Recovery from Disasters

June 10, 2022

1. Vietnam: Arti has shared data for 2004-2016

I have talked to Reyes (the person from WB who worked with this data) and they promised to help me match 2015-2016 to 2004-2014. For now, 2015-2016 data doesn't have intelligible labels for the variables, and the firm IDs differ from 2004-2014. I will re-run regressions once I get 2015-2016 data labels and create a crosswalk for firm IDs.

There is still no VA and materials data before 2009, unfortunately.

2. India: data limitations

For 1985-2011 are 1.37M observations, among which 0.98M have spatial identifier. More importantly, in 2008-2011, there are only 2 regions as spatial identifiers. Rest (most) of the data has no spatial identifiers.

That's why I focus on the subset of 1985-2007. It has 1.15M observations, among which 0.97M have spatial identifier.

3. Jorda method: choosing lags for cyclones in Vietnam

There is some serial correlation even up to 20th lag. Stephanie is helping me with this right now, so I don't include new regressions on cyclones.

4. India, 1985-2007: cyclones regressions, default method

As before, the default method is the following regression:

$$100 * ln(y_{it}) = \sum_{l=0}^{5} \beta_l Storm_{i,t-l} + \alpha_i + \gamma_t + \varepsilon_{it}, \quad (1)$$

where y_{it} is an outcome of a firm i in year t. $Storm_{i,t-l}$ is a measure of storm aggregated at an ADM2 level, lagged 5 times. α_i is firm fixed effect, γ_t is year fixed effect. We cluster standard errors ε_{it} at the plant/firm and region-by-year level.

Jorda method is preferable here since there is serial correlation past 5th lag. We will add this later.

Table 1: India, cyclones, 1985-2007

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
Max Speed (m/s)	-0.0259	-0.0329	-0.0392	0.000823	-0.0447
	(0.0279)	(0.0319)	(0.0236)	(0.0143)	(0.0294)
Lag 1	0.0793**	0.0768*	0.0242	0.0638***	0.0918***
	(0.0280)	(0.0328)	(0.0192)	(0.0177)	(0.0261)
Lag 2	0.0266	0.0407	0.0258	0.0413**	0.0651*
	(0.0317)	(0.0328)	(0.0244)	(0.0134)	(0.0283)
Lag 3	0.0670*	0.0722*	0.0635**	0.0302*	0.0981***
	(0.0269)	(0.0301)	(0.0197)	(0.0136)	(0.0231)
Lag 4	0.0579*	0.0619*	0.0550**	0.0252	0.0835***
	(0.0236)	(0.0268)	(0.0180)	(0.0131)	(0.0203)
Lag 5	0.0267	0.0270	0.0125	0.0231	0.0348
	(0.0249)	(0.0276)	(0.0185)	(0.0133)	(0.0209)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.925	0.910	0.930	0.843	0.947

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: India, cyclones, 1985-2007

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
Max Speed (m/s)	0.0370	-0.0189	-0.0177	-0.00872
	(0.0396)	(0.0332)	(0.0355)	(0.0511)
Lag 1	0.0232	0.0679*	0.160***	0.0588
	(0.0347)	(0.0335)	(0.0386)	(0.0519)
Lag 2	-0.0199	0.0567	0.0764*	-0.00485
	(0.0337)	(0.0343)	(0.0352)	(0.0547)
Lag 3	-0.0156	0.0611	0.0991**	0.0344
	(0.0325)	(0.0319)	(0.0303)	(0.0506)
Lag 4	-0.0185	0.0645*	0.0251	0.0759
	(0.0290)	(0.0291)	(0.0253)	(0.0486)
Lag 5	-0.0605*	0.0367	0.0171	0.0165
	(0.0309)	(0.0300)	(0.0271)	(0.0467)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.942	0.906	0.940	0.837

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: India, cyclones, 1985-2007

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
N of Storms	-0.0698	0.0735	-1.106*	0.670	-0.635
	(0.739)	(0.820)	(0.555)	(0.402)	(0.692)
Lag 1	1.863*	1.982*	0.638	1.867***	2.487***
	(0.808)	(0.904)	(0.582)	(0.459)	(0.712)
Lag 2	0.345	0.954	0.765	1.584***	2.248**
	(0.833)	(0.883)	(0.606)	(0.365)	(0.705)
Lag 3	1.671*	1.925*	2.056***	0.789*	2.972***
	(0.761)	(0.846)	(0.563)	(0.389)	(0.651)
Lag 4	1.606*	1.693*	1.712***	0.517	2.325***
	(0.720)	(0.813)	(0.513)	(0.378)	(0.601)
Lag 5	0.0434	0.0781	0.383	0.197	0.540
	(0.683)	(0.766)	(0.488)	(0.357)	(0.584)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.925	0.910	0.930	0.843	0.947

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: India, cyclones, 1985-2007

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
N of Storms	1.250	0.280	0.660	0.458
	(0.971)	(0.854)	(0.905)	(1.367)
Lag 1	0.601	1.999*	3.703***	0.318
	(0.926)	(0.936)	(1.009)	(1.528)
Lag 2	0.305	1.138	1.746*	-1.443
	(0.972)	(0.925)	(0.885)	(1.461)
Lag 3	0.265	2.069*	2.157**	1.154
	(0.986)	(0.902)	(0.820)	(1.436)
Lag 4	-0.143	2.126*	0.429	2.106
	(0.863)	(0.874)	(0.725)	(1.400)
Lag 5	-1.424	0.493	-0.291	0.866
	(0.830)	(0.784)	(0.749)	(1.226)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.942	0.906	0.940	0.837

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5. India, 1985-2007: shaking regressions, default method

As before, the default method is the following regression:

$$100 * ln(y_{it}) = \sum_{l=0}^{5} \beta_l Shaking_{i,t-l} + \alpha_i + \gamma_t + \varepsilon_{it}, \tag{2}$$

where y_{it} is an outcome of a firm i in year t. $Shaking_{i,t-l}$ is a measure of shaking aggregated at an ADM2 level, lagged 5 times. α_i is firm fixed effect, γ_t is year fixed effect. We cluster standard errors ε_{it} at the plant/firm and region-by-year level.

Table 5: India, ground shaking, 1985-2007

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
MPGA (%g)	0.0223	0.0645	-0.00920	0.106*	0.104
	(0.125)	(0.132)	(0.0941)	(0.0520)	(0.107)
Lag 1	0.321***	0.262**	0.0686	0.218***	0.312***
	(0.0875)	(0.1000)	(0.0737)	(0.0522)	(0.0830)
Lag 2	0.263**	0.228*	0.0646	0.191***	0.252**
	(0.0832)	(0.0895)	(0.0705)	(0.0470)	(0.0811)
Lag 3	0.232**	0.228*	0.107	0.167***	0.299***
	(0.0853)	(0.0917)	(0.0675)	(0.0438)	(0.0780)
Lag 4	0.201*	0.190	0.0629	0.0147	0.0890
	(0.0998)	(0.113)	(0.0625)	(0.0468)	(0.0852)
Lag 5	0.211*	0.156	0.0803	0.0897*	0.181*
	(0.0975)	(0.102)	(0.0616)	(0.0412)	(0.0816)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.925	0.910	0.930	0.843	0.947

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: India, ground shaking, 1985-2007

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
MPGA (%g)	0.140	-0.0560	0.338**	0.0173
	(0.0894)	(0.128)	(0.108)	(0.239)
Lag 1	0.184	0.291**	0.329**	0.118
	(0.114)	(0.101)	(0.103)	(0.201)
Lag 2	0.0358	0.190	0.283**	0.229
	(0.0949)	(0.0996)	(0.107)	(0.197)
Lag 3	-0.0311	0.0920	0.115	0.335
	(0.0920)	(0.119)	(0.0820)	(0.175)
Lag 4	-0.103	0.0264	-0.0740	0.419*
	(0.0861)	(0.145)	(0.0867)	(0.184)
Lag 5	-0.0924	0.244*	0.0113	0.140
	(0.0861)	(0.117)	(0.0874)	(0.168)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.942	0.906	0.940	0.837

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: India, ground shaking, 1985-2007

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
N of EQs	0.235	-0.607	-2.001**	0.636	-1.306
	(1.261)	(1.186)	(0.756)	(0.348)	(0.808)
Lag 1	0.624	-0.0302	-1.357	1.233**	0.263
	(0.825)	(0.867)	(0.710)	(0.452)	(0.640)
Lag 2	0.402	0.182	-1.957**	1.082*	-1.016
	(0.931)	(0.963)	(0.663)	(0.456)	(0.681)
Lag 3	1.117	0.919	-0.373	0.647	0.585
	(0.933)	(0.947)	(0.652)	(0.483)	(0.655)
Lag 4	-0.110	-0.425	-0.948	-0.452	-1.369
	(1.235)	(1.393)	(0.515)	(0.488)	(0.703)
Lag 5	0.337	0.0505	-0.530	0.421	0.00590
	(1.121)	(1.240)	(0.415)	(0.390)	(0.558)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.925	0.910	0.930	0.843	0.947

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: India, ground shaking, 1985-2007

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
N of EQs	0.823	-1.354	0.944	-7.100**
	(1.073)	(1.422)	(0.907)	(2.579)
Lag 1	3.251***	0.534	-0.139	-5.296**
	(0.915)	(1.095)	(0.944)	(1.740)
Lag 2	2.003*	-0.617	-0.489	-3.580
	(0.784)	(1.151)	(0.959)	(2.083)
Lag 3	0.943	-0.835	-0.0950	-1.060
	(0.891)	(1.404)	(0.885)	(2.055)
Lag 4	0.366	-2.438	-1.187	-1.787
	(0.823)	(1.581)	(1.158)	(1.515)
Lag 5	0.775	0.164	0.247	-0.697
	(0.647)	(1.310)	(0.963)	(1.286)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.942	0.906	0.940	0.837

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6. India, shaking regressions, 1985-2007: Jorda method

(An alternative empirical strategy is to use method by Jorda (2005). If independent variable is not serially autocorrelated, the method is identical to running separate regression for each lag. Below, I present tables for number of storms as a covariate.) Since shaking in India doesn't have autocorrelation, we receive estimates fro Jorda from the following set of independent regressions for $l = 0, ...5$:

$$100 * ln(y_{it}) = \beta_l Shaking_{i,t-l} + \alpha_i + \gamma_t + \varepsilon_{it}, \tag{3}$$

where y_{it} is an outcome of a firm i in year t. $Shaking_{i,t-l}$ is a measure of ground shaking aggregated at an ADM2 level, lagged 5 times. α_i is plant/firm fixed effect, γ_t is year fixed effect. We cluster standard errors ε_{it} at the plant/firm and region-by-year level.

Table 9: India, ground shaking, 1985-2007, Jorda method (p.1)

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
MPGA (%g)	-0.0894	-0.0366	-0.0426	0.0454	0.00392
	(0.114)	(0.122)	(0.0887)	(0.0481)	(0.0996)
Lag 1	0.198**	0.152	0.0277	0.148**	0.194**
	(0.0761)	(0.0882)	(0.0638)	(0.0475)	(0.0713)
Lag 2	0.147*	0.124	0.0288	0.122**	0.139*
	(0.0681)	(0.0720)	(0.0595)	(0.0399)	(0.0689)
Lag 3	0.122	0.132	0.0791	0.0949*	0.194**
	(0.0686)	(0.0731)	(0.0577)	(0.0378)	(0.0653)
Lag 4	0.0892	0.0902	0.0318	-0.0684	-0.0314
	(0.0847)	(0.0967)	(0.0513)	(0.0410)	(0.0715)
Lag 5	0.0986	0.0571	0.0490	0.0267	0.0810
	(0.0852)	(0.0879)	(0.0538)	(0.0382)	(0.0729)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

All the results are from local projections, following Jorda (2005).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: India, ground shaking, 1985-2007, Jorda method (p.2)

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
MPGA (%g)	0.137	-0.115	0.275**	-0.118
	(0.0744)	(0.119)	(0.102)	(0.226)
Lag 1	0.198*	0.216*	0.257**	-0.0262
	(0.0923)	(0.0892)	(0.0918)	(0.177)
Lag 2	0.0239	0.118	0.202*	0.110
	(0.0737)	(0.0767)	(0.0923)	(0.170)
Lag 3	-0.0585	0.0135	0.00611	0.246
	(0.0729)	(0.0989)	(0.0676)	(0.147)
Lag 4	-0.132*	-0.0583	-0.197**	0.337*
	(0.0672)	(0.134)	(0.0718)	(0.167)
Lag 5	-0.107	0.173	-0.0607	0.0269
	(0.0755)	(0.107)	(0.0860)	(0.148)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

All the results are from local projections, following Jorda (2005).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: India, ground shaking, 1985-2007, Jorda method (p.1)

	(1) 100Log(Output)	(2) 100Log(Sales)	(3) 100Log(L)	(4) 100Log(Avg Wage)	(5) 100Log(L Cost)
N of EQs	-0.00411	-0.660	-1.375	0.326	-1.057
	(1.003)	(0.988)	(0.780)	(0.276)	(0.758)
Lag 1	0.346	-0.0949	-0.597	0.893*	0.642
	(0.445)	(0.513)	(0.612)	(0.379)	(0.462)
Lag 2	0.121	0.197	-1.278**	0.780**	-0.765
	(0.546)	(0.604)	(0.458)	(0.274)	(0.491)
Lag 3	0.916	0.983	0.453	0.248	0.955
	(0.613)	(0.627)	(0.485)	(0.374)	(0.521)
Lag 4	-0.390	-0.483	-0.274	-0.895*	-1.202*
	(0.849)	(1.008)	(0.463)	(0.358)	(0.611)
Lag 5	0.193	0.0840	0.0192	0.258	0.338
	(0.917)	(1.052)	(0.444)	(0.383)	(0.708)
N	439138	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

All the results are from local projections, following Jorda (2005).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: India, ground shaking, 1985-2007, Jorda method (p.2)

	(1) 100Log(K)	(2) 100Log(Mat)	(3) 100Log(Fuels)	(4) 100Log(Distr Cost)
N of EQs	-0.00850	-0.907	1.192	-5.612*
	(0.814)	(0.982)	(0.738)	(2.364)
Lag 1	2.532***	1.147	0.00601	-3.627**
	(0.625)	(0.824)	(0.546)	(1.274)
Lag 2	1.119*	-0.0429	-0.337	-1.553
	(0.442)	(0.569)	(0.586)	(1.503)
Lag 3	-0.0501	-0.461	0.0387	1.104
	(0.631)	(1.054)	(0.531)	(1.661)
Lag 4	-0.494	-2.286	-1.217	-0.117
	(0.587)	(1.204)	(0.861)	(1.355)
Lag 5	0.160	0.754	0.523	0.696
	(0.445)	(1.339)	(0.883)	(1.149)
N	439138	439138	439138	439138
Plant FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

Plant and year fixed effects are included in each specification. All variables are real values.

Errors are clustered on both plant-level and region-by-year level.

All the results are from local projections, following Jorda (2005).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$