Table 2 - Borrowing Stock

2022-03-16

Load the **borrowing stock** model variables

**borrowing stock**: This is the basic bechmarking model utilizing brm() default, uninformed priors

borrowing\_stock\_bayesmodel <-  
 brm(formula = borrowingstock\_asinh | weights(samp\_wgt) ~  
 cost\_deviation + treat\_any + treat\_GK +  
 borrowingstock\_asinh\_R1 + Lhh\_wealth\_asinh + Lvill\_eligible\_ratio +  
 (1 | block) + (1 | vid),  
 data = borrowing\_stock\_data,  
 family = gaussian("identity"),  
 seed = 1272022,  
 warmup = 1000,  
 iter = 2000,  
 thin = 1,  
 control = list(adapt\_delta = .95, max\_treedepth = 10),  
 #backend = "cmdstanr",  
 cores = 4, #overrides default 1 core  
 #threads = 3,need to get cmdstanr package working here  
 save\_pars = save\_pars(all = TRUE), # potentially allows for more post-processing functionality  
 file = "uninformed\_prior\_outcomes\\borrowing\_stock\_bayes")

Model Summery

summary(borrowing\_stock\_bayesmodel)

## Family: gaussian   
## Links: mu = identity; sigma = identity   
## Formula: borrowingstock\_asinh | weights(samp\_wgt) ~ cost\_deviation + treat\_any + treat\_GK + borrowingstock\_asinh\_R1 + Lhh\_wealth\_asinh + Lvill\_eligible\_ratio + (1 | block) + (1 | vid)   
## Data: borrowing\_stock\_data (Number of observations: 1751)   
## Draws: 4 chains, each with iter = 2000; warmup = 1000; thin = 1;  
## total post-warmup draws = 4000  
##   
## Group-Level Effects:   
## ~block (Number of levels: 22)   
## Estimate Est.Error l-95% CI u-95% CI Rhat Bulk\_ESS Tail\_ESS  
## sd(Intercept) 0.92 0.20 0.58 1.35 1.00 1098 1813  
##   
## ~vid (Number of levels: 248)   
## Estimate Est.Error l-95% CI u-95% CI Rhat Bulk\_ESS Tail\_ESS  
## sd(Intercept) 1.20 0.11 1.00 1.42 1.00 1646 2806  
##   
## Population-Level Effects:   
## Estimate Est.Error l-95% CI u-95% CI Rhat Bulk\_ESS  
## Intercept 6.14 0.44 5.26 7.00 1.00 1777  
## cost\_deviation 0.00 0.00 -0.00 0.00 1.00 2412  
## treat\_any -0.75 0.29 -1.31 -0.17 1.00 1624  
## treat\_GK 0.68 0.29 0.10 1.23 1.00 1627  
## borrowingstock\_asinh\_R1 0.23 0.02 0.20 0.26 1.00 4712  
## Lhh\_wealth\_asinh -0.00 0.02 -0.04 0.04 1.00 4345  
## Lvill\_eligible\_ratio -0.46 1.13 -2.77 1.66 1.00 1366  
## Tail\_ESS  
## Intercept 2578  
## cost\_deviation 2828  
## treat\_any 2199  
## treat\_GK 2233  
## borrowingstock\_asinh\_R1 3247  
## Lhh\_wealth\_asinh 2949  
## Lvill\_eligible\_ratio 2219  
##   
## Family Specific Parameters:   
## Estimate Est.Error l-95% CI u-95% CI Rhat Bulk\_ESS Tail\_ESS  
## sigma 4.48 0.05 4.39 4.58 1.00 4709 2996  
##   
## Draws were sampled using sampling(NUTS). For each parameter, Bulk\_ESS  
## and Tail\_ESS are effective sample size measures, and Rhat is the potential  
## scale reduction factor on split chains (at convergence, Rhat = 1).

Prior summery - how informative are priors

prior\_summary(borrowing\_stock\_bayesmodel)

## prior class coef group resp dpar nlpar  
## (flat) b   
## (flat) b borrowingstock\_asinh\_R1   
## (flat) b cost\_deviation   
## (flat) b Lhh\_wealth\_asinh   
## (flat) b Lvill\_eligible\_ratio   
## (flat) b treat\_any   
## (flat) b treat\_GK   
## student\_t(3, 9.2, 2.9) Intercept   
## student\_t(3, 0, 2.9) sd   
## student\_t(3, 0, 2.9) sd block   
## student\_t(3, 0, 2.9) sd Intercept block   
## student\_t(3, 0, 2.9) sd vid   
## student\_t(3, 0, 2.9) sd Intercept vid   
## student\_t(3, 0, 2.9) sigma   
## bound source  
## default  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## default  
## default  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## (vectorized)  
## default

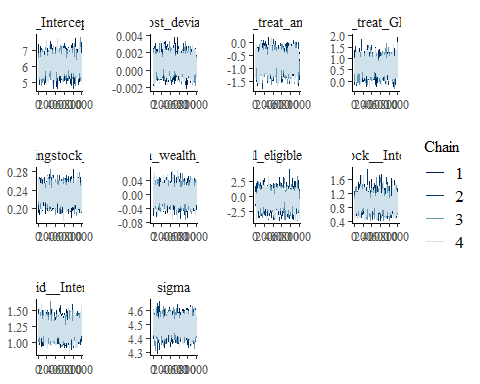
check\_prior(borrowing\_stock\_bayesmodel)

## Warning: Some priors could not be simulated.

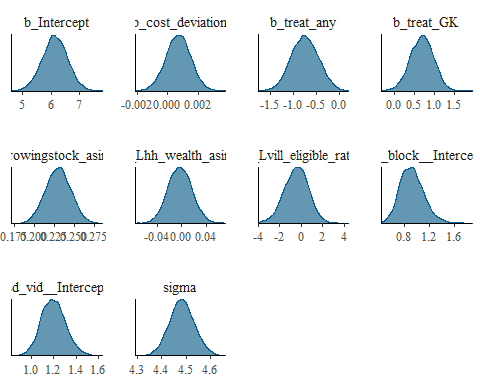
## Parameter Prior\_Quality  
## 1 b\_Intercept uninformative  
## 2 b\_cost\_deviation not determinable  
## 3 b\_treat\_any not determinable  
## 4 b\_treat\_GK not determinable  
## 5 b\_borrowingstock\_asinh\_R1 not determinable  
## 6 b\_Lhh\_wealth\_asinh not determinable  
## 7 b\_Lvill\_eligible\_ratio not determinable

Diagnostics

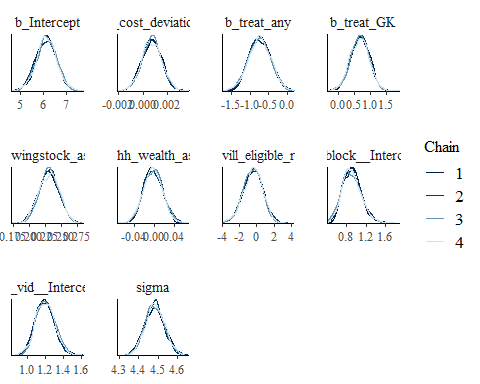
# trace diagnostic plot  
mcmc\_trace(borrowing\_stock\_bayesmodel, n\_warmup = 0,  
 pars = c("b\_Intercept", "b\_cost\_deviation", "b\_treat\_any", "b\_treat\_GK",  
 "b\_borrowingstock\_asinh\_R1", "b\_Lhh\_wealth\_asinh", "b\_Lvill\_eligible\_ratio",  
 "sd\_block\_\_Intercept", "sd\_vid\_\_Intercept", "sigma"))



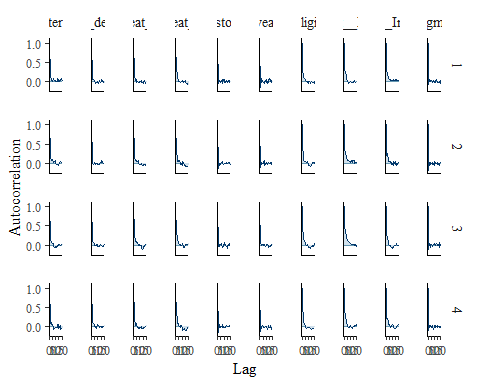
ggsave("table\_2\_diagnostics\\borrowing\_stock\_trace.png", plot = last\_plot(), width = 12, height = 5)  
  
#density diagnostic plots  
mcmc\_dens(borrowing\_stock\_bayesmodel,  
 pars = c("b\_Intercept", "b\_cost\_deviation", "b\_treat\_any", "b\_treat\_GK",  
 "b\_borrowingstock\_asinh\_R1", "b\_Lhh\_wealth\_asinh", "b\_Lvill\_eligible\_ratio",  
 "sd\_block\_\_Intercept", "sd\_vid\_\_Intercept", "sigma"))



ggsave("table\_2\_diagnostics\\borrowing\_stock\_dens.png", plot = last\_plot(), width = 12, height = 5)  
  
mcmc\_dens\_overlay(borrowing\_stock\_bayesmodel,  
 pars = c("b\_Intercept", "b\_cost\_deviation", "b\_treat\_any", "b\_treat\_GK",  
 "b\_borrowingstock\_asinh\_R1", "b\_Lhh\_wealth\_asinh", "b\_Lvill\_eligible\_ratio",  
 "sd\_block\_\_Intercept", "sd\_vid\_\_Intercept", "sigma"))



ggsave("table\_2\_diagnostics\\borrowing\_stock\_dens\_overlay.png", plot = last\_plot(), width = 12, height = 5)  
  
#acf (auto-correlation) diagnostic plot  
mcmc\_acf(borrowing\_stock\_bayesmodel,  
 pars = c("b\_Intercept", "b\_cost\_deviation", "b\_treat\_any", "b\_treat\_GK",  
 "b\_borrowingstock\_asinh\_R1", "b\_Lhh\_wealth\_asinh", "b\_Lvill\_eligible\_ratio",  
 "sd\_block\_\_Intercept", "sd\_vid\_\_Intercept", "sigma"))

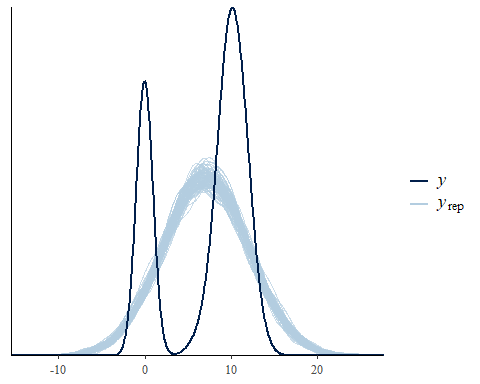


ggsave("table\_2\_diagnostics\\borrowing\_stock\_acf.png", plot = last\_plot(), width = 12, height = 5)

posterior predictive checks

pp\_check(borrowing\_stock\_bayesmodel, nsamples = 100)

## Warning: Argument 'nsamples' is deprecated. Please use argument 'ndraws'  
## instead.



pp\_check(borrowing\_stock\_bayesmodel, nsamples = 10, type = 'error\_scatter\_avg', alpha = .1)

## Warning: Argument 'nsamples' is deprecated. Please use argument 'ndraws'  
## instead.

