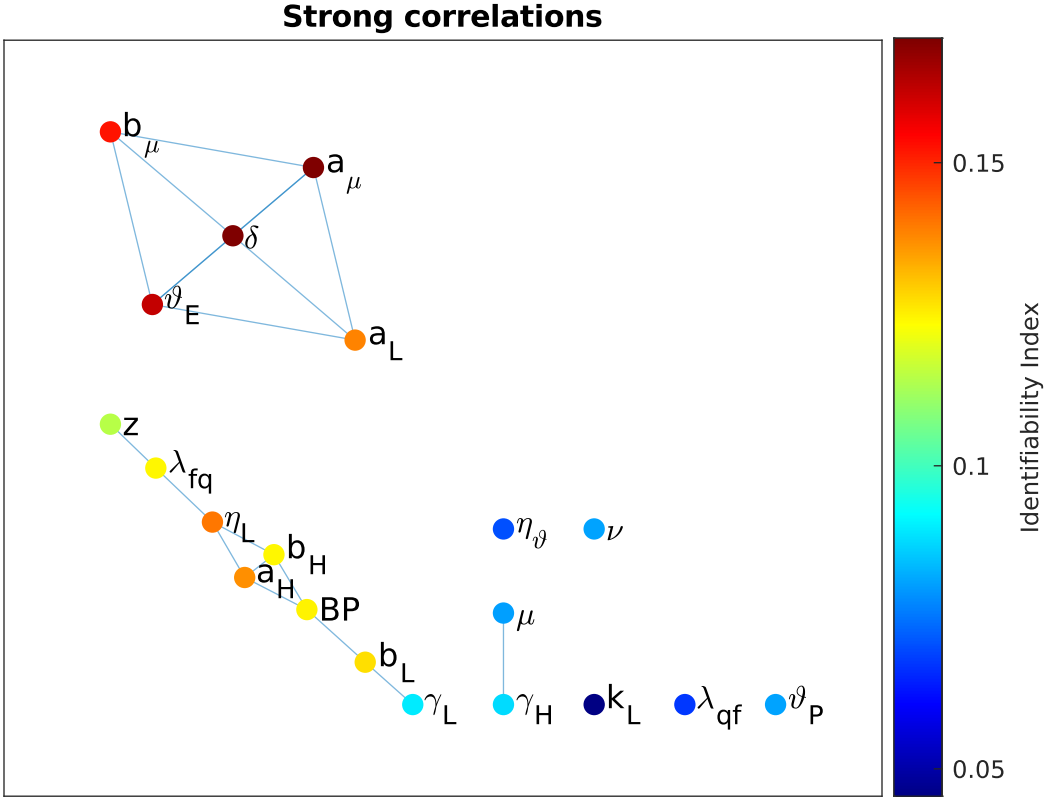
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
b
μ
a
μ
δ
ϑ
E
a
L
z
λ
fq
η
L
b
H
a
H
BP
b
L
γ
L
η_ϑ
ν
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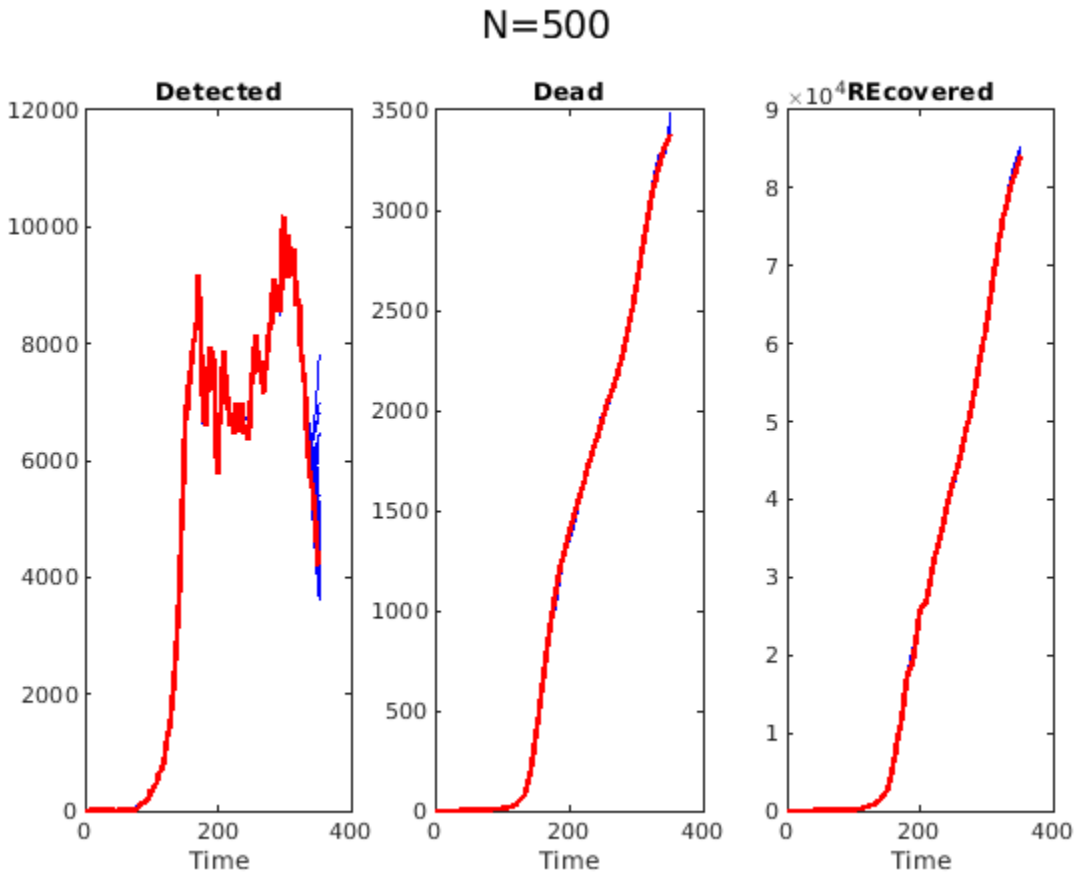
k
L
λ
qf
ϑ
P
0.15
0.1
0.05
Identifiability Index

7.4. Uncertainty analisys



Chapter 8. Extension number8

8.1. Basic information

The extension to be validated consists of the time series from the data353 to the 384. The status of the validation is: COMPLETED.

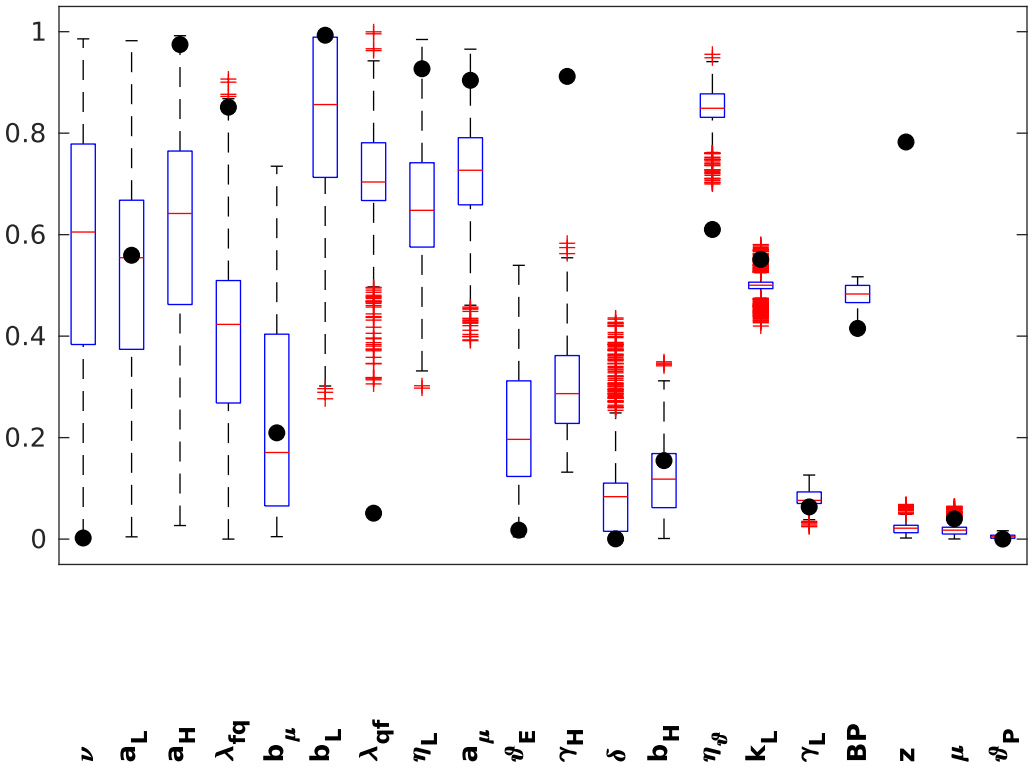
The number of estimations needed to perform the validation was1000.

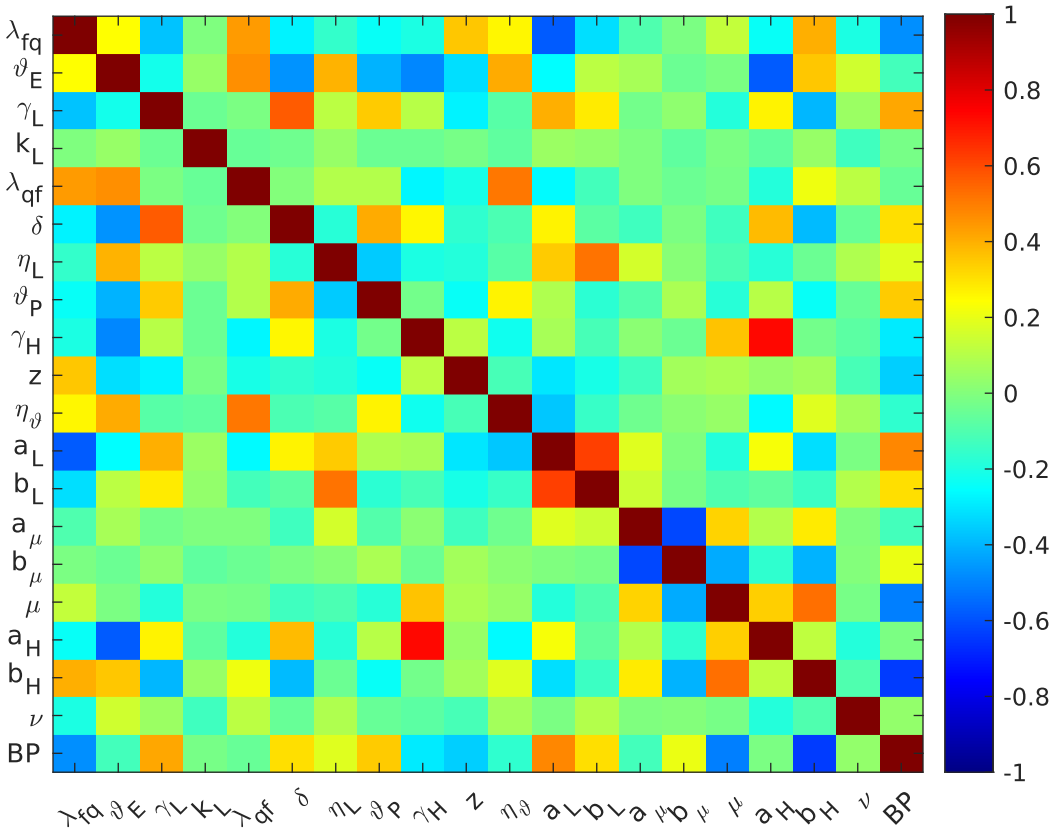
8.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4015'	'0.4453'	'0.4234'	'0.8512'	'0.1215'
\vartheta_E	'0.1846'	'0.2085'	'0.1966'	'0.0177'	'0.1137'
\gamma_L	'0.074'	'0.0785'	'0.0763'	'0.0634'	'0.0921'
k_L	'5.4293'	'5.5765'	'5.5029'	'5.9612'	'0.0433'
\lambda_{qf}	'0.6797'	'0.7275'	'0.7036'	'0.0511'	'0.101'
\delta	'0.0088'	'0.0163'	'0.0126'	'0.0001'	'0.1152'
\eta_L	'0.6325'	'0.6633'	'0.6479'	'0.9269'	'0.0958'
\vartheta_P	'0.0042'	'0.005'	'0.0046'	'0.0001'	'0.0726'
\gamma_H	'0.2744'	'0.2991'	'0.2868'	'0.9119'	'0.0958'
z	'0.3342'	'0.9556'	'0.6449'	'23.4786'	'0.0772'
\eta_\vartheta	'0.8386'	'0.8596'	'0.8491'	'0.6102'	'0.0905'
a_L	'8.4334'	'9.0948'	'8.7641'	'8.8313'	'0.1363'
b_L	'12.6965'	'13.2722'	'12.9844'	'14.9024'	'0.1154'
a_\mu	'10.9363'	'11.4128'	'11.1745'	'13.6592'	'0.0864'
b_\mu	'3.0768'	'3.7108'	'3.3938'	'3.9322'	'0.0882'
\mu	'0.0099'	'0.0253'	'0.0176'	'0.0399'	'0.1039'
a_H	'9.7185'	'10.2497'	'9.9841'	'14.6458'	'0.1217'
b_H	'2.5595'	'2.7503'	'2.6549'	'3.165'	'0.1178'
\nu	'289.8255'	'315.3553'	'302.5904'	'1.0781'	'0.0698'
BP	'353.3478'	'353.6522'	'353.5'	'349.4999'	'0.1154'

8.3. Identifiability analisys




λfq
ϑE
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kL
λqf
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ηL
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γH
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bL
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bμ
μ
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bH
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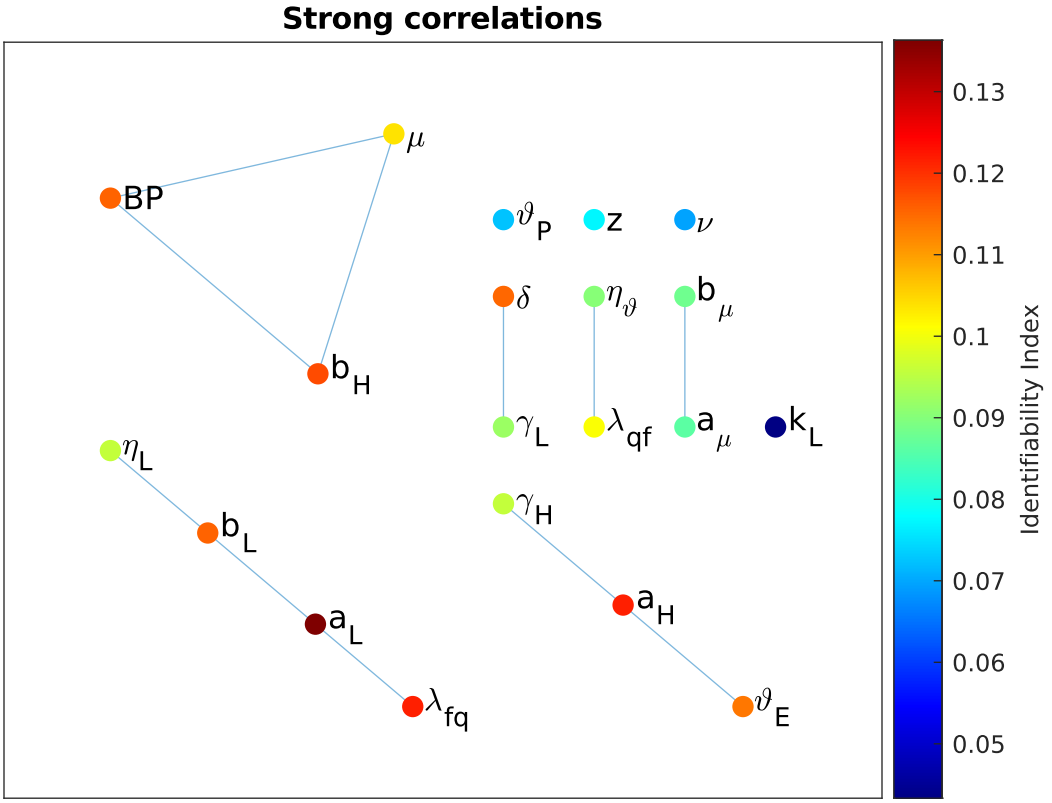
-0.6
-0.8
-1


Strong correlations
μ
BP
b H
ϑ P
z
ν
δ
η ϑ
b μ
γ L
λ qf
a μ
k L
η L
b L
γ H
a L
a H
λ fq
ϑ E
0.13
0.12
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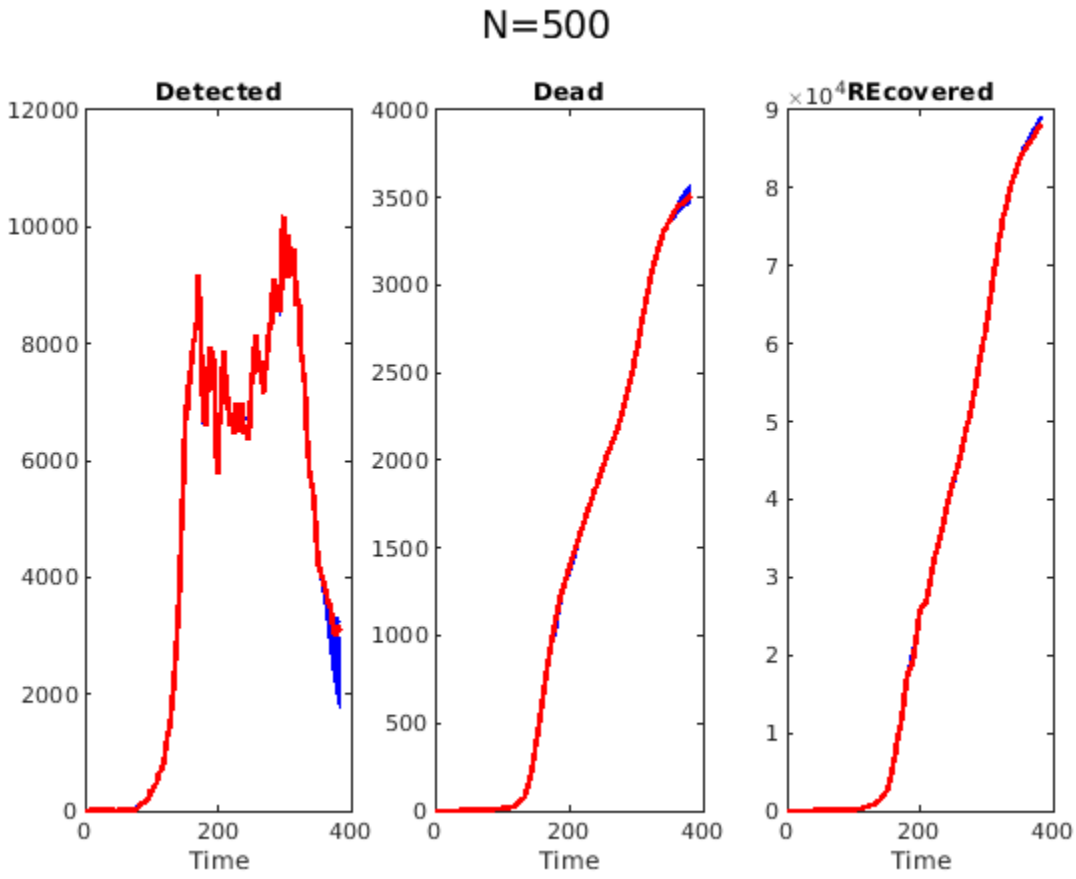
0.1
0.09
0.08
0.07
0.06
0.05
Identifiability Index

8.4. Uncertainty analisys



Chapter 9. Extension number9

9.1. Basic information

The extension to be validated consists of the time series from the data384 to the 423. The status of the validation is: COMPLETED.

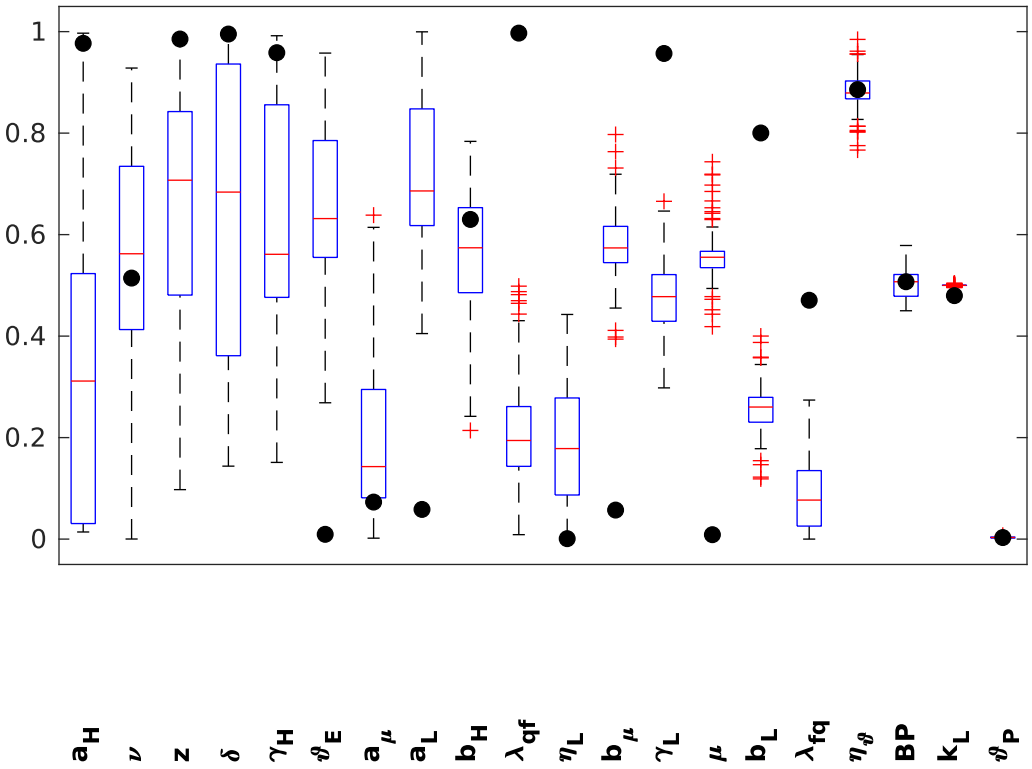
The number of estimations needed to perform the validation was1000.

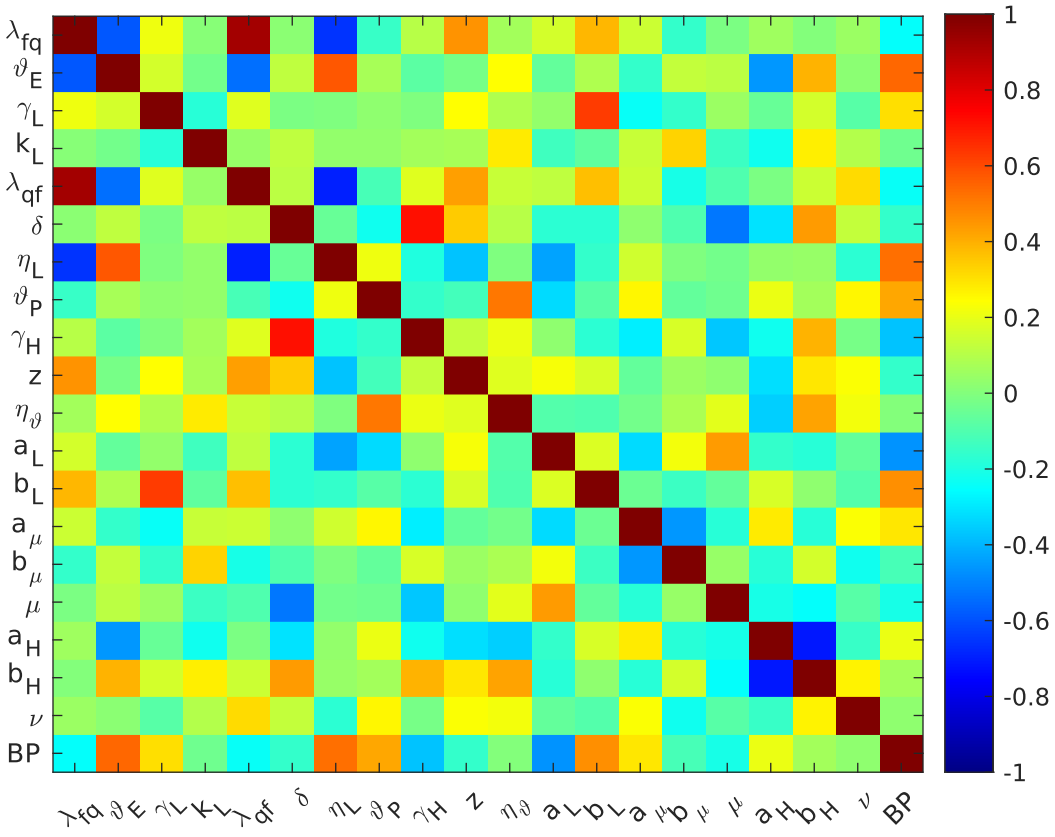
9.2. Estimated parameters with their intervals

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

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.0509'	'0.103'	'0.077'	'0.4707'	'0.1434'
\vartheta_E	'0.5859'	'0.6743'	'0.6301'	'0.0094'	'0.1739'
\gamma_L	'0.4547'	'0.5009'	'0.4778'	'0.9569'	'0.096'
k_L	'5.3642'	'5.6359'	'5.5001'	'5.318'	'0.0691'
\lambda_{qf}	'0.1435'	'0.2454'	'0.1944'	'0.9971'	'0.176'
\delta	'0.0909'	'0.1143'	'0.1026'	'0.1493'	'0.1761'
\eta_L	'0.1487'	'0.2081'	'0.1784'	'0.0008'	'0.1589'
\vartheta_P	'0.0027'	'0.0037'	'0.0032'	'0.003'	'0.0797'
\gamma_H	'0.5029'	'0.6195'	'0.5612'	'0.9585'	'0.1438'
z	'19.3908'	'23.0425'	'21.2166'	'29.5628'	'0.1349'
\eta_\vartheta	'0.8501'	'0.9079'	'0.879'	'0.8858'	'0.1078'
a_L	'9.986'	'11.2105'	'10.5982'	'1.8188'	'0.1165'
b_L	'4.1192'	'5.1674'	'4.6433'	'12.2039'	'0.1192'
a_\mu	'2.3831'	'3.6778'	'3.0305'	'2.0212'	'0.1167'
b_\mu	'8.4579'	'9.6077'	'9.0328'	'1.8007'	'0.1031'
\mu	'0.4996'	'0.6112'	'0.5554'	'0.0087'	'0.1313'
a_H	'4.2883'	'6.4323'	'5.3603'	'14.6773'	'0.1675'
b_H	'8.4132'	'9.6424'	'9.0278'	'9.8187'	'0.1374'
\nu	'252.6169'	'309.6504'	'281.1336'	'257.1778'	'0.1163'
BP	'387.8481'	'389.1504'	'388.4993'	'388.5'	'0.1197'

9.3. Identifiability analisys




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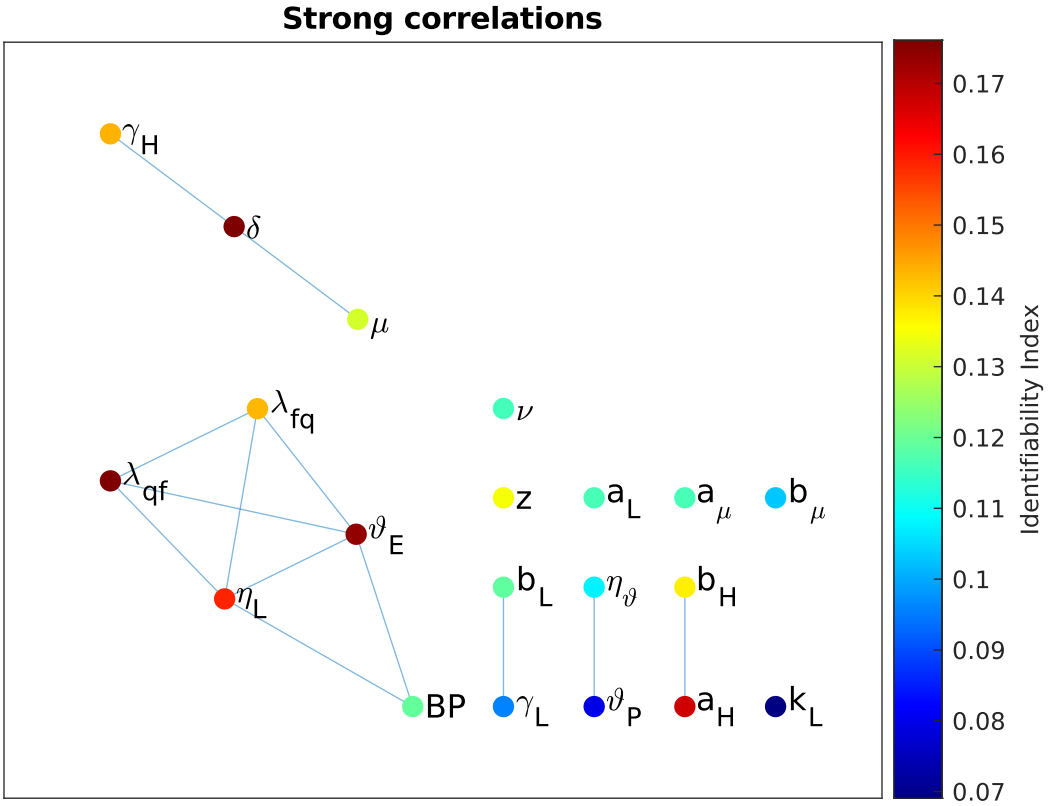
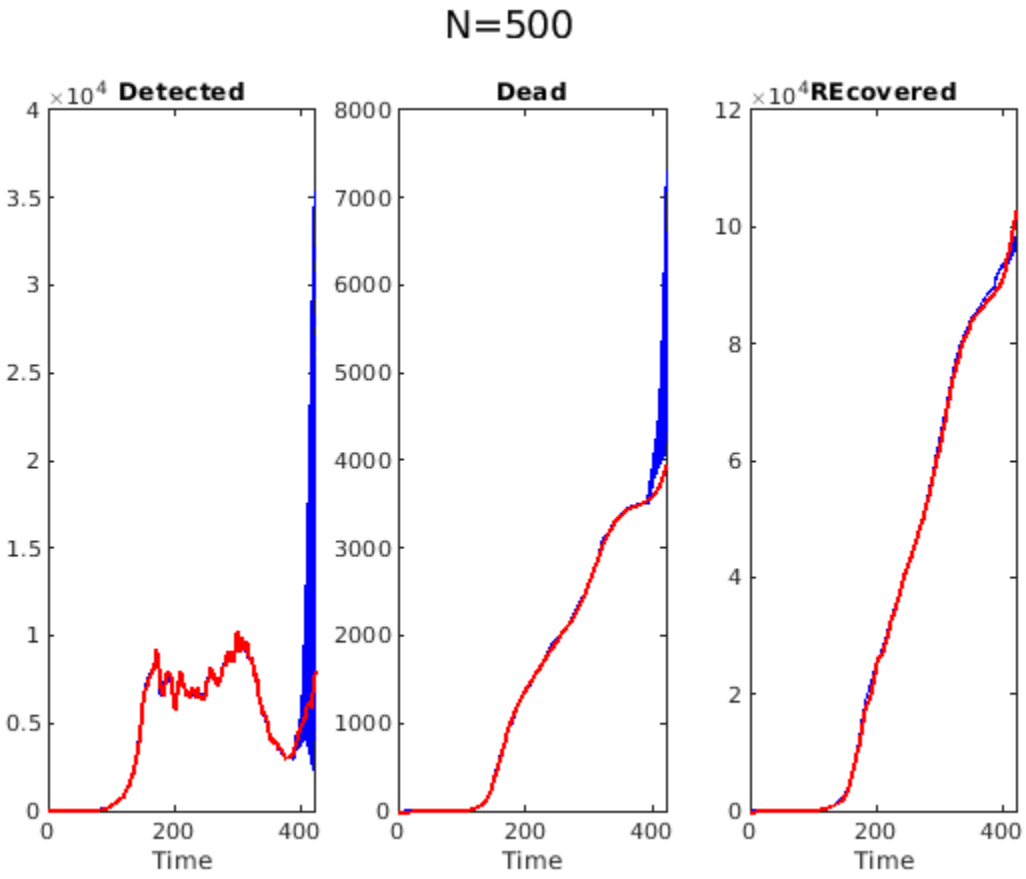
b_L
a_μ
b_μ
μ
a_H
b_H
ν
BP
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1


Strong correlations
γ_H
δ
μ
λ_{fq}
λ_{qf}
ϑ_E
η_L
BP
ν
z
a_L
a_μ
b_μ
b_L
η_ϑ
b_H
γ_L
ϑ_P
a_H
k_L
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
Identifiability Index

9.4. Uncertainty analisys



Chapter 10. Extension number10

10.1. Basic information

The extension to be validated consists of the time series from the data423 to the 434. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

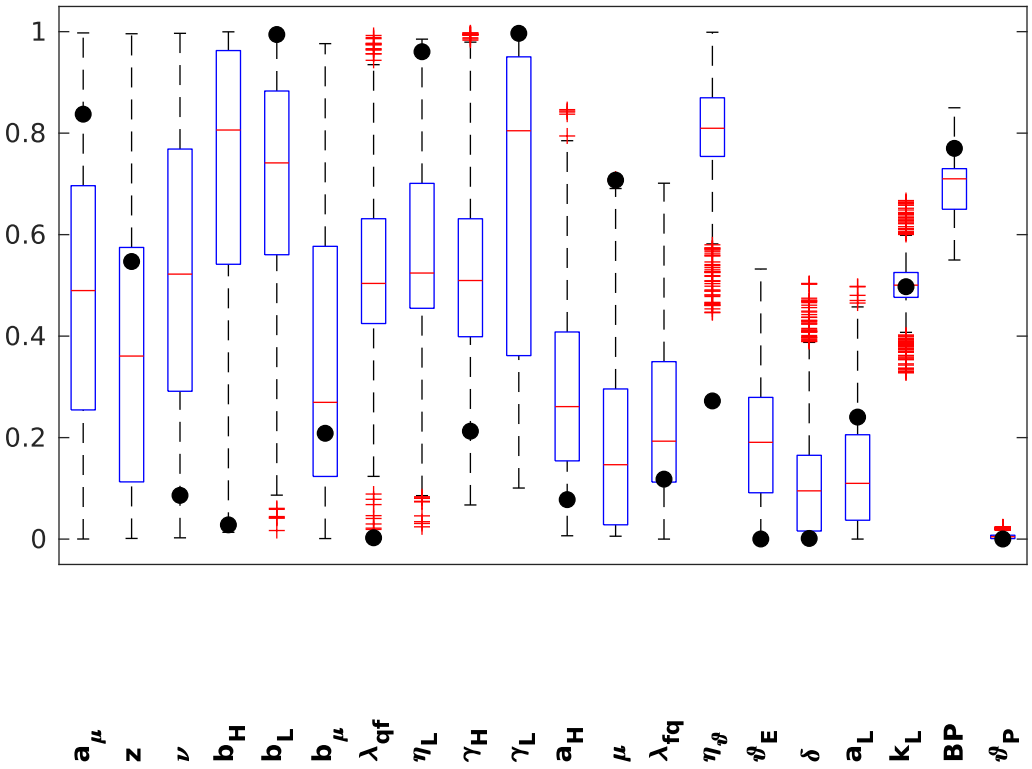
10.2. Estimated parameters with their intervals

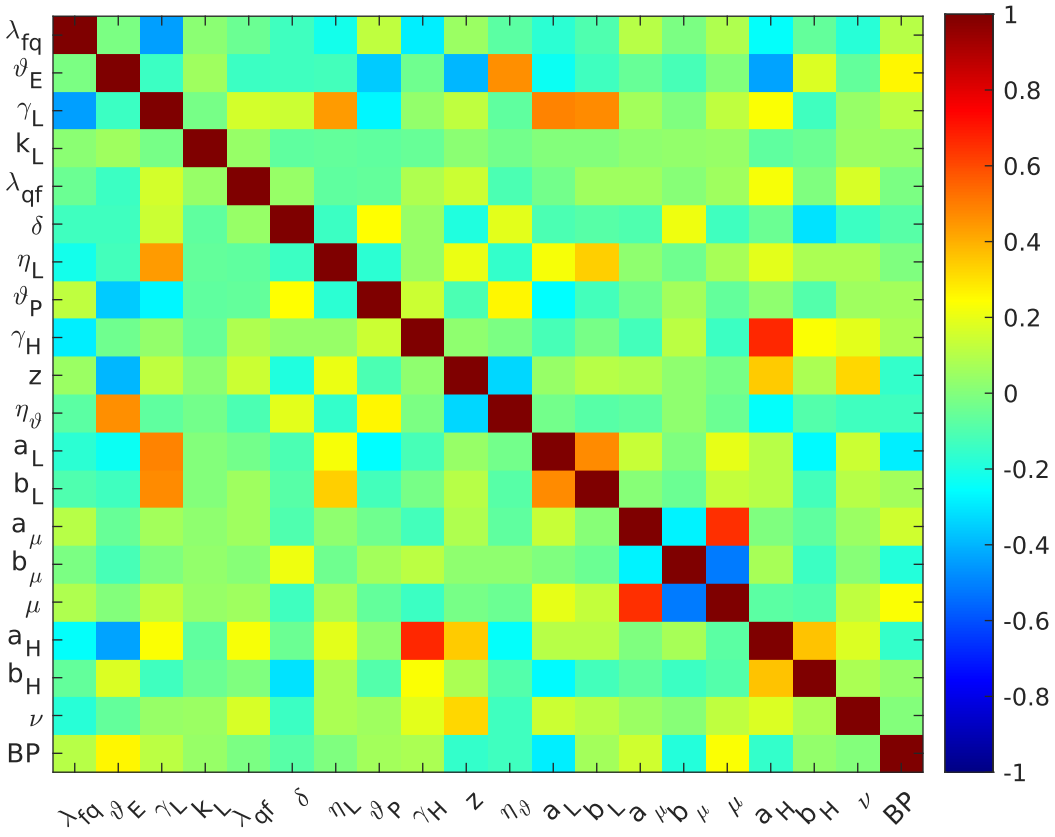
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

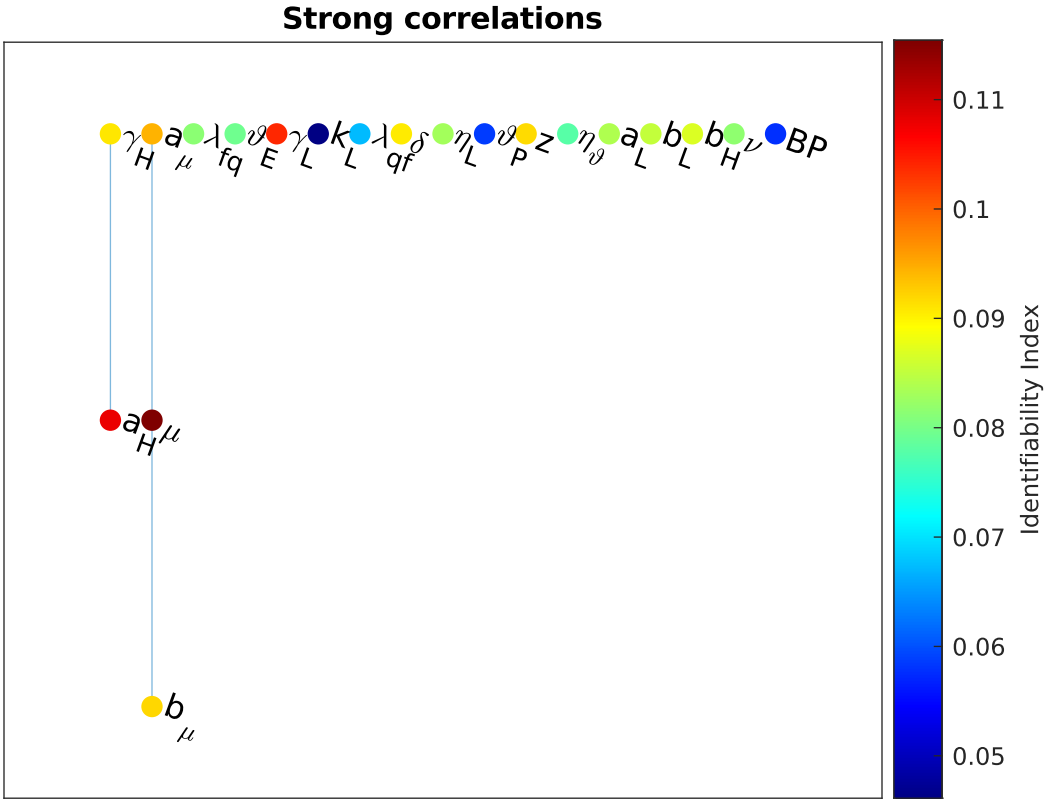
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.062'	'0.9625'	'0.193'	'0.1181'	'0.0816'
\vartheta_E	'0'	'0.0004'	'0.1907'	'0.0002'	'0.0796'
\gamma_L	'0.6406'	'1'	'0.8047'	'0.9967'	'0.1039'
k_L	'1'	'10'	'5.5039'	'5.4763'	'0.0461'
\lambda_{qf}	'0.0001'	'0.0056'	'0.5039'	'0.0026'	'0.0673'
\delta	'0'	'0.0004'	'0.0143'	'0.0002'	'0.0907'
\eta_L	'0'	'1'	'0.5243'	'0.9604'	'0.083'
\vartheta_P	'0.0001'	'0.0009'	'0.0047'	'0.0001'	'0.0587'
\gamma_H	'0.1057'	'0.2905'	'0.5096'	'0.2127'	'0.0909'
z	'0'	'30'	'10.8212'	'16.4105'	'0.0917'
\eta_\vartheta	'0.2267'	'0.3375'	'0.8096'	'0.2723'	'0.078'
a_L	'3.2406'	'4.4647'	'2.5379'	'4.3663'	'0.0839'
b_L	'10.2049'	'15'	'11.3791'	'14.9209'	'0.0852'
a_\mu	'8.5707'	'15'	'7.8566'	'12.7232'	'0.0944'
b_\mu	'1'	'5.4943'	'4.7728'	'3.9193'	'0.0921'
\mu	'0.019'	'0.95'	'0.1466'	'0.7074'	'0.1154'
a_H	'1.0499'	'3.4932'	'4.6553'	'2.0886'	'0.1079'
b_H	'1.2465'	'10.8582'	'12.2861'	'1.393'	'0.0869'
\nu	'21.2503'	'396.26'	'261.0966'	'43.1021'	'0.0818'
BP	'422.3679'	'425.6604'	'419.5'	'422.5'	'0.0579'

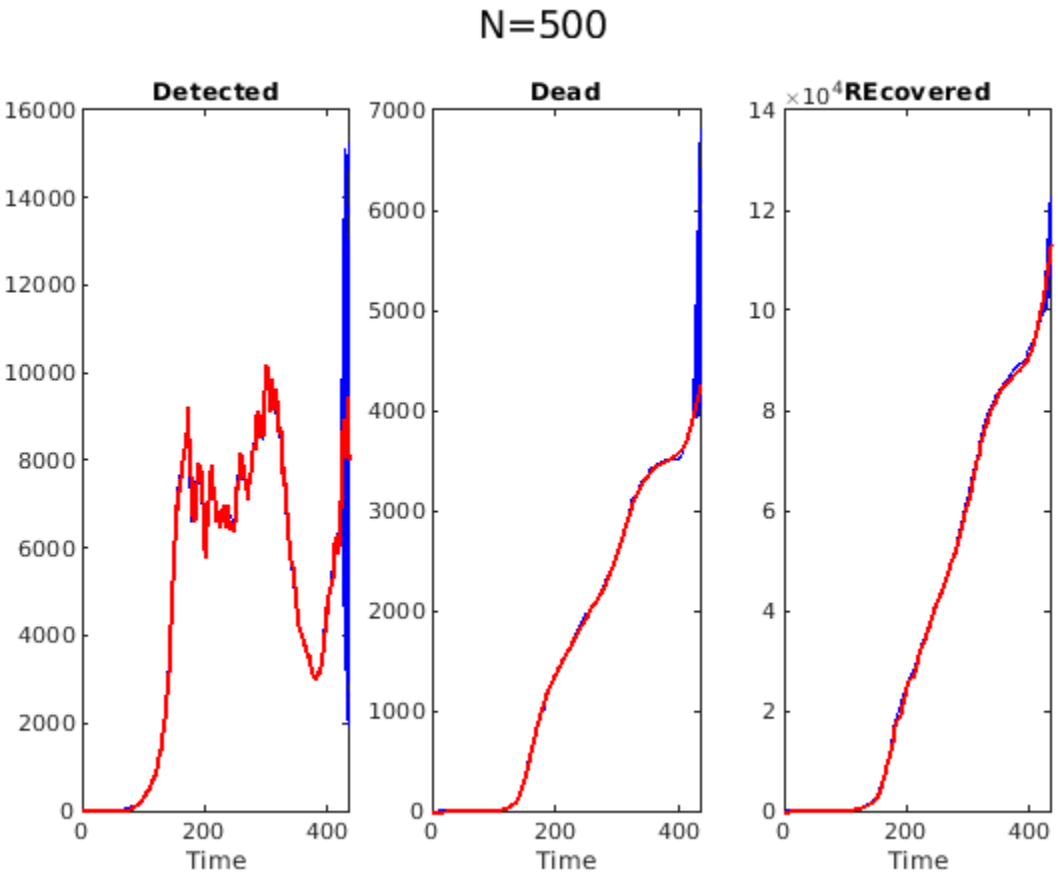
10.3. Identifiability analisys




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
0.11
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 data434 to the 456. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was2000.

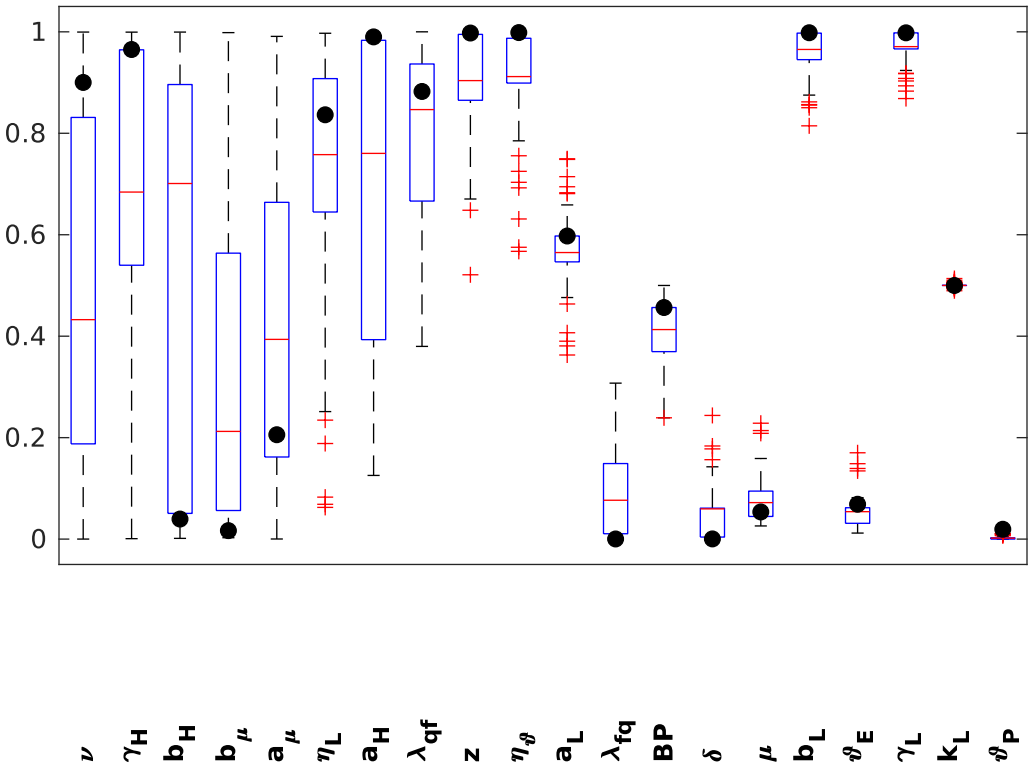
11.2. Estimated parameters with their intervals

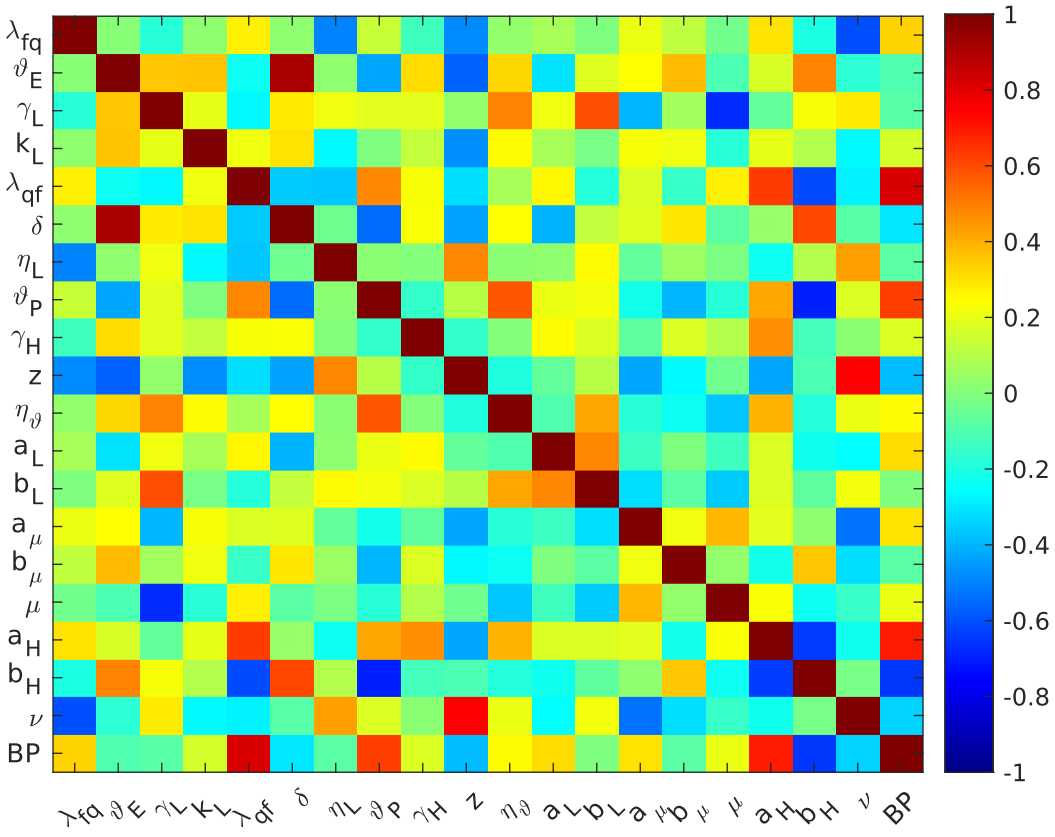
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

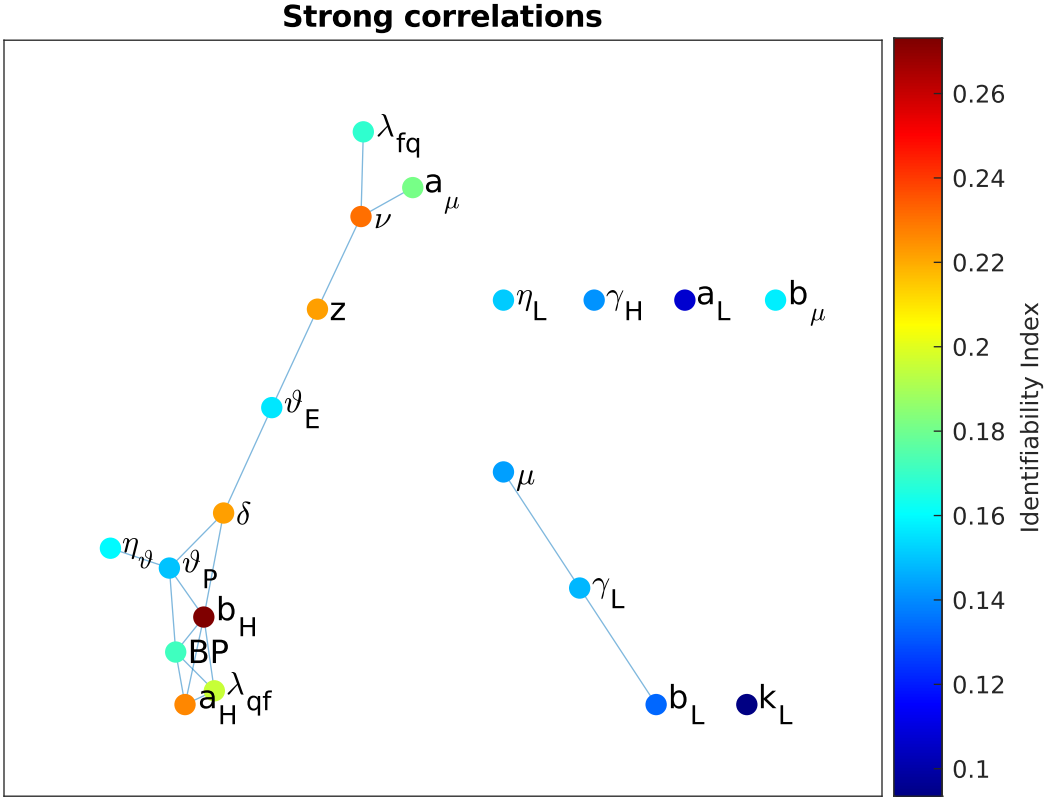
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0006'	'0.0787'	'0.0003'	'0.1687'
\vartheta_E	'0.048'	'0.1122'	'0.0554'	'0.0687'	'0.1562'
\gamma_L	'0.3104'	'1'	'0.9704'	'0.998'	'0.1479'
k_L	'1'	'10'	'5.5006'	'5.4994'	'0.0935'
\lambda_{qf}	'0.5661'	'0.935'	'0.8467'	'0.8824'	'0.1954'
\delta	'0'	'0.0001'	'0.0092'	'0.0001'	'0.2225'
\eta_L	'0.2264'	'1'	'0.7554'	'0.8365'	'0.1511'
\vartheta_P	'0.0104'	'0.0195'	'0.0025'	'0.0194'	'0.1499'
\gamma_H	'0.02'	'1'	'0.6841'	'0.9651'	'0.1414'
z	'12.781'	'30'	'27.0694'	'29.9287'	'0.2224'
\eta_\vartheta	'0.8503'	'1'	'0.9114'	'0.9985'	'0.16'
a_L	'6.6514'	'9.5194'	'8.8903'	'9.3648'	'0.1073'
b_L	'9.1928'	'15'	'14.4582'	'14.9748'	'0.1335'
a_\mu	'1'	'15'	'6.5118'	'3.8805'	'0.1819'
b_\mu	'1'	'15'	'3.9723'	'1.2335'	'0.1576'
\mu	'0'	'0.1144'	'0.072'	'0.0535'	'0.1434'
a_H	'3.66'	'15'	'11.645'	'14.8602'	'0.2264'
b_H	'1'	'13.6'	'10.8137'	'1.5534'	'0.2731'
\nu	'366.3539'	'487.7266'	'216.2993'	'450.1122'	'0.2307'
BP	'430.9503'	'433.5458'	'432.5'	'433.5'	'0.1718'

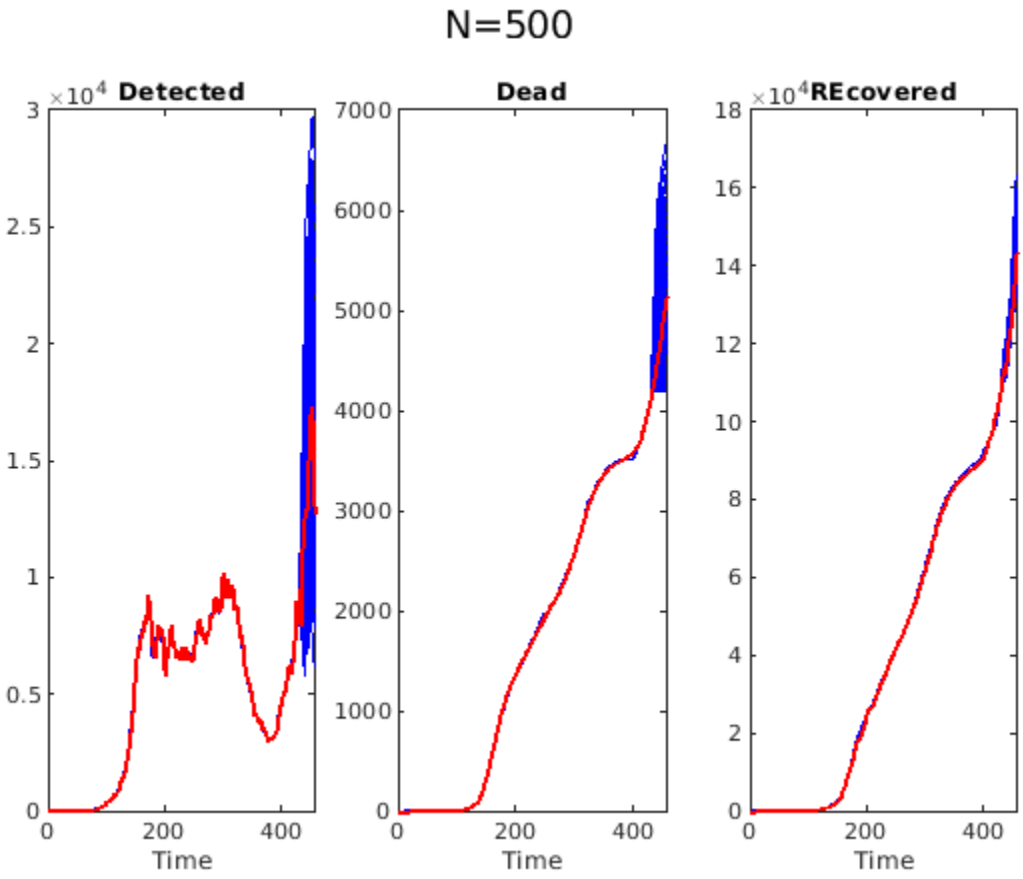
11.3. Identifiability analisys




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
λ_{fq}
a_{μ}
ν
z
ϑ_E
δ
η_{ϑ}
ϑ_P
b_H
BP
a_H
λ_{qf}
η_L
γ_H
a_L
b_{μ}
μ
γ_L
b_L
k_L
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
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 data456 to the 468. The status of the validation is: COMPLETED.

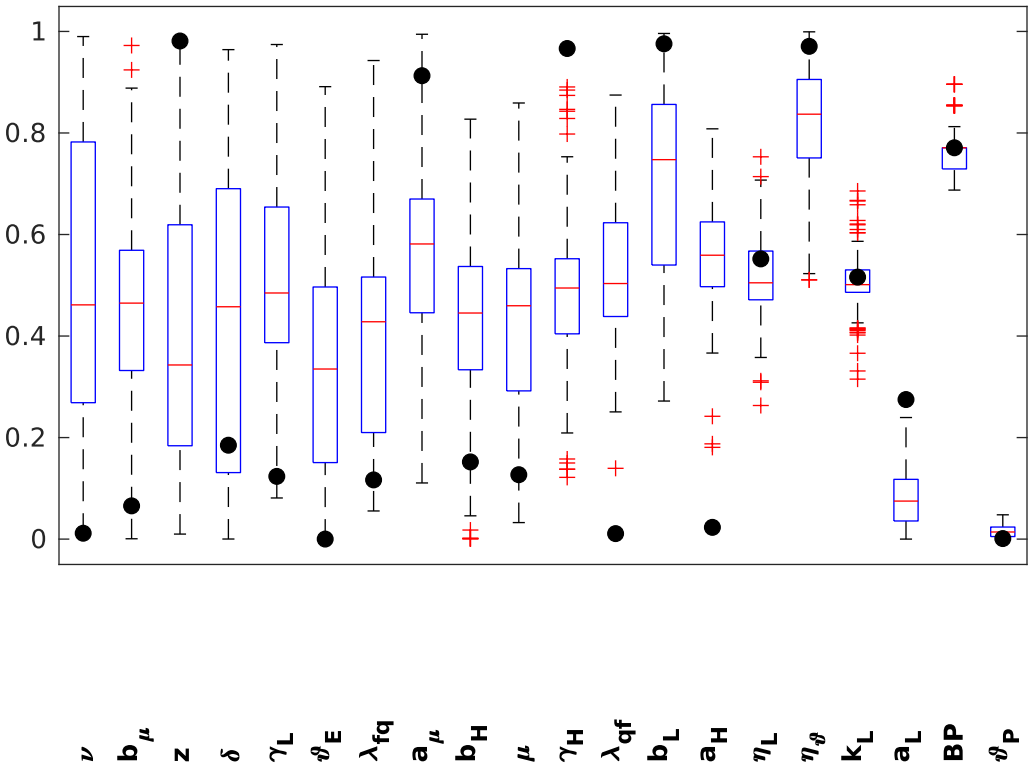
The number of estimations needed to perform the validation was1000.

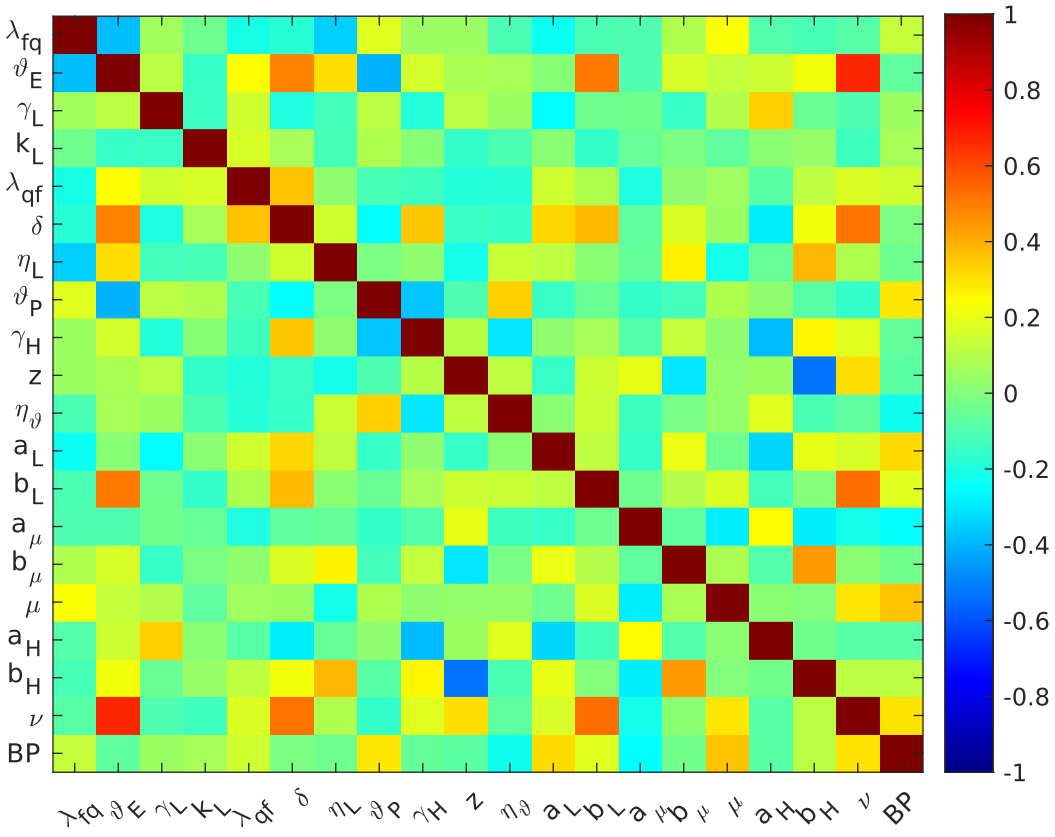
12.2. Estimated parameters with their intervals

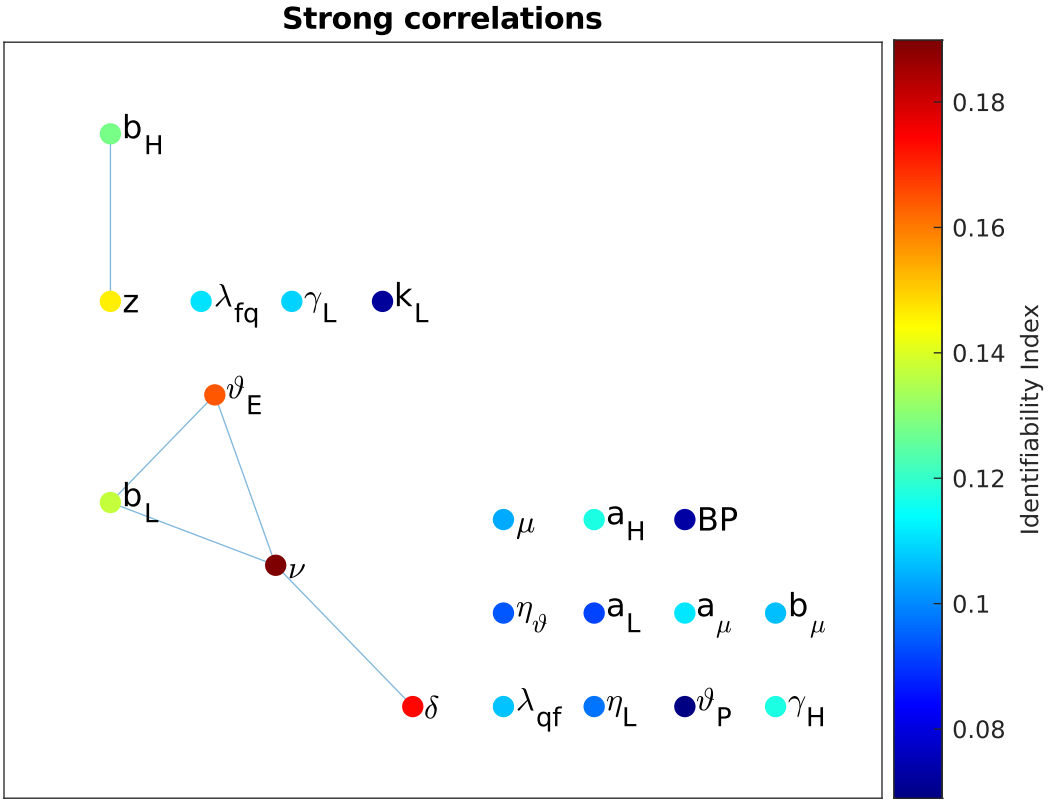
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.3768'	'0.4794'	'0.4281'	'0.1166'	'0.1108'
\vartheta_E	'0.2759'	'0.3942'	'0.335'	'0.0001'	'0.1643'
\gamma_L	'0.4304'	'0.5392'	'0.4848'	'0.1236'	'0.1087'
k_L	'5.2703'	'5.752'	'5.5112'	'5.6444'	'0.072'
\lambda_{qf}	'0.4567'	'0.5502'	'0.5034'	'0.0108'	'0.1068'
\delta	'0.0564'	'0.0809'	'0.0687'	'0.0277'	'0.1735'
\eta_L	'0.4664'	'0.5434'	'0.5049'	'0.552'	'0.0974'
\vartheta_P	'0.0082'	'0.0198'	'0.014'	'0.0011'	'0.069'
\gamma_H	'0.4387'	'0.5505'	'0.4946'	'0.9664'	'0.1176'
z	'8.1651'	'12.4156'	'10.2904'	'29.4359'	'0.1462'
\eta_\vartheta	'0.7981'	'0.8749'	'0.8365'	'0.9706'	'0.0943'
a_L	'1.6381'	'2.4671'	'2.0526'	'4.8487'	'0.0917'
b_L	'10.7573'	'12.1711'	'11.4642'	'14.6592'	'0.1373'
a_\mu	'8.4021'	'9.8763'	'9.1392'	'13.7794'	'0.1114'
b_\mu	'6.8032'	'8.2126'	'7.5079'	'1.9168'	'0.1065'
\mu	'0.4092'	'0.5102'	'0.4597'	'0.1269'	'0.1043'
a_H	'7.9995'	'9.6581'	'8.8288'	'1.3242'	'0.1174'
b_H	'6.5472'	'7.9226'	'7.2349'	'3.1289'	'0.1283'
\nu	'193.2481'	'268.1559'	'230.702'	'5.7833'	'0.1899'
BP	'452.1907'	'452.8093'	'452.5'	'452.5'	'0.073'

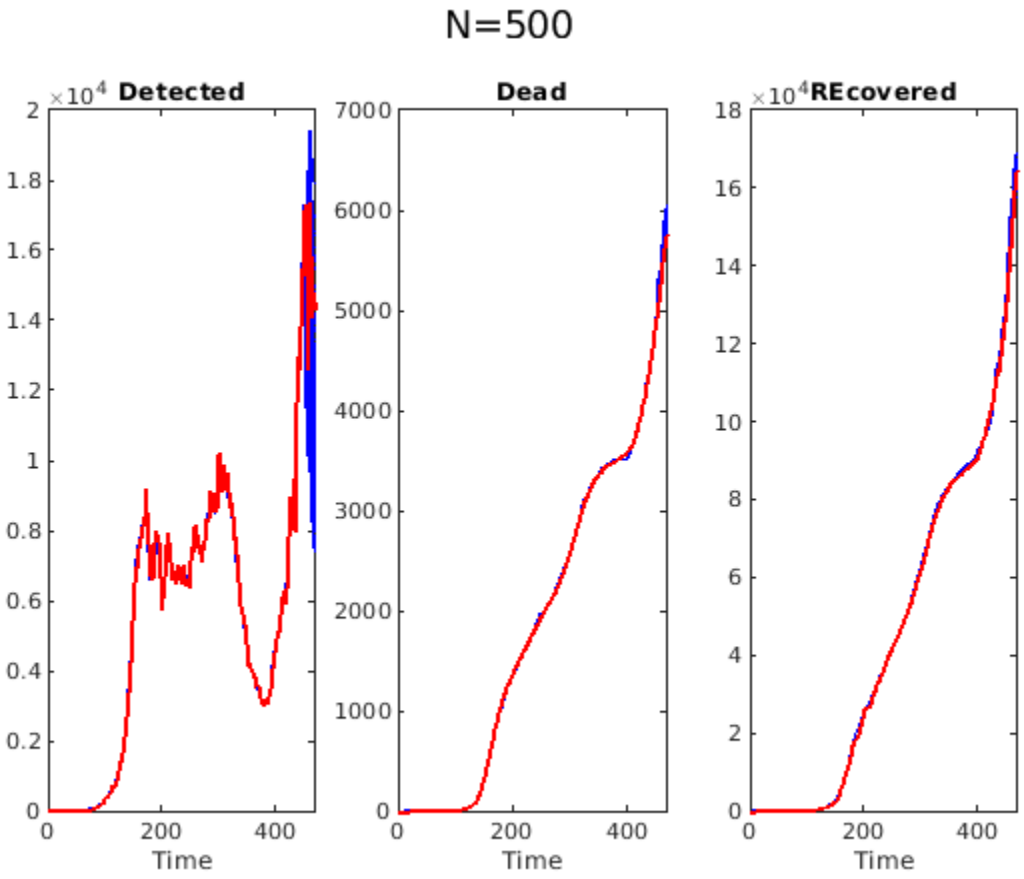
12.3. Identifiability analisys




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
b H
z
λ fq
γ L
k L
ϑ E
b L
ν
δ
μ
a H
BP
η ϑ
a L
a μ
b μ
λ qf
η L
ϑ P
γ H
0.18
0.16
0.14
0.12
0.1
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 data468 to the 484. The status of the validation is: COMPLETED.

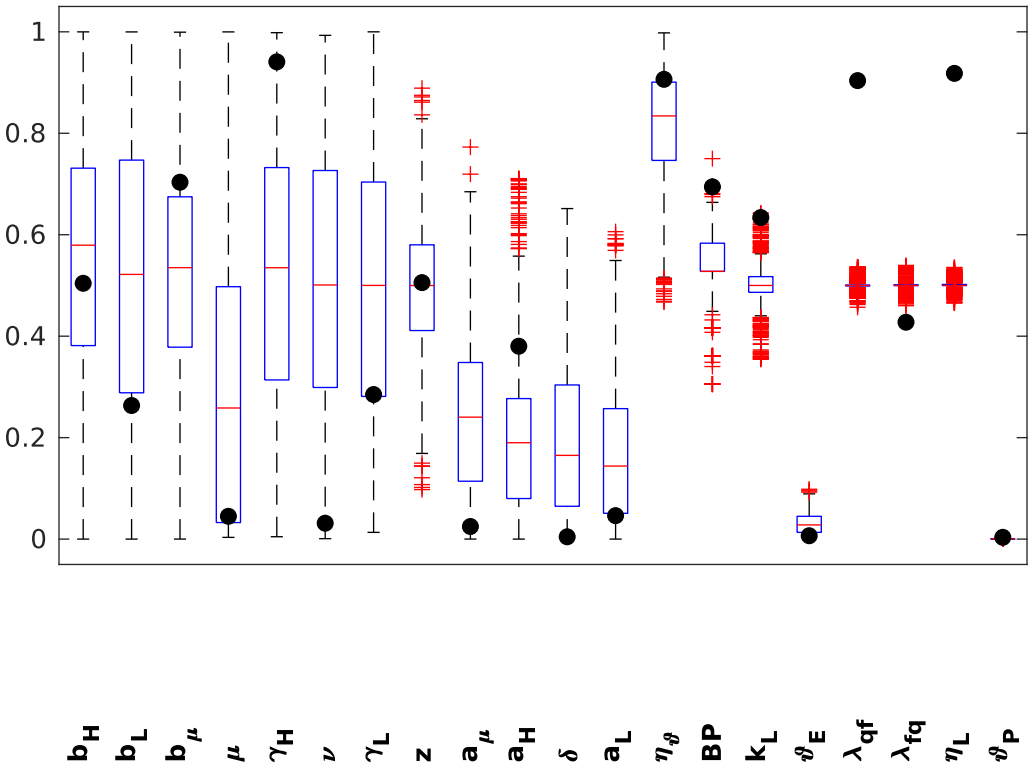
The number of estimations needed to perform the validation was1000.

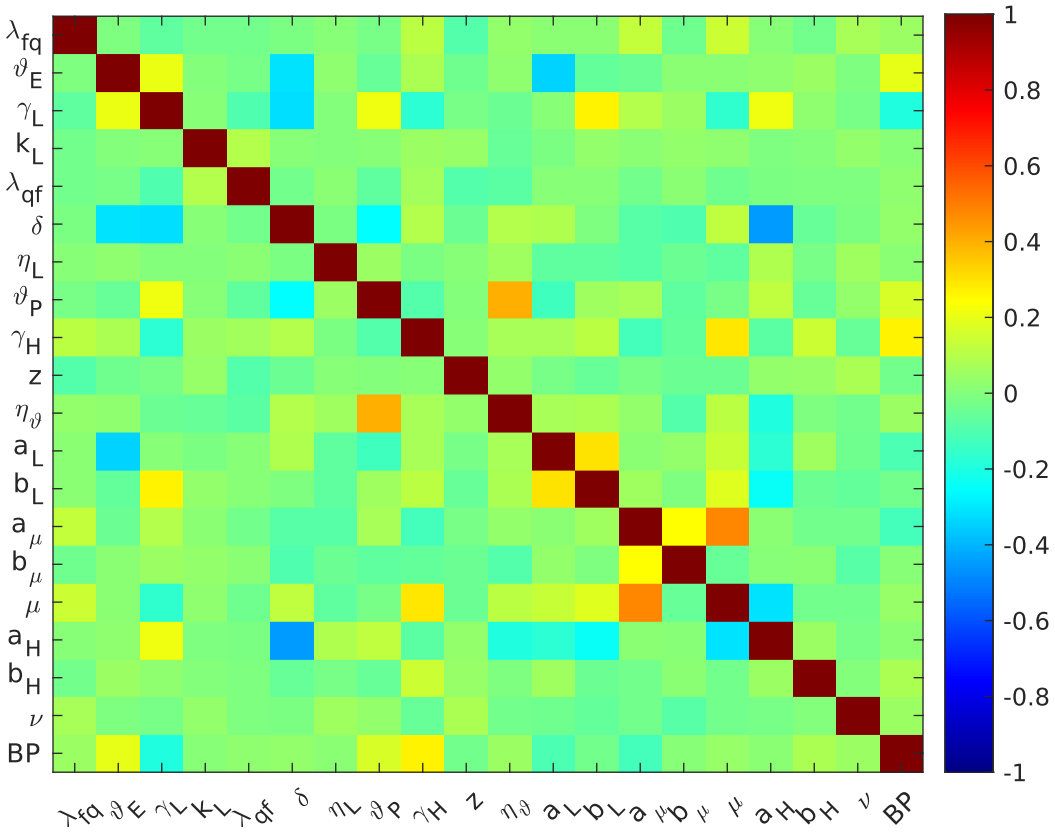
13.2. Estimated parameters with their intervals

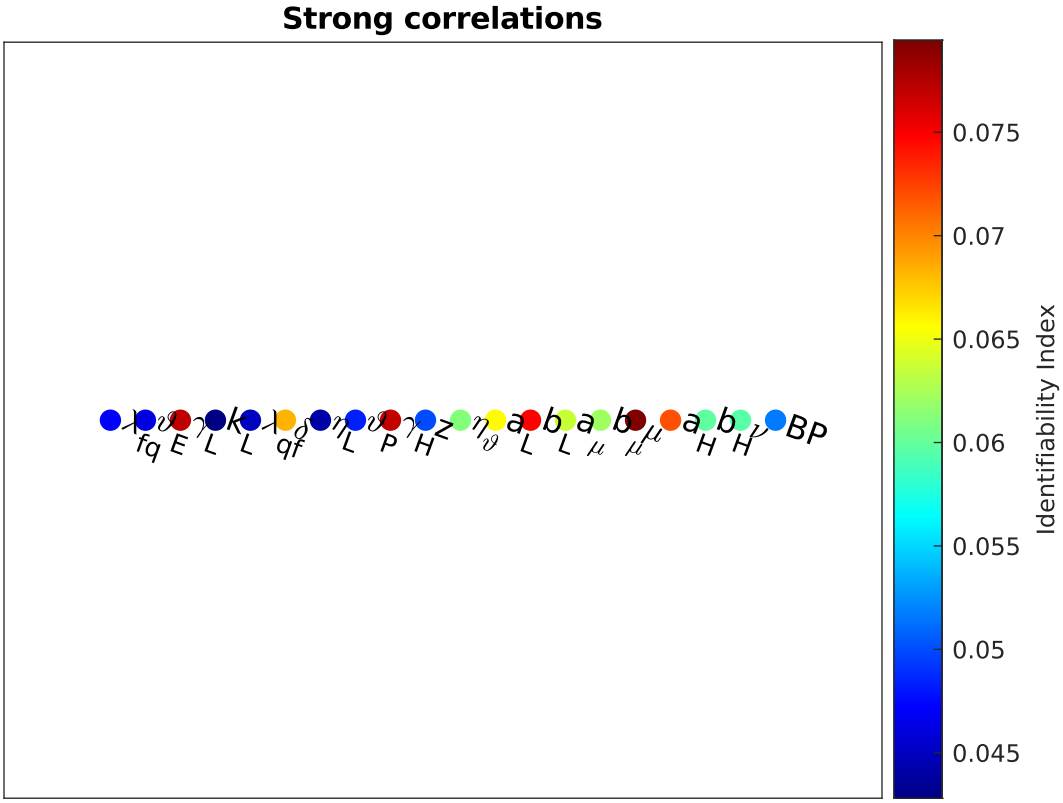
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4892'	'0.5108'	'0.5'	'0.4276'	'0.0474'
\vartheta_E	'0.0258'	'0.0302'	'0.028'	'0.0066'	'0.0463'
\gamma_L	'0.4754'	'0.5248'	'0.5001'	'0.285'	'0.0771'
k_L	'5.3957'	'5.6045'	'5.5001'	'6.7053'	'0.0428'
\lambda_{qf}	'0.4889'	'0.5111'	'0.5'	'0.9038'	'0.0451'
\delta	'0.0223'	'0.0273'	'0.0248'	'0.0007'	'0.0683'
\eta_L	'0.4899'	'0.5103'	'0.5001'	'0.9181'	'0.0441'
\vartheta_P	'0.0001'	'0.0004'	'0.0003'	'0.0035'	'0.0485'
\gamma_H	'0.5074'	'0.5624'	'0.5349'	'0.9408'	'0.077'
z	'14.5271'	'15.4673'	'14.9972'	'15.1682'	'0.05'
\eta_\vartheta	'0.8175'	'0.8509'	'0.8342'	'0.9064'	'0.0612'
a_L	'2.747'	'3.2929'	'3.0199'	'1.647'	'0.0658'
b_L	'7.9003'	'8.7094'	'8.3048'	'4.6872'	'0.0747'
a_\mu	'4.1269'	'4.6091'	'4.368'	'1.3476'	'0.0637'
b_\mu	'8.1486'	'8.8342'	'8.4914'	'10.8495'	'0.0622'
\mu	'0.2328'	'0.2841'	'0.2584'	'0.045'	'0.0795'
a_H	'3.3644'	'3.9551'	'3.6597'	'6.3229'	'0.072'
b_H	'8.7495'	'9.4725'	'9.111'	'8.0598'	'0.0598'
\nu	'237.5412'	'263.4262'	'250.4837'	'15.6723'	'0.0596'
BP	'465.3574'	'465.6426'	'465.5'	'468.5'	'0.0518'

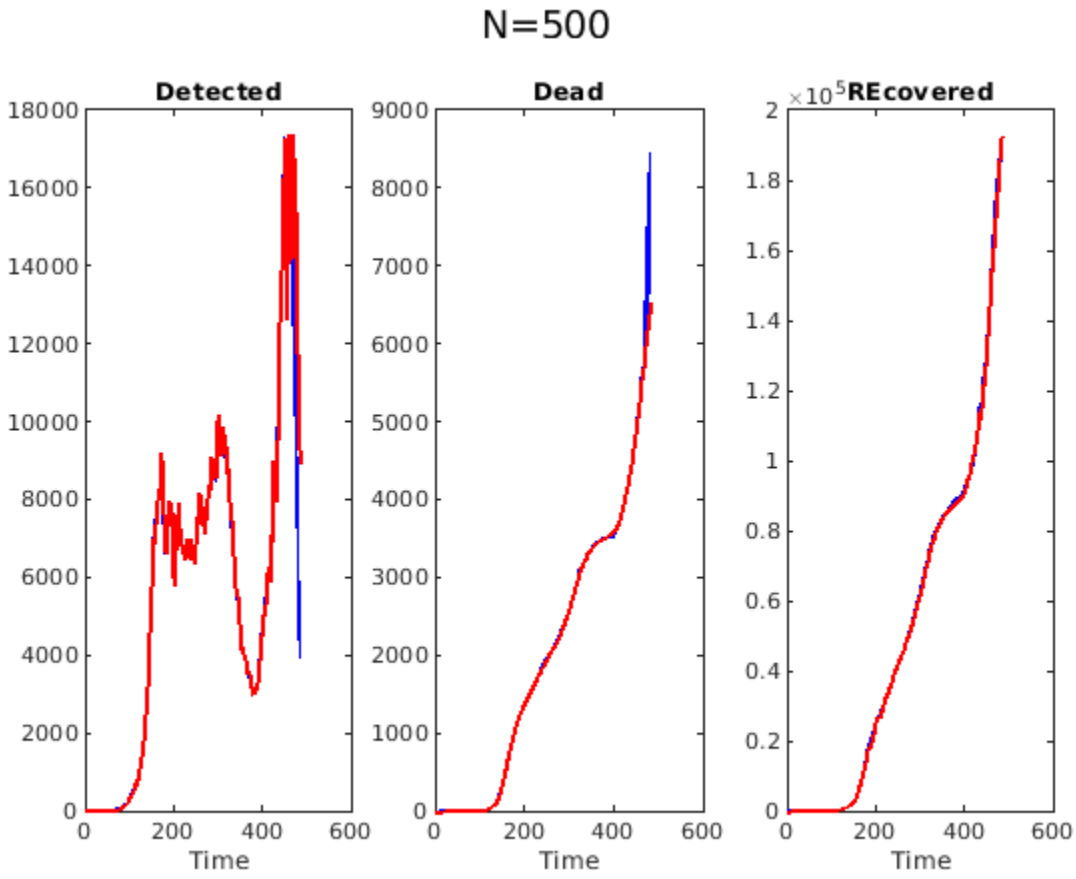
13.3. Identifiability analisys




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
0.075
0.07
0.065
0.06
0.055
0.05
0.045
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 data484 to the 735. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

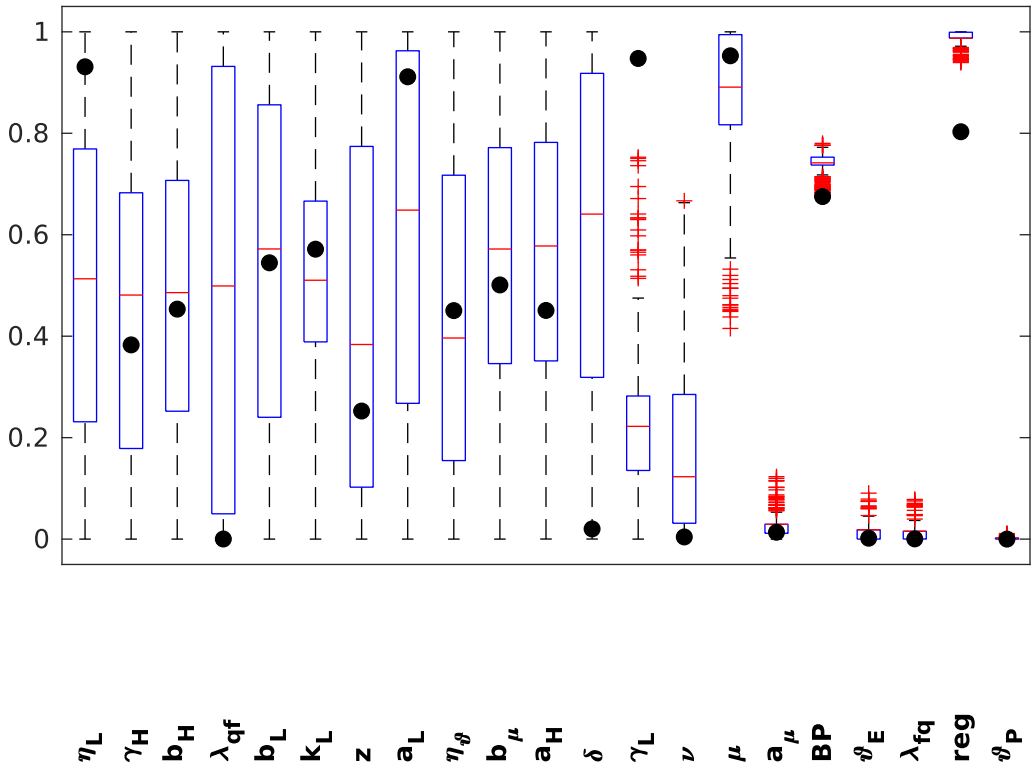
14.2. Estimated parameters with their intervals

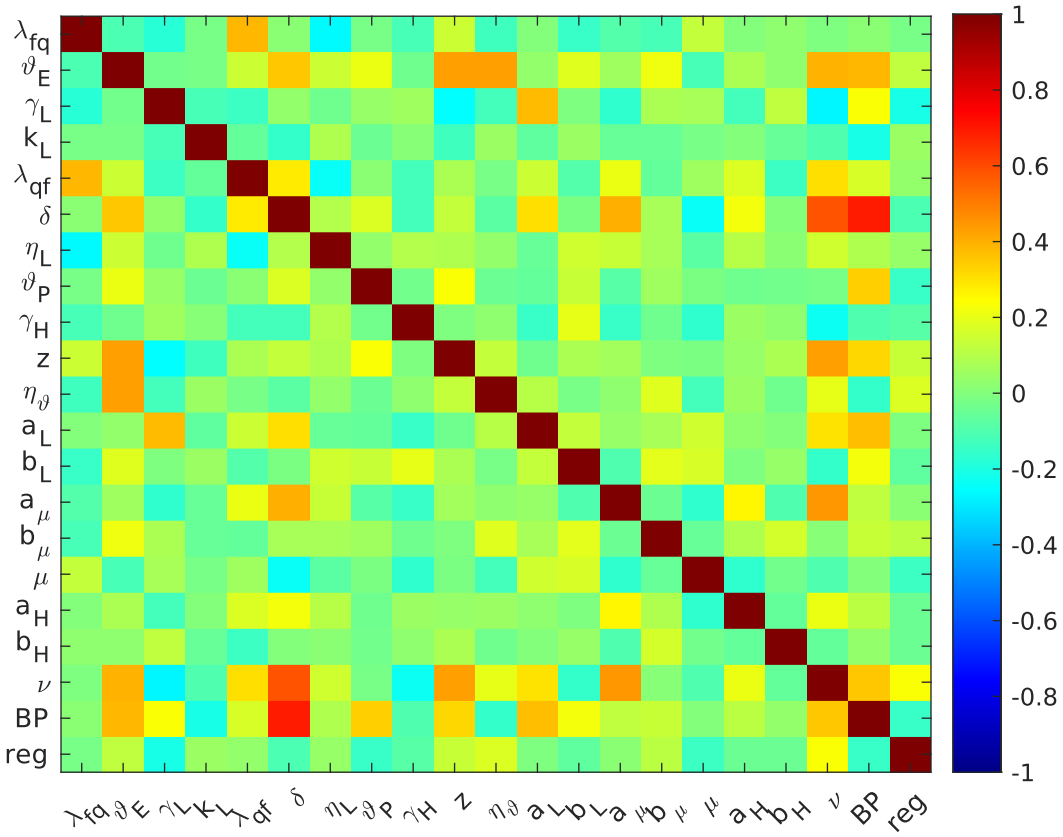
It was necessary to fix 0 parameters of 11 that could be fixed to complete validation.

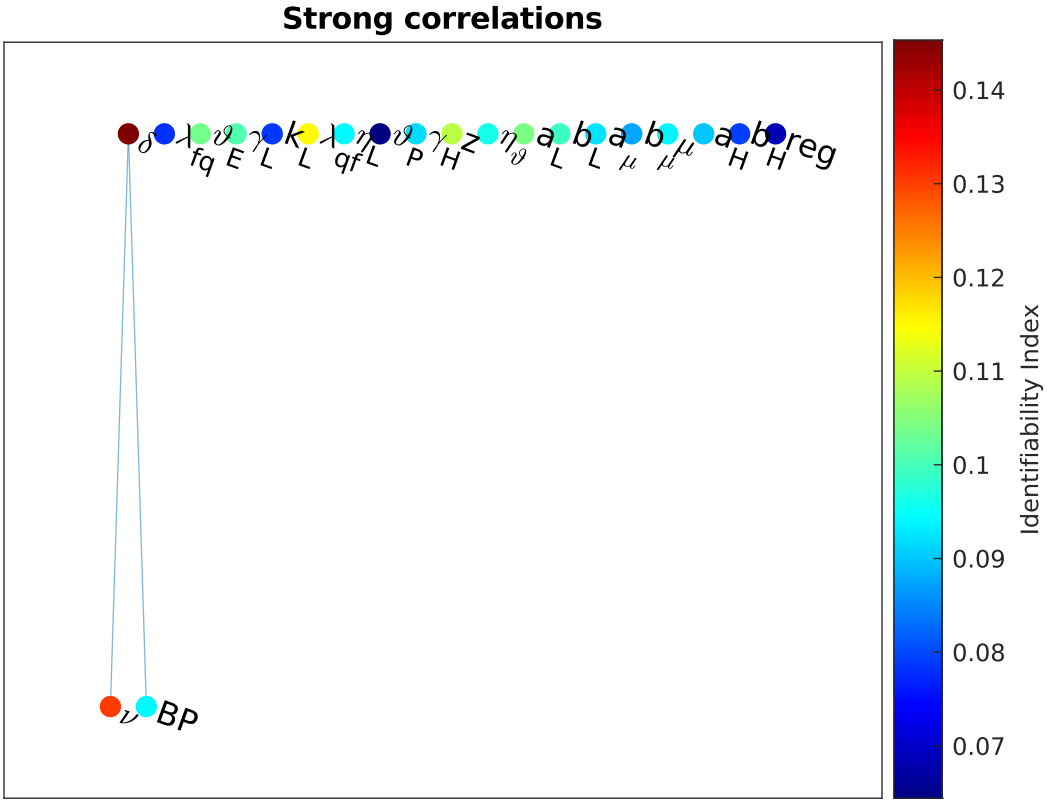
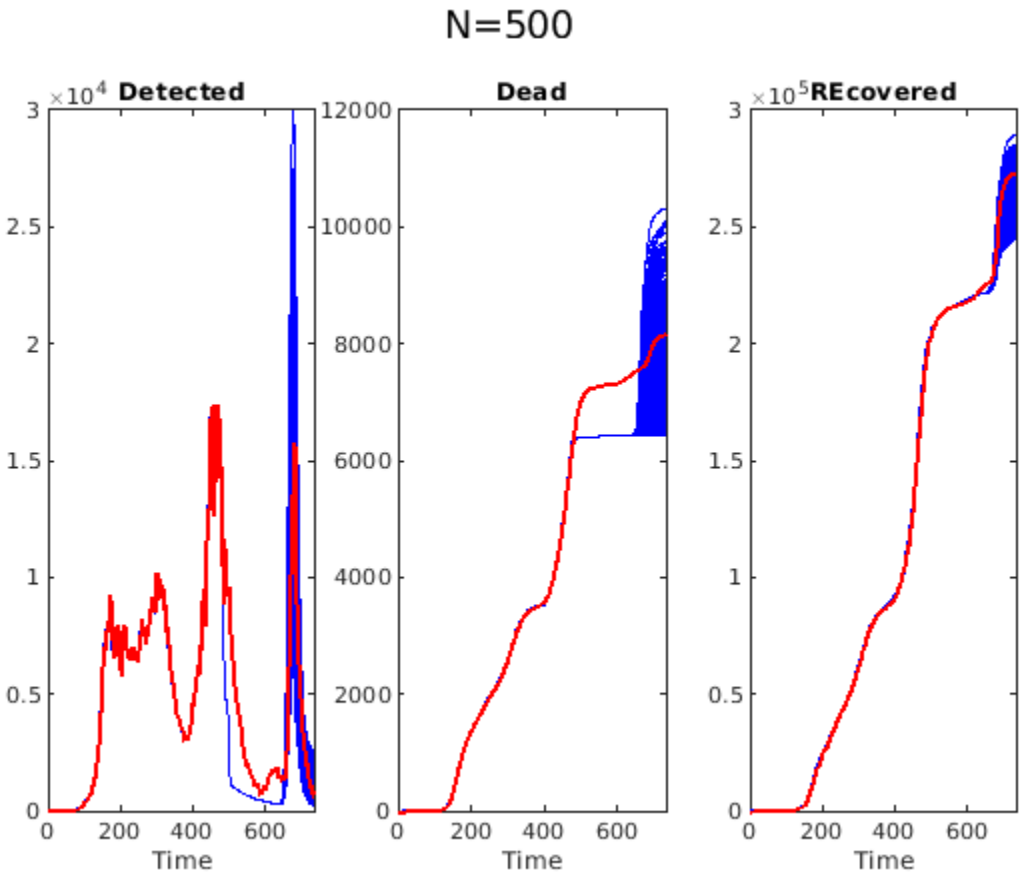
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0009'	'0.0154'	'0.0004'	'0.0782'
\vartheta_E	'0'	'0.004'	'0.0183'	'0.0018'	'0.1038'
\gamma_L	'0.4146'	'1'	'0.2223'	'0.9475'	'0.1008'
k_L	'1'	'10'	'5.5925'	'6.1437'	'0.0787'
\lambda_{qf}	'0'	'0.0004'	'0.499'	'0.0002'	'0.1151'
\delta	'0'	'0.0064'	'0.0961'	'0.003'	'0.1453'
\eta_L	'0.1814'	'0.9543'	'0.5132'	'0.9311'	'0.0944'
\vartheta_P	'0'	'0'	'0.002'	'0'	'0.0644'
\gamma_H	'0'	'0.8614'	'0.4811'	'0.3829'	'0.0917'
z	'7.5142'	'15.2825'	'11.509'	'7.5735'	'0.1094'
\eta_\vartheta	'0.4313'	'0.4616'	'0.3964'	'0.4504'	'0.0963'
a_L	'11.4878'	'14.1306'	'10.0797'	'13.7591'	'0.1043'
b_L	'7.583'	'10.8101'	'9.0075'	'8.6253'	'0.0992'
a_\mu	'1'	'12.592'	'1.4081'	'1.1891'	'0.0922'
b_\mu	'1'	'13.635'	'9.0061'	'8.0147'	'0.0877'
\mu	'0.136'	'1'	'0.891'	'0.9528'	'0.0939'
a_H	'1'	'13.6'	'9.0895'	'7.3108'	'0.0901'
b_H	'1'	'15'	'7.8025'	'7.3468'	'0.0795'
\nu	'1.1848'	'3.5062'	'61.4708'	'2.1076'	'0.1302'
BP	'641.5214'	'644.836'	'658.629'	'641.5395'	'0.0943'
reg	'0.1443'	'0.2167'	'0.2469'	'0.2008'	'0.0687'

14.3. Identifiability analisys




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


Strong correlations
Identifiability Index
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
reg

14.4. Uncertainty analisys