Log. Det. Exploration

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Context

- The problem was that for many scenarios the algorithm failed at the very first iteration.
- Exploration of the log-likelihood for those cases showed that the issue was $log|\Sigma| = \infty$
- Further exploration showed that this was aggravated along with sample size

Idea

- Calculate $log|\Sigma|$ for many scenarios of $\sigma_1^2, \sigma_2^2, a, \rho$ where the initial step is true value itself.
- Do this calculation with increasing sample size 2~3 times with different seeds, in case we're missing numerical problems.
- Save the output to disk for "good" practice

In R

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- For any number of seeds (replication) loop over the grid and sample size vector with the `fit_biwm` code for estimation.[1]

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- For any number of seeds (replication) loop over the grid and sample size vector with the `fit_biwm` code for estimation.[1]
- Hope your advisor doesn't call you dumb

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Results - Old Code

Table 1: Experimentation with Old Code. Pct out of 8000 grid values

	V2	V3	V4
20	40.54	39.86	42.60
25	0.00	0.00	0.00
33	0.00	0.00	0.00
40	0.00	0.00	0.00
43	0.00	0.00	0.00
55	0.00	0.00	0.00
63	0.00	0.00	0.00
70	0.00	0.00	0.00
78	0.00	0.00	0.00
85	0.00	0.00	0.00
93	0.00	0.00	0.00
110	0.29	0.29	0.32
120	1.19	0.85	1.61
130	4.35	3.16	3.30
140	7.45	6.40	7.45

Results - Old Code

Table 2: Experimentation with Old Code. Pct out of 8000 grid values

	V2	V3	V4
140	7.45	6.40	7.45
150	12.34	11.85	12.55
160	19.79	18.52	20.90
170	26.36	28.89	25.86
180	33.38	35.98	35.88
190	40.54	39.86	42.60
200	51.62	50.44	50.04
210	59.19	57.64	58.79
220	66.79	65.99	65.22
230	69.76	68.51	72.26
240	74.75	75.30	75.85
250	81.42	78.46	81.84
260	82.56	82.05	84.21
270	87.50	86.22	87.88
280	89.71	89.50	90.31
290	91.54	92.03	91.61
300	94.47	94.15	93.92

Results - Code With Block Matrix Implementations

Table 3: Experimentation with New Code. Pct out of 8000 grid values

Sample_size	1st_seed	2nd_seed
110	0	0
120	0	0
130	0	0
140	0	0
150	0	0
160	0	0
170	0	0
180	0	0
190	0	0
200	0	0
210	0	0
220	0	0
230	0	0
240	0	0
250	0	0
260	0	0
270	0	0
280	0	0
290	0	0
300	0	0