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Starting this task with conclusion about best model made at the end of previous one:

Conclusion: According to the output from models I think that SARAR best explains variables. Both p-value of independent variable and Rho tell that x is significant and deals decent amount of causation. LR tells that included lagged value may improve the model which goes in line with what we see in SDEM model.

Also considering 3 AIC criteria:
1) 1210.2
2) 1214.2
3) 1215.3

AIC also tells that SARAR model is best.

Building models and getting effects from them

Models without spatial autoregression:

SLX

```
> summary(impacts.SLX)
Impact measures (SLX, estimable, n-k):
           Direct  Indirect     Total
Fertlty 0.3576193 0.1994501 0.5570694
========================================================
Standard errors:
            Direct  Indirect      Total
Fertlty 0.04604585 0.0932589 0.09827207
========================================================
Z-values:
          Direct Indirect    Total
Fertlty 7.766592 2.138671 5.668644

p-values:
        Direct     Indirect Total
Fertlty 7.9936e-15 0.032462 1.4393e-08
```

According to p-values all types of effect are significant, Indirect is the weakest one.

SDEM

```
> summary(impacts.SDEM)
Impact measures (SDEM, estimable, n):
           Direct  Indirect     Total
Fertlty 0.3605721 0.1822245 0.5427966
========================================================
Standard errors:
            Direct   Indirect     Total
Fertlty 0.04562031 0.09548063 0.1042948
========================================================
Z-values:
          Direct Indirect    Total
Fertlty 7.903763 1.908497 5.204444

p-values:
        Direct     Indirect Total
Fertlty 2.6645e-15 0.056327 1.9458e-07
```

Here, we can see that indirect effect is not significant on the 95% confidence interval, its coefficient proves it (0.1822245). Other effects are significant.

Models with spatial autoregression:

SAR

```
> summary(impacts.SAR)
Impact measures (mixed, exact):
           Direct  Indirect     Total
Fertlty 0.3602297 0.2060744 0.5663042
```

In this model Direct effect is stronger than Indirect one.

Confidence intervals:

```
> HPDinterval.lagImpact(impacts.SAR, prob = 0.95, choice = "direct")
           lower     upper
Fertlty 0.2685365 0.4571671
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SAR, prob = 0.95, choice = "indirect")
              lower     upper
Fertlty -0.04158221 0.4020545
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SAR, prob = 0.95, choice = "total")
           lower     upper
Fertlty 0.3099374 0.8084075
attr(,"Probability")
[1] 0.95
```

SARAR

```
> summary(impacts.SARAR)
Impact measures (sac, exact):
          Direct  Indirect     Total
Fertlty 0.334166 0.4422408 0.7764068
```

Here it’s vice versa. Indirect effect stronger than Direct one.

Confidence intervals:

```
> HPDinterval.lagImpact(impacts.SARAR, prob = 0.95, choice = "direct")
          lower     upper
Fertlty 0.263511 0.4145646
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SARAR, prob = 0.95, choice = "indirect")
           lower    upper
Fertlty 0.2038406 1.072637
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SARAR, prob = 0.95, choice = "total")
           lower    upper
Fertlty 0.4801264 1.371981
attr(,"Probability")
[1] 0.95
```

SDM

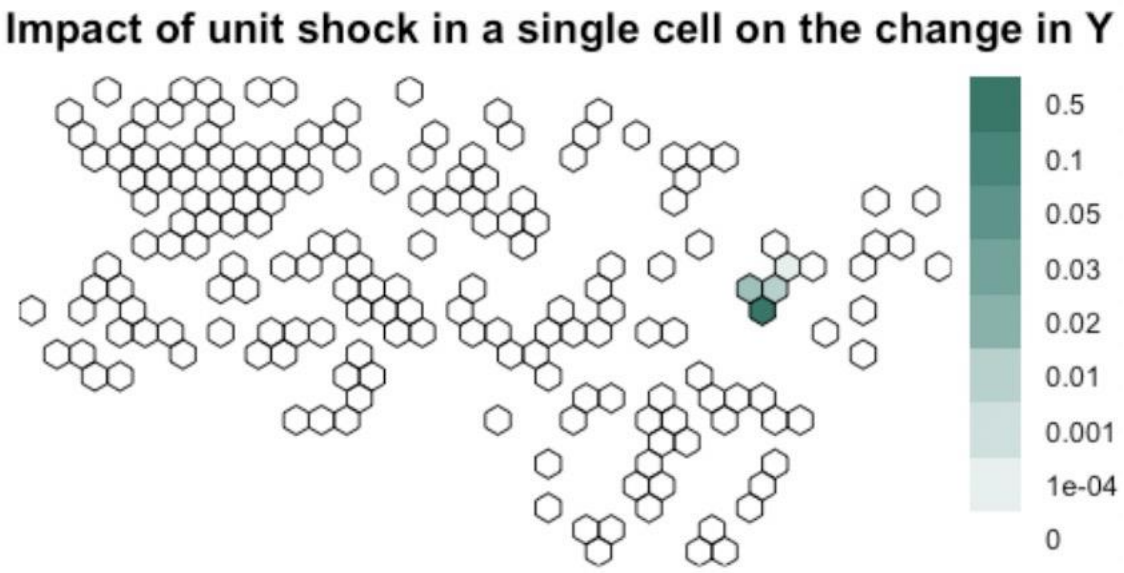
```
> summary(impacts.SDM)
Impact measures (mixed, exact):
           Direct  Indirect     Total
Fertlty 0.3602297 0.2060744 0.5663042
```

The same situation as in SAR model. Direct stronger than Indirect one.

Confidence intervals:

```
> HPDinterval.lagImpact(impacts.SDM, prob = 0.95, choice = "direct")
            lower     upper
Fertlty 0.2615493 0.4444244
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SDM, prob = 0.95, choice = "indirect")
             lower     upper
Fertlty 0.01776167 0.4502715
attr(,"Probability")
[1] 0.95
> HPDinterval.lagImpact(impacts.SDM, prob = 0.95, choice = "total")
            lower     upper
Fertlty 0.2889408 0.7589415
attr(,"Probability")
[1] 0.95
```

In all models except SDEM and SDM Indirect effect is significant so we can conclude that on average it is significant.


Impact of unit shock in a single cell on the change in Y
0.5
0.1
0.05
0.03
0.02
0.01
0.001
1e-04
0