Using Satellite-observed Geospatial Inundation Data to Identify the Impacts of Floods on Firm-level Performance: The Case of China during 2000–2009 Online Appendix

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October 29, 2025

A.1 Heterogeneity in the Inundation Effects

This section explores factors that could moderate or aggravate the impacts of inundation. We consider potential heterogeneity in inundation effects due to inventory management policy, geographical location, ownership type, firm size, and sector of operation. All the analyses are conducted by expanding the benchmark specification of Equation (2).

A.1.1 Inventory Management

Natural disasters are low-probability but high-impact events for individual firms. Keeping excess inventory could serve as buffers against supply chain disruptions, but could also expose the firm to extra losses in the event of floods. We assess whether a firm's inventory management practice affects its performance in the aftermath of floods. We use *inventory turnover* to measure how lean a firm's inventory is (relative to its size). The financial metric is defined as the ratio of the cost of goods sold to inventory. Thus, a higher ratio indicates leaner inventories relative to firm size.

We classify a firm (within an industry) as having relatively excessive inventories in a given year if its inventory turnover falls below the 10th-percentile cutoff of the industry

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in that year, where an industry is defined at the 4-digit GB/T level.[1] Similarly, a firm is classified as having relatively safe, yet not excessive, inventories if its inventory turnover lies between the 10th and 50th percentiles of the industry distribution in that year. The firm-specific indicator, $OverInv_i$ ($SafeInv_i$), equals 1 if firm i is classified as having relatively excessive (relatively safe yet not excessive) inventories in the year prior to treatment for a treated (inundated) firm.[2]We examine the role of inventory in exacerbating/moderating the inundation effects, by appending the benchmark specification in Equation (2) with the interaction terms between the flood treatment indicators and the two inventory indicators. Firms whose inventory turnover exceeds the 50th-percentile industry cutoff in the year prior to treatment for a treated firm serve as the reference group ($OverInv_i = SafeInv_i = 0$). It is worth noting that the level variables $SafeInv_i$ ($OverInv_i$) are not included as separate controls, because their level effects would be absorbed by the firm fixed effects. Defining $OverInv_i$ ($SafeInv_i$) based on pre-treatment inventory turnover also mitigates potential endogeneity concerns that firms may change their inventory strategy after being hit by a flood.

The results are reported in Table A.1. We find that holding safe (but not excessive) amounts of inventories prior to the inundation helps buffer around 1/2 to 1/3 of the negative effects of floods on output and productivity. Maintaining inventories above safe levels does not shelter firms further than safe inventory levels do. On the other hand, the negative effects of inundation on capital stocks increase monotonically with the excess of inventories the treated firms hold prior to treatment (relative to lean inventory practice). Firms with more excess inventories are subject to more severe and longer-term damages to their physical assets. Employment losses similarly tend to worsen with excess inventories. Thus, safe inventory practice helps buffer potential output and productivity losses due to floods, but at the cost of extra damages to physical assets.

A.1.2 Geographical Location: Flood-Prone County

We next assess whether firms located in flood-prone areas perform differently if inundated, in comparison with firms located in less flood-prone areas but hit by floods. Conceptually, local governments in flood-prone areas may make heavier investment in flood containment facilities, which could help reduce the severity of the flood impacts. Firms in these areas may also take more precautionary measures if they perceive they are subject to higher flood risks.

[1]This is finer than the 2-digit sector definition used for sector-year fixed effect controls.

[2]The definitions of inventory indicators for the untreated firms do not matter, as their interactions with $R0$'s would be all zeros for the untreated firms.

As shown in Figure 2, the inundated areas of each flood event according to GFD can extend across multiple provinces. We define a county as flooded in a flood event if any part of it is inundated by the flood. During 2000–2014, 785 counties were inundated at least once, with 36 counties (4.59%) experiencing more than 5 floods. The highest number of floods a county encountered during the period was 11. Table A.2 provides further details on the distribution of inundation frequency at the county level. Given the distribution, we define a county as flood prone and set $ProneCounty_c$ equal to 1 if county c was hit by floods more than 5 times during the period 2000–2014 (according to GFD). We then extend the benchmark specification of Equation (2) by including the interaction terms between the inundation indicators $R0$'s and $ProneCounty_c$.

Table A.3 shows that all of the coefficient estimates for the interaction terms are positive when precisely estimated, partially offsetting the negative baseline impacts. The differential effects are most pronounced in terms of productivity, with the difference being especially large in the longer run. The longer-term reduction in productivity is substantially smaller for inundated firms located in counties with higher flood risks. In sum, these results indicate that there are important heterogeneities across firms in terms of preparedness for floods.

The findings above are consistent with Gandhi et al. (2022), who document that cities more vulnerable to floods (as measured by the frequency of severe flood events) tend to experience smaller losses from floods—almost half as much—compared to cities that do not face recurrent floods.

A.1.3 Ownership Type

A priori, it is unclear how state-owned enterprises (SOEs) in China might react differently to floods compared to private firms. On one hand, since SOEs have better access to external financial resources, they may be better equipped to mitigate the direct impacts of floods (Pan and Qiu, 2022). SOEs might also be tasked with social stability objectives (Bai et al., 2006) and required to maintain employment targets in the aftermath of floods. On the other hand, SOEs in China generally are more intensive in tangible assets, and hence could be more vulnerable to floods.

We classify a firm's ownership type based on the information in ASIF, and define the SOE indicator, $SOE_{i,t}$, at the firm-year level. The indicator is time variant, as it is possible for a firm to change its ownership type during the study period. In particular, China underwent a trend of privatization following its accession to the WTO in 2001 (Chen et al., 2021). Of all the 170,023 firms in the estimation sample, 14,951 (8.8%) were registered as SOEs for at least one year during the period studied (2000–2009). Of this SOE group, 5,892 (39.4%)

firms changed their ownership type during the study period.[3]

Table A.4 summarizes the results. Consistent with the literature, the coefficient estimate for the level indicator, $SOE_{i,t}$, suggests that SOEs are generally larger in terms of capital stocks and employment size, but less productive, relative to non-SOEs. More importantly, the coefficient estimates for the inundation-SOE interaction terms are significant and negative for output and productivity. This highlights potential inefficiencies and weaker incentives of SOEs to recover in the aftermath of floods relative to non-SOEs. In contrast, although the interaction effects on capital and labor inputs are negative, they are significant only in certain time horizons following the floods. This suggests that SOEs may have prevented the potentially larger negative impacts of floods on their capital inputs (given that they are more intensive in tangible assets), and similarly on their employment size, due to the additional state support and resources available to them.

A.1.4 Firm Size

We now explore potential heterogeneous effects by firm size, and verify whether larger firms might be better equipped to navigate and manage the impact of shocks. We classify a firm (within an industry) as large in a year if its sales revenue lies between the 50th and 90th percentiles of the industry distribution in that year, and as giant if its sales revenue exceeds the 90th-percentile cutoff. The firm-specific indicator, $Large_i$ ($Giant_i$), is defined such that it equals 1 if firm i is classified as large (giant) in the year prior to the treatment for a treated (inundated) firm. The results based on the specification of Equation (2), differentiated by firm size, are reported in Table A.5.

We find that the losses in outputs and productivity are systematically larger as firm size increases (from small to large to giant) for both short- and long-run impacts. For example, the long-run negative impacts of floods on outputs and productivity are 24.46 percentage point (26.27 percentage point) *greater* for giant firms, and 18.70 percentage point (12.47 percentage point) *larger* for large firms, relative to small firms, which experience baseline negative effects in the order of 4.85% (3.95%), respectively. The negative impacts on capital and employment exhibit a similar hierarchical pattern, although the differential effects are not precisely estimated for large firms in the case of capital.

[3]In particular, of the 14,951 SOEs, 5,252 (35.1%) firms changed from SOEs to non-SOEs, while 1,941 (13.0%) firms changed from non-SOEs to SOEs. A total of 1,301 SOE firms changed ownership types more than once. If we exclude these firms, 3,951 firms changed from SOEs to non-SOE, and 640 firms changed from non-SOEs to SOEs (i.e., 5,892 = 3,951 + 640 + 1,301), during the study period.

A.1.5 Sector of Operation: Production Structure

Lastly, we examine potential heterogeneous effects of inundation on output across sectors. The nature of production might determine a sector's vulnerability to flood risks. Toward this, we group the original 40 sectors (at 2-digit GB/T level) into 13 broad sectors by similarity of production structures. We estimate the benchmark specification of Equation (2) by sector (and drop the sector-year fixed effect controls). The results are reported in Table A.6, with sectors ranked by the immediate inundation effect in descending order.

In all sectors except "other manufactures", inundated firms suffer long-run negative impacts on their outputs. Sectors that sustain stronger negative impacts from floods tend to be those that are inventory or capital intensive (e.g., recycling and repair, machinery, and computers/electronics), or those producing products sensitive to humidity and sanitary conditions (e.g., paper/printing, textile/apparel, wood/furniture, and food products). In contrast, a few sectors (chemicals/rubber/plastics, utilities, and mining) are less vulnerable to inundation.

A.2 Robustness Checks: Unrestricted Control Group

In the main paper, the analyses restrict the control group to the subset of non-inundated firms that did not enter or exit during the study period (2000–2009).[4] In this appendix, we re-estimate the key tables from the main paper using the entire set of non-inundated firms as the control group.

A.2.1 Dynamic and Spatial Spillover Impacts of Floods

Table A.7 repeats the benchmark estimations based on the entire set of non-inundated firms as the control group. The inundation effects on firm-level performance measures exhibit patterns consistent with those observed in the main analysis, although the negative effects are generally smaller in magnitude. The long-run negative effects of inundation on firm-level capital stock observed in the main analysis are now weakened to the extent that they become statistically insignificant. We also note that the point estimates of the inundation effects exhibit less regular dynamic patterns across time periods compared with those reported in the main analysis.

[4] Refer to the paper for the definitions of firm entry and exit.

A.2.2 Durations of Flood Exposure

Table A.8 likewise indicates that flood durations exert negative and persistent effects on firm performance, similar to the main analysis, though with smaller magnitudes when using the entire set of non-inundated firms as the control group.

A.2.3 Alternative Fuzziness in the Definition of Inundation Areas

Similar to the main analysis, Table A.9 suggests that the inundation effect estimates across the columns of '1km' and '2km' are not statistically different, while the effect estimates tend to be smaller under the column '0.5km' and further smaller under the column '0km' (which defines the inundation areas strictly based on the polygons detected by GFD).

The negative effects of inundation tend to reduce in magnitude, and become statistically insignificant in the longer run for capital stock. The inundation effects also tend to be less regular in magnitudes across lags, and irregular when the inundation areas are defined strictly based on the polygons detected by GFD, suggesting that defining inundation areas based on some extension/enlargement of the GFD-identified polygons is a practical/sensible strategy.

A.2.4 Firm Relocation and Restrictions in Sample Composition

Table A.10 shows a similar pattern to its counterpart in the main analysis: the dynamic inundation effects on firm-level output, productivity and employment remain robust to potential firm relocations, but with reduced magnitudes. The long-run effects tend to be statistically insignificant for capital stock and productivity.

A.3 Robustness Checks: With Additional Lagged Firm-level Controls

Table A.11 to Table A.15 report the key estimation results when additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$. The results are nearly identical to the benchmark findings reported in the main paper.

A.4 Robustness Checks: With Extended Panel Period (2000–2014)

As documented in the main text, the study period is restricted to 2000–2009 for three reasons: (1) the inundation data are only available from 2000 onward; (2) the firm-level data span 1998–2014, but with a gap in 2010 when most key variables are missing; and (3) the Arellano–Bond dynamic panel estimator relies on a lagged dependent variable structure, for which missing observations across all panel units in a given year would cause both identification and moment-condition problems. In this Online Appendix, we explore a potential workaround to extend the sample period and verify the robustness of the results. Specifically, the two disconnected periods 2000–2009 and 2011–2014 are joined to create an artificial extended panel. While this is not an ideal setup and may introduce potential bias in the estimated dynamic and structural relationship, this appendix shows that the results are largely consistent with the benchmark findings based on the 2000–2009 panel.

Tables A.16–A.34 and Figure A.1 report the sample descriptive statistics and estimation results if we were to use the extended 'panel' of 2000–2014 (excluding 2010). The estimation sample is defined using the same criteria as in the main analysis: for inundated firms, we drop firms that were inundated in multiple years; for non-inundated firms, we retain only those that did not enter/exit during the extended study period (2000—2014). The patterns documented in the main paper continue to hold largely.

A.5 Robustness Checks: Treatment Status Defined by DFO Inundation Area

In this robustness check, we define treatment status based on the inundation areas mapped by the DFO, according to: (I) all flood events catalogued by DFO, or (II) restricted to the subset of flood events that were successfully verified by the GFD detection algorithm. The number of flood events, the size of inundation areas, and the inundated firm counts for these two scenarios are as documented in Table 1. The distance of each non-inundated firm from the inundated area is recalculated given the alternative inundated areas defined under these two regimes. We repeat the main analysis of Table 5 based on these two alternative treatment classifications.

Table A.35 provides the corresponding firm counts and firm-year observations for each category of treatment status in the national and estimation samples under treatment classification (I). Note that given the larger number of flood events and inundation areas mapped

by DFO, substantially more firms are classified to be inundated in at least one year in the national sample, compared with Table 2 based on the GFD-identified flood events and inundation areas. Correspondingly, the estimation sample consists of a much smaller set of untreated firms relative to the single-treated firms. Table A.36 and Figure A.2 report the estimation results. Table A.36 indicates that the negative inundation impacts tend to be more pronounced under the DFO-defined treatment status (for productivity and in the long run), but with imprecisely estimated impacts on capital. Furthermore, Figure A.2 shows that the effect estimates across the neighborhood rings and time lags after treatment are generally insignificant and irregular. Thus, the identification based on the DFO-defined flood exposure is unable to capture the granular, differential neighborhood-ring effects.

Table A.37 repeats the exercise by providing the corresponding firm counts and firm-year observations for each category of treatment status in the national and estimation samples under treatment classification (II), where treatment status is defined based on the inundation areas mapped by the DFO, but for the subset of flood events that were successfully detected by GFD. The proportion of firms labelled as untreated increases correspondingly, while among the firms labelled as inundated, the fraction of multiple-treated firms decreases as a result. The effective estimation sample size in fact increases, since fewer multiple-treated firms are dropped from the sample. Table A.37 and Figure A.3 report the estimation results. We find that the negative inundation effects are generally weaker relative to Table 5, and the effects on capital exhibit irregular positive patterns. Similarly, we cannot identify meaningful spatial spillover effects in Figure A.3 when based on this alternative DFO flood exposure measure.

References

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Table A.1: Heterogeneous Effects by Inventory Management

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.1239***	-0.0219**	-0.0214***	-0.1151***
	(0.0065)	(0.0093)	(0.0056)	(0.0117)
$R0_{i,t-1}$	-0.1703***	0.0074	-0.0396***	-0.1099***
	(0.0070)	(0.0101)	(0.0061)	(0.0145)
$R0_{i,t-2}$	-0.1810***	0.0188*	-0.0321***	-0.1788***
	(0.0073)	(0.0105)	(0.0063)	(0.0156)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1813***	0.0232*	-0.0402***	-0.1652***
	(0.0082)	(0.0119)	(0.0071)	(0.0166)
$R0_{i,t} \times SafeInv_i$	0.0709***	-0.0319**	-0.0222***	0.0311**
	(0.0087)	(0.0126)	(0.0076)	(0.0154)
$R0_{i,t-1} \times SafeInv_i$	0.0693***	-0.0971***	-0.0390***	0.0542***
	(0.0095)	(0.0138)	(0.0083)	(0.0193)
$R0_{i,t-2} \times SafeInv_i$	0.0630***	-0.0886***	-0.0446***	0.0689***
	(0.0103)	(0.0149)	(0.0089)	(0.0213)
$R0_{i,\{t-m,m\geq 3\}} \times SafeInv_i$	0.0467***	-0.1270***	-0.0583***	0.0536**
	(0.0119)	(0.0173)	(0.0104)	(0.0243)
$R0_{i,t} \times OverInv_i$	0.0787***	-0.0747***	-0.0002	-0.0121
	(0.0143)	(0.0206)	(0.0124)	(0.0258)
$R0_{i,t-1} \times OverInv_i$	0.0403**	-0.1722***	-0.0492***	0.0295
	(0.0161)	(0.0233)	(0.0140)	(0.0340)
$R0_{i,t-2} \times OverInv_i$	0.0511***	-0.1919***	-0.0468***	0.0835**
	(0.0178)	(0.0258)	(0.0155)	(0.0395)
$R0_{i,\{t-m,m\geq 3\}} \times OverInv_i$	-0.0051	-0.2182***	-0.0642***	0.0618
	(0.0220)	(0.0318)	(0.0191)	(0.0505)
Observations	534,442	534,442	534,442	281,749
Number of Panel_id	117,514	117,514	117,514	90,878
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table compares the heterogeneous inundation effects across firms with different inventory management practices. We classify a firm (within an industry) to have relatively excessive (vs. relatively safe yet not excessive) amounts of inventories in a year if its inventory turnover is less than the 10th-percentile (vs. less than 50th-percentile but not less than the 10th-percentile) cutoff of the industry in that year. The firm-specific indicator, $OverInv_i$ ($SafeInv_i$), equals 1 if firm i is classified to have relatively excessive (vs. relatively safe yet not excessive) amounts of inventories in the year prior to the treatment for a treated (inundated) firm. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table 5 for further details on the estimation method and the sample used.

Table A.2: The Distribution of Inundation Frequency at the County Level (2000–2014)

Frequency of inundation	0	1	2	3	4	5	6	7	8	9	11
No. of counties	2049	359	187	121	49	33	18	7	8	2	1
Percentage share	72.30%	12.67%	6.60%	4.27%	1.73%	1.16%	0.64%	0.25%	0.28%	0.07%	0.04%
Cumulative percentage	72.30%	84.97%	91.57%	95.84%	97.57%	98.73%	99.36%	99.61%	99.89%	99.96%	100.00%
Percentage share among inundated counties		45.73%	23.82%	15.41%	6.24%	4.20%	2.29%	0.89%	1.02%	0.25%	0.13%
Cumulative percentage among inundated counties		45.73%	69.55%	84.97%	91.21%	95.41%	97.71%	98.60%	99.62%	99.87%	100.00%

Notes: This table reports the distribution of floods at the county level during the period 2000–2014.

Table A.3: Heterogeneous Effects by Location

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.0883***	-0.0466***	-0.0316***	-0.1105***
	(0.0053)	(0.0076)	(0.0046)	(0.0095)
$R0_{i,t-1}$	-0.1406***	-0.0515***	-0.0613***	-0.0980***
	(0.0058)	(0.0084)	(0.0050)	(0.0119)
$R0_{i,t-2}$	-0.1587***	-0.0462***	-0.0561***	-0.1523***
	(0.0061)	(0.0088)	(0.0053)	(0.0132)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1689***	-0.0497***	-0.0719***	-0.1625***
	(0.0072)	(0.0104)	(0.0062)	(0.0147)
$R0_{i,t} \times ProneCounty_c$	0.0057	0.0359**	0.0099	0.0445**
	(0.0114)	(0.0165)	(0.0099)	(0.0205)
$R0_{i,t-1} \times ProneCounty_c$	0.0143	0.0251	0.0110	0.0880***
	(0.0129)	(0.0186)	(0.0112)	(0.0258)
$R0_{i,t-2} \times ProneCounty_c$	0.0477***	0.0690***	0.0147	0.0467
	(0.0142)	(0.0205)	(0.0123)	(0.0286)
$R0_{i,\{t-m,m\geq 3\}} \times ProneCounty_c$	0.0587***	0.0493**	0.0316**	0.1227***
	(0.0158)	(0.0229)	(0.0137)	(0.0301)
Observations	534,442	534,442	534,442	281,749
Number of Panel_id	117,514	117,514	117,514	90,878
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table reports the heterogeneous inundation effects by whether a firm is located in a flood-prone county. The indicator, $ProneCounty_c$, equals 1 if county c was hit by floods more than 5 times during the period 2000–2014 according to GFD. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table 5 for further details on the estimation method and the sample used.

Table A.4: Heterogeneous Effects by Ownership Type

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.0820***	-0.0394***	-0.0306***	-0.0970***
	(0.0052)	(0.0075)	(0.0045)	(0.0095)
$R0_{i,t-1}$	-0.1330***	-0.0460***	-0.0573***	-0.0793***
	(0.0056)	(0.0081)	(0.0048)	(0.0117)
$R0_{i,t-2}$	-0.1435***	-0.0318***	-0.0517***	-0.1353***
	(0.0058)	(0.0084)	(0.0050)	(0.0127)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1496***	-0.0370***	-0.0654***	-0.1281***
	(0.0068)	(0.0098)	(0.0059)	(0.0138)
$R0_{i,t} \times SOE_{i,t}$	-0.0558***	-0.0245	0.0016	-0.0527**
	(0.0129)	(0.0186)	(0.0112)	(0.0218)
$R0_{i,t-1} \times SOE_{i,t}$	-0.0537***	-0.0136	-0.0358***	-0.0587**
	(0.0156)	(0.0226)	(0.0135)	(0.0279)
$R0_{i,t-2} \times SOE_{i,t}$	-0.0819***	-0.0311	-0.0241	-0.1107***
	(0.0184)	(0.0266)	(0.0160)	(0.0336)
$R0_{i,\{t-m,m\geq 3\}} \times SOE_{i,t}$	-0.1030***	-0.0566*	-0.0101	-0.0856**
	(0.0208)	(0.0301)	(0.0180)	(0.0402)
$SOE_{i,t}$	-0.0050	0.0577***	0.0368***	-0.0329**
	(0.0088)	(0.0127)	(0.0076)	(0.0154)
Observations	534,442	534,442	534,442	281,749
Number of Panel_id	117,514	117,514	117,514	90,878
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table reports the heterogeneous inundation effects by ownership type: whether a firm is a state-owned enterprise (SOE) or not. The indicator, $SOE_{i,t}$, equals 1 if firm i is registered as a SOE in year t. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table 5 for further details on the estimation method and the sample used.

Table A.5: Heterogeneous Effects by Firm Size

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.0014	-0.0342***	-0.0134**	-0.0417***
	(0.0069)	(0.0101)	(0.0060)	(0.0130)
$R0_{i,t-1}$	-0.0443***	-0.0429***	-0.0424***	-0.0047
	(0.0076)	(0.0111)	(0.0066)	(0.0167)
$R0_{i,t-2}$	-0.0519***	-0.0234**	-0.0331***	-0.0485***
	(0.0079)	(0.0116)	(0.0069)	(0.0184)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0485***	-0.0265**	-0.0387***	-0.0395**
	(0.0090)	(0.0131)	(0.0078)	(0.0197)
$R0_{i,t} \times Large_i$	-0.1442***	-0.0082	-0.0233***	-0.0935***
	(0.0087)	(0.0128)	(0.0077)	(0.0160)
$R0_{i,t-1} \times Large_i$	-0.1535***	0.0008	-0.0237***	-0.1122***
	(0.0096)	(0.0141)	(0.0084)	(0.0203)
$R0_{i,t-2} \times Large_i$	-0.1547***	-0.0105	-0.0271***	-0.1394***
	(0.0103)	(0.0151)	(0.0090)	(0.0224)
$R0_{i,\{t-m,m\geq 3\}} \times Large_i$	-0.1870***	-0.0161	-0.0531***	-0.1247***
	(0.0118)	(0.0172)	(0.0103)	(0.0249)
$R0_{i,t} \times Giant_i$	-0.1687***	-0.0252	-0.0455***	-0.1158***
	(0.0128)	(0.0188)	(0.0112)	(0.0220)
$R0_{i,t-1} \times Giant_i$	-0.2000***	-0.0227	-0.0406***	-0.1798***
	(0.0138)	(0.0203)	(0.0122)	(0.0277)
$R0_{i,t-2} \times Giant_i$	-0.2205***	-0.0563**	-0.0629***	-0.2096***
	(0.0150)	(0.0219)	(0.0131)	(0.0307)
$R0_{i,\{t-m,m\geq 3\}} \times Giant_i$	-0.2446***	-0.0752***	-0.0445***	-0.2627***
	(0.0177)	(0.0258)	(0.0154)	(0.0346)
Observations	534,442	534,442	534,442	281,749
Number of Panel_id	117,514	117,514	117,514	90,878
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table reports the heterogeneous inundation effects by firm size. We classify a firm (within an industry) to be large (vs. giant) in a year if its sales revenues are above the 50th-percentile but less than the 90th-percentile (vs. above the 90th-percentile) cutoff of the industry in that year. The firm-specific indicator, $Large_i$ ($Giant_i$), is defined such that it equals 1 if firm i is classified to be large (vs. giant) in the year prior to the treatment for a treated (inundated) firm. The specifications of the remaining variables and controls are the same as in Equation (2). Refer to the footnotes in Table 5 for further details on the estimation method and the sample used.

Table A.6: Heterogeneous Effects on Output by Sector

Sector:	Recycle and repair	Paper, printing, and art products	Textile, apparel, and footwear	Machinery	Mineral and metal products	Wood and furniture	Computers and electronic equipment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$R0_{i,t}$	-0.1362***	-0.1148***	-0.0961***	-0.0920***	-0.0916***	-0.0882***	-0.0867***
	(0.0335)	(0.0173)	(0.0132)	(0.0143)	(0.0127)	(0.0322)	(0.0160)
$R0_{i,t-1}$	-0.1643***	-0.1195***	-0.1773***	-0.1703***	-0.1229***	-0.1450***	-0.1206***
	(0.0384)	(0.0188)	(0.0143)	(0.0159)	(0.0140)	(0.0361)	(0.0172)
$R0_{i,t-2}$	-0.2050***	-0.1725***	-0.2018***	-0.1497***	-0.1611***	-0.1130***	-0.1248***
	(0.0416)	(0.0196)	(0.0148)	(0.0165)	(0.0148)	(0.0381)	(0.0179)
$R0_{i,\{t-m,m\geq 3\}}$	-0.2907***	-0.1774***	-0.2210***	-0.1547***	-0.1459***	-0.1300***	-0.1373***
	(0.0509)	(0.0230)	(0.0178)	(0.0191)	(0.0173)	(0.0439)	(0.0212)
Observations	11,577	34,716	80,231	73,193	77,077	12,300	54,714
Number of Panel_id	3,547	7,742	17,465	18,514	19,069	3,196	12,844
Control for Spillovers (R1-10)	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Sector:	Food, beverages, and tobacco	Automobiles and transport equipment	Other manufactures	Chemical, rubber, and plastic products	Gas, electricity, and water	Mining
	(8)	(9)	(10)	(11)	(12)	(13)
$R0_{i,t}$	-0.0854***	-0.0783***	-0.0640*	-0.0625***	-0.0571**	-0.0108
	(0.0177)	(0.0190)	(0.0371)	(0.0145)	(0.0222)	(0.0365)
$R0_{i,t-1}$	-0.1356***	-0.0992***	-0.0453	-0.1239***	-0.0783***	-0.0680*
	(0.0195)	(0.0215)	(0.0445)	(0.0158)	(0.0236)	(0.0403)
$R0_{i,t-2}$	-0.1654***	-0.1062***	-0.0847*	-0.1174***	-0.0753***	-0.0977**
	(0.0206)	(0.0224)	(0.0456)	(0.0166)	(0.0251)	(0.0432)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1781***	-0.1231***	-0.0327	-0.1479***	-0.0910***	-0.0958*
	(0.0237)	(0.0260)	(0.0564)	(0.0191)	(0.0283)	(0.0489)
Observations	41,494	44,143	10,165	61,323	18,833	14,676
Number of Panel_id	9,857	11,370	3,751	14,232	3,966	4,271
Control for Spillovers (R1-10)	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Notes: This table reports the inundation effects by sector. We group the original 40 sectors (at 2-digit GB/T level) into 13 broad sectors by similarity of production structures. Sectors are ranked in descending order of the immediate inundation effect (coefficient of $R0_{i,t}$). We estimate the benchmark specification of Equation (2) by sector (dropping the sector-year fixed effect controls). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table 5 for further details on the estimation method and the sample used.

Table A.7: (Unrestricted Control Group) Dynamic and Spatial Spillover Impacts of Floods — Concentric Ring Analysis

	y		k		emp		tfp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control for Spillovers	NO	YES	NO	YES	NO	YES	NO	YES
$R0_{i,t}$	-0.0497***	-0.0592***	-0.0189***	-0.0358***	-0.0169***	-0.0191***	-0.0634***	-0.0857***
	(0.0046)	(0.0049)	(0.0067)	(0.0071)	(0.0040)	(0.0043)	(0.0080)	(0.0088)
$R0_{i,t-1}$	-0.0687***	-0.0824***	-0.0245***	-0.0318***	-0.0263***	-0.0336***	-0.0432***	-0.0376***
	(0.0051)	(0.0054)	(0.0075)	(0.0078)	(0.0045)	(0.0047)	(0.0103)	(0.0110)
$R0_{i,t-2}$	-0.0724***	-0.0709***	-0.0298***	-0.0175**	-0.0187***	-0.0098**	-0.0778***	-0.0821***
	(0.0055)	(0.0057)	(0.0081)	(0.0083)	(0.0049)	(0.0050)	(0.0115)	(0.0120)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0610***	-0.0550***	-0.0169*	-0.0154	-0.0180***	-0.0136**	-0.0560***	-0.0510***
	(0.0065)	(0.0066)	(0.0095)	(0.0096)	(0.0057)	(0.0057)	(0.0131)	(0.0132)
Observations	1,123,367	1,123,367	1,123,367	1,123,367	1,123,367	1,123,367	522,593	522,593
Number of Panel_id	332,140	332,140	332,140	332,140	332,140	332,140	204,439	204,439
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07

Notes: This table reports the counterpart of Table 5 based on an alternative sample as a robustness check. In the main analysis, the estimation sample consists of treated firms that were inundated in only one year during 2000–2009 and non-inundated firms that did not enter or exit during the study period. This robustness check extends the sample to include all non-inundated firms regardless of their entry/exit years as the control group. For further details, refer to the footnotes in Table 5.

Table A.8: (Unrestricted Control Group) Impacts of Flood Duration on Firm Performances

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$Dur_{i,t}$	-0.0008***	-0.0005***	-0.0002***	-0.0008***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$Dur_{i,t-1}$	-0.0013***	-0.0004**	-0.0006***	-0.0007***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
$Dur_{i,t-2}$	-0.0011***	-0.0000	-0.0002*	-0.0014***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
$Dur_{i,\{t-m,m\geq 3\}}$	-0.0011***	-0.0004*	-0.0005***	-0.0012***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
Observations	1,123,367	1,123,367	1,123,367	522,593
Number of Panel_id	332,140	332,140	332,140	204,439
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table reports the counterpart of Table 6 based on an alternative sample as a robustness check. In the main analysis, the estimation sample consists of treated firms that were inundated in only one year during 2000–2009 and non-inundated firms that did not enter or exit during the study period. This robustness check extends the sample to include all non-inundated firms regardless of their entry/exit years as the control group. For further details, refer to the footnotes in Table 6.

Table A.9: (Unrestricted Control Group) Alternative Degrees of Fuzziness in the Definition of Inundation Areas

	y				tfp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0251**	-0.0385***	-0.0592***	-0.0621***	-0.0808***	-0.0785***	-0.0857***	-0.0807***
	(0.0108)	(0.0063)	(0.0049)	(0.0041)	(0.0187)	(0.0111)	(0.0088)	(0.0075)
$R0_{i,t-1}$	-0.0327***	-0.0496***	-0.0824***	-0.0862***	-0.0132	-0.0093	-0.0376***	-0.0512***
	(0.0115)	(0.0068)	(0.0054)	(0.0046)	(0.0206)	(0.0134)	(0.0110)	(0.0098)
$R0_{i,t-2}$	-0.0054	-0.0378***	-0.0709***	-0.0707***	-0.0726***	-0.0636***	-0.0821***	-0.0823***
	(0.0122)	(0.0073)	(0.0057)	(0.0048)	(0.0232)	(0.0149)	(0.0120)	(0.0105)
$R0_{i,\{t-m,m\geq 3\}}$	0.0271**	-0.0124	-0.0550***	-0.0595***	0.0246	-0.0126	-0.0510***	-0.0659***
	(0.0132)	(0.0082)	(0.0066)	(0.0057)	(0.0283)	(0.0169)	(0.0132)	(0.0115)
Observations	1,188,122	1,160,860	1,123,367	1,041,377	556,825	542,257	522,593	480,420
Number of Panel_id	347,212	340,897	332,140	312,655	216,179	211,130	204,439	189,959
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07	2000-07	2000-07

	k				emp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0232	-0.0311***	-0.0358***	-0.0258***	0.0044	-0.0087	-0.0191***	-0.0209***
	(0.0157)	(0.0091)	(0.0071)	(0.0060)	(0.0094)	(0.0055)	(0.0043)	(0.0036)
$R0_{i,t-1}$	0.0016	-0.0103	-0.0318***	-0.0334***	-0.0028	-0.0248***	-0.0336***	-0.0397***
	(0.0167)	(0.0100)	(0.0078)	(0.0066)	(0.0100)	(0.0060)	(0.0047)	(0.0040)
$R0_{i,t-2}$	0.0019	-0.0101	-0.0175**	-0.0013	0.0205*	-0.0027	-0.0098**	-0.0177***
	(0.0177)	(0.0106)	(0.0083)	(0.0069)	(0.0106)	(0.0063)	(0.0050)	(0.0042)
$R0_{i,\{t-m,m\geq 3\}}$	0.0112	-0.0035	-0.0154	-0.0097	0.0297**	-0.0027	-0.0136**	-0.0249***
	(0.0193)	(0.0120)	(0.0096)	(0.0083)	(0.0116)	(0.0072)	(0.0057)	(0.0050)
Observations	1,188,122	1,160,860	1,123,367	1,041,377	1,188,122	1,160,860	1,123,367	1,041,377
Number of Panel_id	347,212	340,897	332,140	312,655	347,212	340,897	332,140	312,655
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Notes: This table reports the counterpart of Table 8 based on an alternative sample as a robustness check. In the main analysis, the estimation sample consists of treated firms that were inundated in only one year during 2000–2009 and non-inundated firms that did not enter or exit during the study period. This robustness check extends the sample to include all non-inundated firms regardless of their entry/exit years as the control group. For further details, refer to the footnotes in Table 8.

Table A.10: (Unrestricted Control Group) Firm Relocation and Restrictions in Sample Composition

	y				tfp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0592***	-0.0545***	-0.0539***	-0.0668***	-0.0857***	-0.0633***	-0.0625***	-0.0539**
	(0.0049)	(0.0090)	(0.0090)	(0.0152)	(0.0088)	(0.0164)	(0.0165)	(0.0255)
$R0_{i,t-1}$	-0.0824***	-0.0623***	-0.0560***	-0.0830***	-0.0376***	0.0006	0.0025	-0.0212
	(0.0054)	(0.0099)	(0.0103)	(0.0178)	(0.0110)	(0.0226)	(0.0227)	(0.0339)
$R0_{i,t-2}$	-0.0709***	-0.0664***	-0.0668***	-0.0870***	-0.0821***	-0.0753***	-0.0724***	-0.0955**
	(0.0057)	(0.0103)	(0.0111)	(0.0189)	(0.0120)	(0.0247)	(0.0256)	(0.0375)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0550***	-0.0434***	-0.0788***	-0.0860***	-0.0510***	-0.0240	-0.0239	-0.0207
	(0.0066)	(0.0120)	(0.0145)	(0.0224)	(0.0132)	(0.0272)	(0.0297)	(0.0423)
Observations	1,123,367	442,981	431,680	96,999	522,593	159,657	157,060	58,149
Number of Panel_id	332,140	150,647	146,159	27,771	204,439	75,628	73,755	21,293
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07	2000-07	2000-07

	k				emp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0358***	-0.0290**	-0.0251*	-0.0419**	-0.0191***	-0.0188**	-0.0181**	-0.0254**
	(0.0071)	(0.0129)	(0.0129)	(0.0188)	(0.0043)	(0.0079)	(0.0079)	(0.0118)
$R0_{i,t-1}$	-0.0318***	-0.0198	0.0048	-0.0499**	-0.0336***	-0.0376***	-0.0309***	-0.0574***
	(0.0078)	(0.0143)	(0.0148)	(0.0220)	(0.0047)	(0.0087)	(0.0090)	(0.0137)
$R0_{i,t-2}$	-0.0175**	-0.0066	-0.0012	-0.0688***	-0.0098**	-0.0223**	-0.0169*	-0.0213
	(0.0083)	(0.0148)	(0.0159)	(0.0235)	(0.0050)	(0.0090)	(0.0097)	(0.0147)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0154	-0.0062	-0.0027	-0.0420	-0.0136**	-0.0224**	-0.0239*	-0.0452***
	(0.0096)	(0.0173)	(0.0209)	(0.0277)	(0.0057)	(0.0106)	(0.0128)	(0.0173)
Observations	1,123,367	442,981	431,680	96,999	1,123,367	442,981	431,680	96,999
Number of Panel_id	332,140	150,647	146,159	27,771	332,140	150,647	146,159	27,771
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Notes: This table reports the counterpart of Table 10 based on an alternative sample as a robustness check. In the main analysis, the estimation sample consists of treated firms that were inundated in only one year during 2000–2009 and non-inundated firms that did not enter or exit during the study period. This robustness check extends the sample to include all non-inundated firms regardless of their entry/exit years as the control group. For further details, refer to the footnotes in Table 10.

Table A.11: (Additional Lagged Firm Covariates) Dynamic Impacts of Floods

	y				k				emp				tfp			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
$R0_{i,t}$	-0.0150***		-0.0778***	-0.0793***	-0.0083		-0.0255***	-0.0257***	-0.0046		-0.0321***	-0.0327***	-0.0494***		-0.0859***	-0.0872***
	(0.0036)		(0.0046)	(0.0046)	(0.0052)		(0.0065)	(0.0065)	(0.0031)		(0.0039)	(0.0039)	(0.0067)		(0.0079)	(0.0080)
$R0_{i,t-1}$				-0.1204***				-0.0326***				-0.0535***				-0.0897***
				(0.0051)				(0.0073)				(0.0044)				(0.0103)
$R0_{i,t-2}$				-0.1537***				-0.0489***				-0.0626***				-0.1410***
				(0.0056)				(0.0079)				(0.0048)				(0.0116)
$R0_{i,\{t-m,m\geq 3\}}$				-0.1587***				-0.0398***				-0.0690***				-0.1328***
				(0.0067)				(0.0096)				(0.0058)				(0.0133)
$R0_{i,\{t-m,m\geq 0\}}$		-0.0782***				-0.0248***				-0.0315***				-0.0859***		
		(0.0046)				(0.0066)				(0.0040)				(0.0080)		
$R0_{i,\{t-m,m\geq 1\}}$			-0.1200***				-0.0330***				-0.0526***				-0.0857***	
			(0.0052)				(0.0074)				(0.0045)				(0.0105)	
Lagged y	0.4192***	0.4215***	0.4232***	0.4257***	0.0159**	0.0167***	0.0171***	0.0183***	0.0241***	0.0251***	0.0260***	0.0266***				
	(0.0045)	(0.0045)	(0.0045)	(0.0046)	(0.0064)	(0.0064)	(0.0064)	(0.0065)	(0.0039)	(0.0039)	(0.0039)	(0.0039)				
Lagged k	-0.0109***	-0.0099***	-0.0093***	-0.0086***	0.3351***	0.3354***	0.3355***	0.3358***	0.0049**	0.0053***	0.0056***	0.0058***	-0.1764***	-0.1755***	-0.1755***	-0.1748***
	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0035)	(0.0035)	(0.0035)	(0.0035)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0053)	(0.0053)	(0.0053)	(0.0053)
Lagged emp	0.1165***	0.1181***	0.1193***	0.1207***	0.1000***	0.1005***	0.1008***	0.1012***	0.5053***	0.5060***	0.5066***	0.5071***	0.0131	0.0152	0.0152	0.0176
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0035)	(0.0035)	(0.0035)	(0.0035)	(0.0108)	(0.0108)	(0.0107)	(0.0107)
Lagged tfp													0.0526***	0.0529***	0.0529***	0.0532***
													(0.0023)	(0.0023)	(0.0023)	(0.0023)
Lagged asset	0.1841***	0.1853***	0.1862***	0.1876***	0.2796***	0.2799***	0.2801***	0.2807***	0.0743***	0.0747***	0.0752***	0.0755***	0.2182***	0.2200***	0.2200***	0.2228***
	(0.0046)	(0.0047)	(0.0047)	(0.0047)	(0.0065)	(0.0065)	(0.0065)	(0.0065)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0139)	(0.0139)	(0.0139)	(0.0139)
Lagged sca	0.0256***	0.0262***	0.0266***	0.0269***	-0.0808***	-0.0806***	-0.0805***	-0.0805***	0.0127***	0.0130***	0.0131***	0.0133***	0.0702***	0.0712***	0.0712***	0.0719***
	(0.0031)	(0.0031)	(0.0031)	(0.0031)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0071)	(0.0071)	(0.0071)	(0.0071)
age	-0.0162***	-0.0156***	-0.0150***	-0.0143***	0.0154***	0.0156***	0.0157***	0.0160***	0.0155***	0.0157***	0.0159***	0.0162***	0.0142**	0.0139**	0.0139**	0.0138**
	(0.0029)	(0.0029)	(0.0030)	(0.0030)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0055)	(0.0055)	(0.0055)	(0.0055)
Lagged county night light density	-0.0036	-0.0028	-0.0033	-0.0053	0.0009	0.0011	0.0010	-0.0001	-0.0076*	-0.0072*	-0.0075*	-0.0080*	-0.0133	-0.0126	-0.0126	-0.0155*
	(0.0051)	(0.0051)	(0.0051)	(0.0051)	(0.0072)	(0.0072)	(0.0072)	(0.0072)	(0.0043)	(0.0044)	(0.0044)	(0.0044)	(0.0084)	(0.0084)	(0.0084)	(0.0085)
Lagged county GDP	-0.1527***	-0.1506***	-0.1468***	-0.1460***	-0.0723***	-0.0712***	-0.0707***	-0.0707***	-0.0141	-0.0133	-0.0116	-0.0109	-0.0810***	-0.0840***	-0.0840***	-0.0841***
	(0.0129)	(0.0129)	(0.0129)	(0.0130)	(0.0184)	(0.0184)	(0.0184)	(0.0184)	(0.0111)	(0.0111)	(0.0111)	(0.0111)	(0.0293)	(0.0293)	(0.0293)	(0.0294)
Lagged county VA of sec. ind.	0.0805***	0.0821***	0.0831***	0.0839***	0.0091	0.0096	0.0098	0.0103	0.0224**	0.0231**	0.0235***	0.0239***	-0.0513*	-0.0412	-0.0412	-0.0381
	(0.0104)	(0.0104)	(0.0105)	(0.0105)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0090)	(0.0090)	(0.0090)	(0.0090)	(0.0289)	(0.0289)	(0.0289)	(0.0289)
Lagged county gov. rev.	-0.0739***	-0.0726***	-0.0742***	-0.0741***	-0.0280*	-0.0278*	-0.0282*	-0.0272*	-0.0198**	-0.0192**	-0.0201**	-0.0204**	-0.0606***	-0.0613***	-0.0613***	-0.0608***
	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0155)	(0.0155)	(0.0155)	(0.0155)	(0.0093)	(0.0093)	(0.0093)	(0.0093)	(0.0196)	(0.0196)	(0.0196)	(0.0196)
Lagged county gov. exp.	0.2524***	0.2434***	0.2404***	0.2365***	0.1447***	0.1421***	0.1414***	0.1389***	0.0507***	0.0469***	0.0453***	0.0442***	0.2185***	0.2112***	0.2112***	0.2074***
	(0.0125)	(0.0125)	(0.0125)	(0.0125)	(0.0177)	(0.0178)	(0.0178)	(0.0178)	(0.0107)	(0.0107)	(0.0107)	(0.0107)	(0.0238)	(0.0238)	(0.0238)	(0.0238)
Observations	534,250	534,250	534,250	534,250	534,250	534,250	534,250	534,250	534,250	534,250	534,250	534,250	281,662	281,662	281,662	281,662
Number of Panel_id	117,491	117,491	117,491	117,491	117,491	117,491	117,491	117,491	117,491	117,491	117,491	117,491	90,860	90,860	90,860	90,860
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07	2000-07	2000-07

Notes: This table reports the counterpart of Table 4 based on an alternative specification where additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$. For further details, refer to the footnotes in Table 4.

Table A.12: (Additional Lagged Firm Covariates) Dynamic and Spatial Spillover Impacts of Floods — Concentric Ring Analysis

	y		k		emp		tfp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control for Spillovers	NO	YES	NO	YES	NO	YES	NO	YES
$R0_{i,t}$	-0.0793***	-0.0854***	-0.0257***	-0.0387***	-0.0327***	-0.0293***	-0.0872***	-0.1059***
	(0.0046)	(0.0052)	(0.0065)	(0.0073)	(0.0039)	(0.0044)	(0.0080)	(0.0092)
$R0_{i,t-1}$	-0.1204***	-0.1322***	-0.0326***	-0.0442***	-0.0535***	-0.0584***	-0.0897***	-0.0841***
	(0.0051)	(0.0056)	(0.0073)	(0.0079)	(0.0044)	(0.0048)	(0.0103)	(0.0113)
$R0_{i,t-2}$	-0.1537***	-0.1520***	-0.0489***	-0.0428***	-0.0626***	-0.0590***	-0.1410***	-0.1452***
	(0.0056)	(0.0058)	(0.0079)	(0.0083)	(0.0048)	(0.0050)	(0.0116)	(0.0123)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1587***	-0.1525***	-0.0398***	-0.0411***	-0.0690***	-0.0656***	-0.1328***	-0.1280***
	(0.0067)	(0.0068)	(0.0096)	(0.0097)	(0.0058)	(0.0058)	(0.0133)	(0.0134)
Observations	534,250	534,250	534,250	534,250	534,250	534,250	281,662	281,662
Number of Panel_id	117,491	117,491	117,491	117,491	117,491	117,491	90,860	90,860
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07

Notes: This table reports the counterpart of Table 5 based on an alternative specification where additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$ as in Table A.11. For further details, refer to the footnotes in Table 5.

Table A.13: (Additional Lagged Firm Covariates) Impacts of Flood Duration on Firm Performances

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$Dur_{i,t}$	-0.0011***	-0.0006***	-0.0004***	-0.0010***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$Dur_{i,t-1}$	-0.0020***	-0.0006***	-0.0009***	-0.0014***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$Dur_{i,t-2}$	-0.0021***	-0.0004***	-0.0008***	-0.0022***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
$Dur_{i,\{t-m,m\geq 3\}}$	-0.0023***	-0.0008***	-0.0012***	-0.0023***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
Observations	534,250	534,250	534,250	281,662
Number of Panel_id	117,491	117,491	117,491	90,860
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-07

Notes: This table reports the counterpart of Table 6 based on an alternative specification where additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$ as in Table A.11. For further details, refer to the footnotes in Table 6.

Table A.14: (Additional Lagged Firm Covariates) Alternative Degrees of Fuzziness in the Definition of Inundation Areas

	y				tfp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0505***	-0.0670***	-0.0854***	-0.0866***	-0.1063***	-0.1015***	-0.1059***	-0.1022***
	(0.0106)	(0.0064)	(0.0052)	(0.0045)	(0.0184)	(0.0113)	(0.0092)	(0.0082)
$R0_{i,t-1}$	-0.0801***	-0.1001***	-0.1322***	-0.1313***	-0.0520**	-0.0550***	-0.0841***	-0.0977***
	(0.0113)	(0.0069)	(0.0056)	(0.0049)	(0.0204)	(0.0136)	(0.0113)	(0.0103)
$R0_{i,t-2}$	-0.0886***	-0.1240***	-0.1520***	-0.1453***	-0.1184***	-0.1214***	-0.1452***	-0.1473***
	(0.0120)	(0.0073)	(0.0058)	(0.0051)	(0.0230)	(0.0151)	(0.0123)	(0.0111)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0738***	-0.1151***	-0.1525***	-0.1492***	-0.0355	-0.0837***	-0.1280***	-0.1457***
	(0.0131)	(0.0084)	(0.0068)	(0.0061)	(0.0277)	(0.0170)	(0.0134)	(0.0120)
Observations	518,264	527,637	534,250	525,546	275,673	279,453	281,662	273,337
Number of Panel_id	108,039	112,796	117,491	120,905	86,165	88,716	90,860	90,586
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07	2000-07	2000-07

	k				emp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0277*	-0.0389***	-0.0387***	-0.0275***	-0.0070	-0.0205***	-0.0293***	-0.0294***
	(0.0150)	(0.0091)	(0.0073)	(0.0064)	(0.0091)	(0.0055)	(0.0044)	(0.0039)
$R0_{i,t-1}$	-0.0110	-0.0306***	-0.0442***	-0.0438***	-0.0264***	-0.0473***	-0.0584***	-0.0624***
	(0.0160)	(0.0099)	(0.0079)	(0.0069)	(0.0097)	(0.0059)	(0.0048)	(0.0042)
$R0_{i,t-2}$	-0.0186	-0.0420***	-0.0428***	-0.0255***	-0.0229**	-0.0500***	-0.0590***	-0.0609***
	(0.0169)	(0.0104)	(0.0083)	(0.0071)	(0.0102)	(0.0063)	(0.0050)	(0.0043)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0083	-0.0356***	-0.0411***	-0.0320***	-0.0146	-0.0521***	-0.0656***	-0.0677***
	(0.0186)	(0.0120)	(0.0097)	(0.0086)	(0.0112)	(0.0072)	(0.0058)	(0.0052)
Observations	518,264	527,637	534,250	525,546	518,264	527,637	534,250	525,546
Number of Panel_id	108,039	112,796	117,491	120,905	108,039	112,796	117,491	120,905
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Notes: This table reports the counterpart of Table 8 based on an alternative specification where additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$ as in Table A.11. For further details, refer to the footnotes in Table 8.

Table A.15: (Additional Lagged Firm Covariates) Firm Relocation and Restrictions in Sample Composition

	y				tfp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0854***	-0.0888***	-0.0885***	-0.1020***	-0.1059***	-0.0964***	-0.0955***	-0.0998***
	(0.0052)	(0.0093)	(0.0093)	(0.0146)	(0.0092)	(0.0170)	(0.0171)	(0.0255)
$R0_{i,t-1}$	-0.1322***	-0.1298***	-0.1055***	-0.1327***	-0.0841***	-0.0488**	-0.0429*	-0.0726**
	(0.0056)	(0.0102)	(0.0104)	(0.0168)	(0.0113)	(0.0227)	(0.0229)	(0.0333)
$R0_{i,t-2}$	-0.1520***	-0.1648***	-0.1188***	-0.1587***	-0.1452***	-0.1318***	-0.1239***	-0.1884***
	(0.0058)	(0.0105)	(0.0111)	(0.0179)	(0.0123)	(0.0248)	(0.0256)	(0.0368)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1525***	-0.1565***	-0.1366***	-0.1660***	-0.1280***	-0.0779***	-0.0835***	-0.1194***
	(0.0068)	(0.0126)	(0.0147)	(0.0212)	(0.0134)	(0.0273)	(0.0294)	(0.0412)
Observations	534,250	195,144	183,851	72,299	281,662	90,554	87,958	40,515
Number of Panel_id	117,491	46,212	41,726	16,403	90,860	32,326	30,454	12,747
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07	2000-07	2000-07

	k				emp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0387***	-0.0328**	-0.0297**	-0.0511***	-0.0293***	-0.0275***	-0.0278***	-0.0363***
	(0.0073)	(0.0128)	(0.0127)	(0.0190)	(0.0044)	(0.0079)	(0.0079)	(0.0118)
$R0_{i,t-1}$	-0.0442***	-0.0503***	-0.0178	-0.0645***	-0.0584***	-0.0606***	-0.0477***	-0.0742***
	(0.0079)	(0.0141)	(0.0143)	(0.0219)	(0.0048)	(0.0087)	(0.0089)	(0.0135)
$R0_{i,t-2}$	-0.0428***	-0.0357**	-0.0134	-0.0816***	-0.0590***	-0.0729***	-0.0502***	-0.0444***
	(0.0083)	(0.0146)	(0.0152)	(0.0232)	(0.0050)	(0.0090)	(0.0094)	(0.0144)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0411***	-0.0374**	-0.0048	-0.0607**	-0.0656***	-0.0720***	-0.0521***	-0.0699***
	(0.0097)	(0.0175)	(0.0201)	(0.0276)	(0.0058)	(0.0108)	(0.0124)	(0.0171)
Observations	534,250	195,144	183,851	72,299	534,250	195,144	183,851	72,299
Number of Panel_id	117,491	46,212	41,726	16,403	117,491	46,212	41,726	16,403
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Additional Lagged Firm Covariates	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09

Notes: This table reports the counterpart of Table 10 based on an alternative specification where additional lagged firm-level characteristics are included as controls. Specifically, these controls include lagged one-period total assets $asset_{i,t-1}$, the share of current assets $sca_{i,t-1}$, output $y_{i,t-1}$ (or productivity $tfp_{i,t-1}$, conditional on the performance measure under study), capital $k_{i,t-1}$, and employment $emp_{i,t-1}$ as in Table A.11. For further details, refer to the footnotes in Table 10.

Table A.16: (Extended Panel) Inundation Area Data in DFO and GFD

		DFO			GFD			GFD vs. DFO (for the set of flood events detected by GFD)		GFD enlarged by 1km
Year	# Firms	# Floods	Inun. Area (km^2)	# Inun. Firms	# Floods	Inun. Area (km^2)	# Inun. Firms	Inun. Area in DFO (km^2)	# Inun. Firms in DFO	# Inun. Firms
2000	153,906	8	446,864	20,560	2	5,027	65	107,763	3,096	894
2001	163,758	8	99,449	2,583	0	0	0	-	-	0
2002	174,686	22	1,859,656	71,058	4	46,865	767	702,551	60,520	8,910
2003	190,783	14	3,248,970	71,906	5	113,429	1,704	2,359,691	69,214	14,806
2004	266,212	15	733,578	37,833	3	19,131	862	258,014	18,811	7,948
2005	267,176	18	3,289,300	129,959	9	103,850	3,892	1,152,691	78,530	16,670
2006	296,970	23	1,271,760	46,808	5	29,105	2,851	206,147	4,651	10,194
2007	332,714	11	3,343,944	198,914	7	86,028	457	3,041,902	191,599	14,788
2008	365,388	12	1,347,647	95,375	4	38,591	106	1,015,861	92,244	7,662
2009	331,949	6	1,139,055	54,147	0	0	0	-	-	0
2011	264,959	5	3,128,876	72,281	1	1,761	2	24,302	428	515
2012	297,078	9	4,142,103	59,709	3	8,879	221	162,674	8,151	2,126
2013	329,201	8	2,382,108	81,346	1	89,782	131	1,430,156	6,296	1,771
2014	273,694	6	1,153,909	37,582	1	10,694	2,247	45,994	15,346	15,653
Total	**3,708,474**	**165**	**27,587,218**	**980,061**	**45**	**553,142**	**13,305**	**10,507,746**	**548,886**	**101,937**

Notes: The second column indicates the number of firms in the ASIF database from 2000 to 2014. The next three columns under "DFO" report the number of flood events and the total areas of flood-affected regions, based on the flood data provided in DFO, and the number of ASIF firms located in these regions in each year. The next three columns under "GFD" report the corresponding statistics for the flood events successfully detected/mapped by GFD (based on satellite images and water detection algorithms). The next two columns under "GFD vs. DFO" report the total areas of inundation provided in DFO (and the corresponding number of inundated firms) for the subset of flood events detected/mapped by GFD. For example, in 2000, GFD successfully mapped 2 flood events out of the total 8 events catalogued in DFO, which had a total inundation area of 5,027 km^2, and 65 firms located in these areas. In comparison, for the same 2 flood events, the inundation area provided in DFO was 107,763 km^2, and the resulting number of firms considered inundated was 3,096. The last column reports the firm count if we enlarge inundation areas from the GFD-identified areas by 1 km in radius.

Table A.17: National Sample and Estimation Sample (2000–2009, 2011–2014)

National Sample

treated	firm	firm-year observations: treated obs.	firm-year observations: untreated obs.	firm-year observations: total obs.	firm share
0	806,535	0	3,257,243	3,257,243	92%
1	52,533	52,533	234,671	287,204	6%
> 1 (2-8)	19,326	49,404	114,623	164,027	2%
total	878,394	101,937	3,606,537	3,708,474	
obs. share		3%	97%		

Estimation Sample

treated	firm	firm-year observations: treated obs.	firm-year observations: untreated obs.	firm-year observations: total obs.	firm share
0	66,324	0	454,067	454,067	56%
1	52,533	52,533	234,671	287,204	44%
total	118,857	52,533	688,738	741,271	
obs. share		7%	93%		

Notes: The column 'treated' lists the incidence of inundation. The column 'firm' indicates the firm count for each category of inundation incidence. The columns under 'firm-year obs.' indicates the number of firm-year observations corresponding to the set of firms classified under each category of inundation incidence. For example, in the estimation sample, 52,533 firms were *ever inundated* during 2000–2014 (excluding 2010), and this set of firms has a total of 52,533 treated firm-year observations, 234,671 untreated firm-year observations, and 287,204 total firm-year observations across years during 2000–2014 (excluding 2010). The column 'firm share' indicates the proportion in terms of firm count relative to the total firm count for each set of firms. The row 'obs. share' indicates the proportion of treated and untreated firm-year observations relative to the total firm-year observations.

Table A.18: (Extended Panel) Summary Statistics

		National Sample			Estimation Sample		
Variables	Firms	Obs	Mean	SD	Obs	Mean	SD
ln(output):							
	treated	450,896	17.4612	1.4897	287,097	17.4149	1.4767
	untreated	3,251,500	17.2932	1.4233	453,089	18.0396	1.4004
ln(tfp):							
	treated	220,967	10.9641	2.9330	132,272	10.9720	2.8504
	untreated	1,167,243	11.0288	2.6662	181,049	11.2909	2.9842
ln(capital):							
	treated	450,896	15.7128	1.8895	287,097	15.5868	1.8721
	untreated	3,251,500	15.4663	1.7683	453,089	16.3457	1.7499
ln(employment):							
	treated	451,231	5.1482	1.1587	287,204	5.1085	1.1514
	untreated	3,257,243	4.9369	1.1060	454,067	5.5370	1.1252
ln(asset):							
	treated	451,215	17.2629	1.6199	287,191	17.1797	1.5943
	untreated	3,257,167	16.9928	1.5244	454,064	17.9399	1.5407
ln(share of current asset):							
	treated	447,454	-0.7020	0.6348	283,795	-0.6851	0.6375
	untreated	3,238,788	-0.7296	0.6570	451,046	-0.6342	0.5382
ln(age):							
	treated	441,928	2.0815	0.8954	280,738	2.0276	0.8846
	untreated	3,162,371	1.8878	0.8847	453,782	2.5628	0.6609
ln(share of tangible asset):							
	treated	449,602	-0.7731	0.6374	286,179	-0.7838	0.6646
	untreated	3,234,369	-0.7793	0.6446	452,412	-0.8330	0.5841
ln(inventory turnover):							
	treated	430,997	2.2562	1.5354	273,745	2.2774	1.5537
	untreated	3,089,792	2.5135	1.6283	442,259	2.2139	1.4151
ln(sales):							
	treated	450,705	17.5094	1.5200	286,756	17.4674	1.5063
	untreated	3,250,121	17.3944	1.4756	452,168	18.1278	1.4334

Notes: The column 'Obs' indicates the number of firm-year observations for the set of firms that were ever treated (inundated) and the set of firms that were untreated (non-inundated) in the National/Estimation Sample, respectively. For example, in the estimation sample, 52,533 firms were ever inundated during 2000–2014 (excluding 2010), and this set of firms has a total of 287,204 firm-year observations across years during 2000–2014 (excluding 2010), as indicated in Table A.17. The columns 'Mean' and 'SD' provide the mean and standard deviation of the variables for the observations associated with the treated/untreated firms, respectively.

Table A.19: (Extended Panel) Dynamic Impacts of Floods

	y				k				emp				tfp			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
$R0_{i,t}$	-0.0103***		-0.0730***	-0.0749***	-0.0120**		-0.0301***	-0.0310***	-0.0146***		-0.0379***	-0.0378***	-0.0444***		-0.0941***	-0.0978***
	(0.0035)		(0.0042)	(0.0043)	(0.0049)		(0.0060)	(0.0060)	(0.0037)		(0.0044)	(0.0045)	(0.0072)		(0.0085)	(0.0086)
$R0_{i,t-1}$				-0.1351***				-0.0437***				-0.0642***				-0.1246***
				(0.0052)				(0.0073)				(0.0054)				(0.0112)
$R0_{i,t-2}$				-0.1665***				-0.0577***				-0.0601***				-0.1841***
				(0.0057)				(0.0081)				(0.0060)				(0.0127)
$R0_{i,\{t-m,m\geq 3\}}$				-0.1783***				-0.0640***				-0.0684***				-0.1904***
				(0.0067)				(0.0094)				(0.0070)				(0.0149)
$R0_{i,\{t-m,m\geq 0\}}$		-0.0715***				-0.0264***				-0.0316***				-0.0930***		
		(0.0043)				(0.0061)				(0.0045)				(0.0086)		
$R0_{i,\{t-m,m\geq 1\}}$			-0.1326***				-0.0377***				-0.0484***				-0.1161***	
			(0.0053)				(0.0075)				(0.0055)				(0.0114)	
Lagged y	0.5134***	0.5205***	0.5278***	0.5344***												
	(0.0042)	(0.0042)	(0.0042)	(0.0042)												
Lagged k					0.4843***	0.4866***	0.4879***	0.4906***								
					(0.0041)	(0.0041)	(0.0041)	(0.0041)								
Lagged emp									0.6334***	0.6352***	0.6367***	0.6397***				
									(0.0030)	(0.0030)	(0.0030)	(0.0029)				
Lagged tfp													0.0579***	0.0589***	0.0592***	0.0602***
													(0.0029)	(0.0029)	(0.0029)	(0.0029)
age	-0.0054	-0.0049	-0.0046	-0.0038	0.0398***	0.0401***	0.0402***	0.0406***	0.0597***	0.0603***	0.0605***	0.0593***	0.0090	0.0086	0.0085	0.0088
	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0046)	(0.0046)	(0.0046)	(0.0047)	(0.0034)	(0.0034)	(0.0034)	(0.0034)	(0.0067)	(0.0067)	(0.0067)	(0.0067)
Lagged county night light density	0.0033	0.0048	0.0040	0.0017	0.0066	0.0068	0.0065	0.0061	-0.0054	-0.0050	-0.0055	-0.0028	-0.0330***	-0.0309***	-0.0309***	-0.0355***
	(0.0053)	(0.0053)	(0.0054)	(0.0054)	(0.0075)	(0.0076)	(0.0076)	(0.0076)	(0.0056)	(0.0056)	(0.0056)	(0.0056)	(0.0105)	(0.0105)	(0.0105)	(0.0106)
Lagged county GDP	-0.1221***	-0.1215***	-0.1166***	-0.1164***	-0.1378***	-0.1369***	-0.1376***	-0.1359***	-0.0289*	-0.0276*	-0.0294*	-0.0236	0.0071	-0.0069	-0.0100	-0.0129
	(0.0158)	(0.0158)	(0.0159)	(0.0159)	(0.0224)	(0.0224)	(0.0225)	(0.0225)	(0.0166)	(0.0166)	(0.0166)	(0.0166)	(0.0435)	(0.0435)	(0.0435)	(0.0435)
Lagged county VA of sec. ind.	0.1089***	0.1108***	0.1129***	0.1151***	0.0704***	0.0716***	0.0726***	0.0741***	0.0383***	0.0398***	0.0415***	0.0406***	-0.1023**	-0.0796*	-0.0731	-0.0648
	(0.0126)	(0.0127)	(0.0127)	(0.0128)	(0.0179)	(0.0180)	(0.0180)	(0.0180)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0452)	(0.0452)	(0.0452)	(0.0452)
Lagged county gov. rev.	0.0144	0.0132	0.0086	0.0070	0.0167	0.0153	0.0143	0.0130	0.0177	0.0160	0.0146	0.0119	-0.0472*	-0.0480*	-0.0498*	-0.0513*
	(0.0114)	(0.0114)	(0.0114)	(0.0115)	(0.0161)	(0.0161)	(0.0162)	(0.0162)	(0.0119)	(0.0119)	(0.0120)	(0.0120)	(0.0263)	(0.0263)	(0.0263)	(0.0263)
Lagged county gov. exp.	0.1482***	0.1409***	0.1380***	0.1343***	0.1423***	0.1404***	0.1395***	0.1378***	0.0064	0.0045	0.0031	0.0050	0.2009***	0.1900***	0.1885***	0.1839***
	(0.0126)	(0.0126)	(0.0127)	(0.0127)	(0.0178)	(0.0179)	(0.0179)	(0.0179)	(0.0132)	(0.0132)	(0.0132)	(0.0132)	(0.0320)	(0.0320)	(0.0320)	(0.0320)
Observations	457,013	457,013	457,013	457,013	457,013	457,013	457,013	457,013	457,013	457,013	457,013	457,013	157,486	157,486	157,486	157,486
Number of Panel_id	78,407	78,407	78,407	78,407	78,407	78,407	78,407	78,407	78,407	78,407	78,407	78,407	49,071	49,071	49,071	49,071
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-07	2000-07	2000-07	2000-07

Notes: This table reports the estimation results based on Equation (1) and its variants, for four firm-level performance measures: output, capital, employment and total factor productivity (all in logarithms). For each performance measure as the dependent variable, the first column reports the results if the set of treatment indicators includes only $R0_{i,t}$, which equals 1 if firm i is inundated in year t. The second column reports the results if the set of treatment indicators includes only a DID-like indicator $R0_{i,\{t-m,m\geq 0\}}$, which equals 1 for inundated firm i in the year of treatment and in all years post treatment. The third column reports the results if the set of treatment indicators includes $R0_{i,t}$ and $R0_{i,\{t-m,m\geq 1\}}$, i.e., it differentiates between the year of treatment and the years post treatment. The last column reports the results based on Equation (1), which further divides the post-treatment periods into 3 intervals: one year $R0_{i,t-1}$, two years $R0_{i,t-2}$, and three years onwards $R0_{i,\{t-m,m\geq 3\}}$ post treatment. Variables following the set of flood indicators are additional controls that are used throughout the paper. We use the dynamic panel estimator of Arellano and Bond (1991), and include firm, province-year, and sector-year fixed effects in all the specifications. The estimation sample as documented in Table A.17 is used. Firms' TFP can only be computed for the period 2000–2007 due to data availability, hence, the shorter sample period when the analysis uses productivity as the dependent variable. Standard errors are reported in parentheses under the estimates. The asterisks ***/**/* denote $p < 0.01$, $p < 0.05$, $p < 0.1$, respectively.

Table A.20: (Extended Panel) Dynamic and Spatial Spillover Impacts of Floods — Concentric Ring Analysis

	y		k		emp		tfp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control for Spillovers	NO	YES	NO	YES	NO	YES	NO	YES
$R0_{i,t}$	-0.0749***	-0.0767***	-0.0310***	-0.0304***	-0.0378***	-0.0250***	-0.0978***	-0.1160***
	(0.0043)	(0.0052)	(0.0060)	(0.0074)	(0.0045)	(0.0054)	(0.0086)	(0.0107)
$R0_{i,t-1}$	-0.1351***	-0.1500***	-0.0437***	-0.0443***	-0.0642***	-0.0646***	-0.1246***	-0.1259***
	(0.0052)	(0.0059)	(0.0073)	(0.0083)	(0.0054)	(0.0061)	(0.0112)	(0.0129)
$R0_{i,t-2}$	-0.1665***	-0.1611***	-0.0577***	-0.0433***	-0.0601***	-0.0476***	-0.1841***	-0.1916***
	(0.0057)	(0.0060)	(0.0081)	(0.0085)	(0.0060)	(0.0063)	(0.0127)	(0.0140)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1783***	-0.1745***	-0.0640***	-0.0644***	-0.0684***	-0.0606***	-0.1904***	-0.1840***
	(0.0067)	(0.0068)	(0.0094)	(0.0095)	(0.0070)	(0.0070)	(0.0149)	(0.0151)
Observations	457,013	457,013	457,013	457,013	457,013	457,013	157,486	157,486
Number of Panel_id	78,407	78,407	78,407	78,407	78,407	78,407	49,071	49,071
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-07	2000-07

Notes: This table reports the inundation effects based on Equation (2), in comparison with the results based on Equation (1). For each firm performance measure as the dependent variable, the first column repeats the results from Table A.19, while the second column reports the estimates based on Equation (2), which explicitly controls for geographic spillover effects on firms located within each of the 10 rings ($\leq$2 km, 2–4 km, ..., 18–20 km) away from the inundation area. The same set of additional controls and fixed effects as in Table A.19 is controlled for. We use the dynamic panel estimator of Arellano and Bond (1991). The estimation sample as documented in Table A.17 is used. Firms' TFP can only be computed for the period 2000–2007 due to data availability, hence, the shorter sample period when the analysis uses productivity as the dependent variable. Standard errors are reported in parentheses under the estimates. The asterisks ***/**/* denote $p < 0.01$, $p < 0.05$, $p < 0.1$, respectively.

Table A.21: (Extended Panel) Impacts of Flood Duration on Firm Performances

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$Dur_{i,t}$	-0.0011***	-0.0005***	-0.0003***	-0.0010***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$Dur_{i,t-1}$	-0.0025***	-0.0007***	-0.0010***	-0.0022***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
$Dur_{i,t-2}$	-0.0023***	-0.0007***	-0.0009***	-0.0027***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
$Dur_{i,\{t-m,m\geq 3\}}$	-0.0027***	-0.0013***	-0.0011***	-0.0029***
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
Observations	457,013	457,013	457,013	157,486
Number of Panel_id	78,407	78,407	78,407	49,071
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table reports the inundation effects based on Equation (2) but with the flood treatment indicator $R0$ replaced by the flood duration measure Dur. Specifically, $Dur_{i,t}$ indicates the number of days firm i is inundated in year t. This accounts for the possibility where a firm may experience multiple floods in one year. In such cases, $Dur_{i,t}$ is equal to the total duration of flood events by which the firm is classified as treated in the year. The duration information of each flood event is obtained from DFO. Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.22: (Extended Panel) Inundation Effects on Multiple-Treated Firms

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$FirstD_{i,t}$	-0.0345***	-0.0281***	0.0018	-0.0411***
	(0.0076)	(0.0106)	(0.0080)	(0.0131)
$FirstD_{i,t-1}$	-0.0835***	-0.0547***	-0.0342***	-0.0351**
	(0.0078)	(0.0109)	(0.0082)	(0.0150)
$FirstD_{i,t-2}$	-0.1099***	-0.0599***	-0.0360***	-0.0519***
	(0.0083)	(0.0116)	(0.0087)	(0.0176)
$FirstD_{i,\{t-m,m\geq 3\}}$	-0.1110***	-0.0679***	-0.0143	-0.0297
	(0.0096)	(0.0134)	(0.0101)	(0.0214)
$SubseqD_{i,t}$	-0.0112**	-0.0122	0.0064	-0.0434***
	(0.0055)	(0.0076)	(0.0057)	(0.0119)
$SubseqD_{i,t-1}$	-0.0216***	0.0085	-0.0016	-0.0563***
	(0.0059)	(0.0082)	(0.0061)	(0.0155)
$SubseqD_{i,t-2}$	-0.0098	0.0109	0.0124*	-0.0500***
	(0.0061)	(0.0085)	(0.0064)	(0.0158)
$SubseqD_{i,\{t-m,m\geq 3\}}$	-0.0212***	-0.0271***	0.0143**	-0.0534***
	(0.0068)	(0.0094)	(0.0071)	(0.0167)
Observations	397,331	397,331	397,331	139,913
Number of Panel_id	60,919	60,919	60,919	42,126
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table reports the dynamic inundation effects on firms that were treated in multiple years during 2000–2014 (in contrast with single-treated firms used in Table A.20). The specification extends that of Equation (2), and differentiates between the first treatment $FirstD$ and subsequent treatments $SubseqD$. The sample uses the set of multiple-treated firms as the treatment group, and the same set of non-inundated firms as in Table A.20 as the control group.

Table A.23: (Extended Panel) Alternative Degrees of Fuzziness in the Definition of Inundation Areas

	y				tfp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0412***	-0.0634***	-0.0767***	-0.0827***	-0.1115***	-0.1032***	-0.1160***	-0.1111***
	(0.0097)	(0.0062)	(0.0052)	(0.0047)	(0.0196)	(0.0127)	(0.0107)	(0.0097)
$R0_{i,t-1}$	-0.0856***	-0.1167***	-0.1500***	-0.1514***	-0.0752***	-0.0950***	-0.1259***	-0.1382***
	(0.0114)	(0.0071)	(0.0059)	(0.0052)	(0.0219)	(0.0152)	(0.0129)	(0.0119)
$R0_{i,t-2}$	-0.1138***	-0.1448***	-0.1611***	-0.1493***	-0.1539***	-0.1678***	-0.1916***	-0.1870***
	(0.0122)	(0.0075)	(0.0060)	(0.0053)	(0.0249)	(0.0169)	(0.0140)	(0.0128)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1075***	-0.1549***	-0.1745***	-0.1638***	-0.0642**	-0.1460***	-0.1840***	-0.1922***
	(0.0135)	(0.0085)	(0.0068)	(0.0059)	(0.0296)	(0.0189)	(0.0151)	(0.0138)
Observations	382,709	420,713	457,013	488,404	131,804	145,093	157,486	164,455
Number of Panel_id	56,198	66,840	78,407	93,467	38,063	43,742	49,071	53,647
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-07	2000-07	2000-07	2000-07

	k				emp			
	0km	0.5km	**1km**	2km	0km	0.5km	**1km**	2km
$R0_{i,t}$	-0.0055	-0.0277***	-0.0304***	-0.0286***	-0.0208**	-0.0246***	-0.0250***	-0.0183***
	(0.0135)	(0.0087)	(0.0074)	(0.0067)	(0.0103)	(0.0065)	(0.0054)	(0.0049)
$R0_{i,t-1}$	-0.0140	-0.0289***	-0.0443***	-0.0568***	-0.0415***	-0.0562***	-0.0646***	-0.0622***
	(0.0158)	(0.0100)	(0.0083)	(0.0074)	(0.0121)	(0.0075)	(0.0061)	(0.0054)
$R0_{i,t-2}$	-0.0408**	-0.0495***	-0.0433***	-0.0388***	-0.0504***	-0.0558***	-0.0476***	-0.0328***
	(0.0169)	(0.0105)	(0.0085)	(0.0074)	(0.0130)	(0.0079)	(0.0063)	(0.0054)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0404**	-0.0645***	-0.0644***	-0.0720***	-0.0433***	-0.0605***	-0.0606***	-0.0458***
	(0.0188)	(0.0119)	(0.0095)	(0.0084)	(0.0144)	(0.0089)	(0.0070)	(0.0061)
Observations	382,709	420,713	457,013	488,404	382,709	420,713	457,013	488,404
Number of Panel_id	56,198	66,840	78,407	93,467	56,198	66,840	78,407	93,467
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14

Notes: This table reports the inundation effects based on Equation (2), using alternative degrees of fuzziness in the definition of inundation areas: GFD enlarged by 0km, 0.5km, 1km, and 2km, respectively. This in turn determines the treatment status of firms. Specifically, the column '0km' defines the inundation areas strictly based on the polygons detected by GFD. The columns '0.5km', '1km', and '2km' define the inundation areas based on the polygons detected by GFD and enlarged by a radius of 0.5km, 1km, and 2km, respectively. The column '1km' repeats the results from Table A.20. The sample size varies across alternative definitions of inundation areas, because after defining the treatment status of firms, the multiple-treated firms are dropped from the treatment group, and the non-inundated firms that enter or exit during the sample period are dropped from the control group. This could lead to changes in the number of treated and untreated observations.

Table A.24: (Extended Panel) Inundation Effects on Firm Exit/Entry at the County Level

	(1) r_{exit}	(2) r_{entry}	(3) ln (#exit)	(4) ln (#entry)
$\#\text{flood}_{c,t}$	0.0118**	-0.0024	0.0315	0.0004
	(0.0055)	(0.0041)	(0.0247)	(0.0254)
$\#\text{flood}_{c,t-1}$	-0.0005	-0.0103***	0.0420*	-0.0212
	(0.0046)	(0.0035)	(0.0225)	(0.0255)
$\#\text{flood}_{c,t-2}$	-0.0001	-0.0011	0.0113	0.0178
	(0.0039)	(0.0032)	(0.0244)	(0.0262)
$\#\text{flood}_{c,\{t-m,m\geq 3\}}$	0.0029	-0.0094***	-0.0037	-0.0407
	(0.0037)	(0.0035)	(0.0223)	(0.0256)
Observations	35,055	35,055	27,137	26,225
R^2	0.5366	0.4642	0.7913	0.7233
County FE	YES	YES	YES	YES
Prefecture×Year FE	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14

Notes: This table reports the inundation effects on firm exit and entry at the county level. The dependent variables r_{exit}, r_{entry}, ln (#exit), and ln (#entry) correspond to the exit rate, the entry rate, the number of firms that exit (in logarithms), and the number of new entrants (in logarithms), respectively. Exit is defined as when a firm exits from the county (or from the sample). Entry is defined as when a firm enters the county (from another county) or is founded in the county. As in the firm-level regressions, we allow for dynamic effects of floods on exit/entry at the county level using contemporaneous and lagged treatment indicators. The variable $\#\text{flood}_{c,t-m}$ corresponds to the number of floods in county c in year $t-m$, for $m = 0, 1, 2$. The variable $\#\text{flood}_{c,\{t-m,m\geq 3\}}$ corresponds to the annual average number of floods for the periods $t-m, m \geq 3$. We further control for county and prefecture-year fixed effects.

Table A.25: (Extended Panel) Firm Relocation and Restrictions in Sample Composition

	y				tfp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0767***	-0.0669***	-0.0651***	-0.0889***	-0.1160***	-0.1004***	-0.1012***	-0.0980***
	(0.0052)	(0.0087)	(0.0089)	(0.0148)	(0.0107)	(0.0203)	(0.0206)	(0.0299)
$R0_{i,t-1}$	-0.1500***	-0.1202***	-0.0966***	-0.1406***	-0.1259***	-0.0923***	-0.0891***	-0.0868**
	(0.0059)	(0.0103)	(0.0110)	(0.0177)	(0.0129)	(0.0263)	(0.0268)	(0.0381)
$R0_{i,t-2}$	-0.1611***	-0.1478***	-0.1149***	-0.1810***	-0.1916***	-0.1886***	-0.1848***	-0.2214***
	(0.0060)	(0.0107)	(0.0117)	(0.0190)	(0.0140)	(0.0292)	(0.0301)	(0.0426)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1745***	-0.1370***	-0.1333***	-0.2083***	-0.1840***	-0.1320***	-0.1333***	-0.1528***
	(0.0068)	(0.0122)	(0.0141)	(0.0219)	(0.0151)	(0.0319)	(0.0341)	(0.0473)
Observations	457,013	156,152	142,052	50,675	157,486	44,731	42,528	19,448
Number of Panel_id	78,407	28,004	23,424	8,696	49,071	14,707	13,152	5,586
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-07	2000-07	2000-07	2000-07

	k				emp			
	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old	Benchmark	Non-mover	Non-mover & Established	Non-mover & Old
$R0_{i,t}$	-0.0304***	-0.0233*	-0.0152	-0.0249	-0.0250***	-0.0178*	-0.0193**	-0.0250
	(0.0074)	(0.0119)	(0.0120)	(0.0188)	(0.0054)	(0.0094)	(0.0097)	(0.0156)
$R0_{i,t-1}$	-0.0443***	-0.0348**	-0.0125	-0.0345	-0.0646***	-0.0721***	-0.0685***	-0.0923***
	(0.0083)	(0.0142)	(0.0148)	(0.0224)	(0.0061)	(0.0112)	(0.0119)	(0.0187)
$R0_{i,t-2}$	-0.0433***	-0.0337**	-0.0344**	-0.0951***	-0.0476***	-0.0647***	-0.0636***	-0.0603***
	(0.0085)	(0.0146)	(0.0158)	(0.0240)	(0.0063)	(0.0115)	(0.0127)	(0.0200)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0644***	-0.0586***	-0.0513***	-0.0880***	-0.0606***	-0.0677***	-0.0964***	-0.1043***
	(0.0095)	(0.0168)	(0.0190)	(0.0277)	(0.0070)	(0.0133)	(0.0153)	(0.0231)
Observations	457,013	156,152	142,052	50,675	457,013	156,152	142,052	50,675
Number of Panel_id	78,407	28,004	23,424	8,696	78,407	28,004	23,424	8,696
Control for Spillovers	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14

Notes: This table reports the estimation results of Equation (2) based on different subsamples. For each dependent variable, the first column "Benchmark" repeats the benchmark result (as reported in the second column under each dependent variable in Table A.20). The second column "Non-mover" reports the estimation results when the sample is restricted to firms that do not change their locations during the sample period 2000–2014. The third column "Non-mover & Established" reports the estimation results when the sample is further restricted to firms that remain in the same location and are not hit by a flood during the first two years in the location. The last column "Non-mover & Old" reports the estimation results when using the subsample of firms that do not change their locations during the sample period 2000–2014 and have an age greater than 5 years in 2000. Refer to the footnotes in Table A.20 for further details on the estimation method.

Table A.26: (Extended Panel) Heterogeneous Effects by Inventory Management

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.1143***	-0.0175**	-0.0214***	-0.1231***
	(0.0063)	(0.0088)	(0.0065)	(0.0129)
$R0_{i,t-1}$	-0.1828***	0.0035	-0.0509***	-0.1542***
	(0.0072)	(0.0101)	(0.0075)	(0.0157)
$R0_{i,t-2}$	-0.1979***	0.0015	-0.0365***	-0.2260***
	(0.0074)	(0.0104)	(0.0077)	(0.0170)
$R0_{i,\{t-m,m\geq 3\}}$	-0.2114***	-0.0089	-0.0415***	-0.2194***
	(0.0082)	(0.0115)	(0.0085)	(0.0181)
$R0_{i,t} \times SafeInv_i$	0.0698***	-0.0257**	-0.0175**	0.0269*
	(0.0076)	(0.0107)	(0.0079)	(0.0159)
$R0_{i,t-1} \times SafeInv_i$	0.0643***	-0.0917***	-0.0292***	0.0586***
	(0.0094)	(0.0132)	(0.0098)	(0.0200)
$R0_{i,t-2} \times SafeInv_i$	0.0739***	-0.0785***	-0.0359***	0.0688***
	(0.0102)	(0.0144)	(0.0107)	(0.0220)
$R0_{i,\{t-m,m\geq 3\}} \times SafeInv_i$	0.0718***	-0.1091***	-0.0571***	0.0546**
	(0.0113)	(0.0160)	(0.0118)	(0.0252)
$R0_{i,t} \times OverInv_i$	0.1071***	-0.0451***	0.0164	-0.0117
	(0.0120)	(0.0169)	(0.0125)	(0.0266)
$R0_{i,t-1} \times OverInv_i$	0.0604***	-0.1365***	-0.0284*	0.0504
	(0.0158)	(0.0223)	(0.0165)	(0.0349)
$R0_{i,t-2} \times OverInv_i$	0.0802***	-0.1444***	-0.0241	0.1030**
	(0.0177)	(0.0250)	(0.0185)	(0.0406)
$R0_{i,\{t-m,m\geq 3\}} \times OverInv_i$	0.0471**	-0.1992***	-0.0540**	0.0568
	(0.0209)	(0.0294)	(0.0218)	(0.0522)
Observations	457,013	457,013	457,013	157,486
Number of Panel_id	78,407	78,407	78,407	49,071
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table compares the heterogeneous inundation effects across firms with different inventory management practices. We classify a firm (within an industry) to have relatively excessive (vs. relatively safe yet not excessive) amounts of inventories in a year if its inventory turnover is less than the 10th-percentile (vs. less than 50th-percentile but not less than the 10th-percentile) cutoff of the industry in that year. The firm-specific indicator, $OverInv_i$ ($SafeInv_i$), equals 1 if firm i is classified to have relatively excessive (vs. relatively safe yet not excessive) amounts of inventories in the year prior to the treatment for a treated (inundated) firm. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.27: (Extended Panel) Heterogeneous Effects by Location

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.0764***	-0.0381***	-0.0269***	-0.1209***
	(0.0053)	(0.0074)	(0.0055)	(0.0109)
$R0_{i,t-1}$	-0.1503***	-0.0546***	-0.0648***	-0.1354***
	(0.0060)	(0.0085)	(0.0063)	(0.0133)
$R0_{i,t-2}$	-0.1645***	-0.0566***	-0.0506***	-0.1937***
	(0.0063)	(0.0089)	(0.0066)	(0.0148)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1796***	-0.0720***	-0.0628***	-0.2106***
	(0.0071)	(0.0100)	(0.0074)	(0.0162)
$R0_{i,t} \times ProneCounty_c$	0.0099	0.0391***	0.0001	0.0453**
	(0.0097)	(0.0136)	(0.0101)	(0.0215)
$R0_{i,t-1} \times ProneCounty_c$	0.0076	0.0557***	-0.0077	0.0737***
	(0.0123)	(0.0174)	(0.0128)	(0.0273)
$R0_{i,t-2} \times ProneCounty_c$	0.0241*	0.0803***	-0.0127	0.0206
	(0.0138)	(0.0194)	(0.0144)	(0.0304)
$R0_{i,\{t-m,m\geq 3\}} \times ProneCounty_c$	0.0190	0.0452**	-0.0136	0.0997***
	(0.0147)	(0.0207)	(0.0153)	(0.0323)
Observations	457,013	457,013	457,013	157,486
Number of Panel_id	78,407	78,407	78,407	49,071
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table reports the heterogeneous inundation effects by whether a firm is located in a flood-prone county. The indicator, $ProneCounty_c$, equals 1 if county c was hit by floods more than 5 times during the period 2000–2014 according to GFD. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.28: (Extended Panel) Heterogeneous Effects by Ownership Type

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	-0.0701***	-0.0308***	-0.0268***	-0.1063***
	(0.0052)	(0.0073)	(0.0054)	(0.0108)
$R0_{i,t-1}$	-0.1455***	-0.0445***	-0.0633***	-0.1200***
	(0.0059)	(0.0083)	(0.0061)	(0.0131)
$R0_{i,t-2}$	-0.1567***	-0.0415***	-0.0500***	-0.1809***
	(0.0060)	(0.0085)	(0.0063)	(0.0143)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1718***	-0.0602***	-0.0625***	-0.1817***
	(0.0068)	(0.0096)	(0.0071)	(0.0154)
$R0_{i,t} \times SOE_{i,t}$	-0.0602***	-0.0223	-0.0031	-0.0563**
	(0.0129)	(0.0182)	(0.0134)	(0.0224)
$R0_{i,t-1} \times SOE_{i,t}$	-0.0443***	-0.0142	-0.0375**	-0.0597**
	(0.0155)	(0.0219)	(0.0162)	(0.0288)
$R0_{i,t-2} \times SOE_{i,t}$	-0.0559***	-0.0378	-0.0381**	-0.1103***
	(0.0181)	(0.0255)	(0.0189)	(0.0348)
$R0_{i,\{t-m,m\geq 3\}} \times SOE_{i,t}$	-0.0672***	-0.0741***	-0.0368*	-0.0783*
	(0.0183)	(0.0259)	(0.0191)	(0.0418)
$SOE_{i,t}$	0.0144*	0.0658***	0.0399***	-0.0288
	(0.0085)	(0.0119)	(0.0088)	(0.0196)
Observations	457,013	457,013	457,013	157,486
Number of Panel_id	78,407	78,407	78,407	49,071
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table reports the heterogeneous inundation effects by ownership type: whether a firm is a state-owned enterprise (SOE) or not. The indicator, $SOE_{i,t}$, equals 1 if firm i is registered as a SOE in year t. The specification of the remaining variables and controls are the same as in Equation (2). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.29: (Extended Panel) Heterogeneous Effects by Firm Size

	y	k	emp	tfp
	(1)	(2)	(3)	(4)
$R0_{i,t}$	0.0144**	-0.0144	-0.0088	-0.0537***
	(0.0064)	(0.0092)	(0.0068)	(0.0141)
$R0_{i,t-1}$	-0.0582***	-0.0253**	-0.0390***	-0.0447**
	(0.0076)	(0.0108)	(0.0080)	(0.0178)
$R0_{i,t-2}$	-0.0721***	-0.0171	-0.0181**	-0.0934***
	(0.0079)	(0.0112)	(0.0083)	(0.0196)
$R0_{i,\{t-m,m\geq 3\}}$	-0.0747***	-0.0308**	-0.0072	-0.0919***
	(0.0087)	(0.0125)	(0.0092)	(0.0210)
$R0_{i,t} \times Large_i$	-0.1488***	-0.0217**	-0.0234***	-0.0923***
	(0.0075)	(0.0107)	(0.0079)	(0.0164)
$R0_{i,t-1} \times Large_i$	-0.1493***	-0.0190	-0.0302***	-0.1151***
	(0.0093)	(0.0133)	(0.0098)	(0.0208)
$R0_{i,t-2} \times Large_i$	-0.1355***	-0.0354**	-0.0448***	-0.1430***
	(0.0101)	(0.0144)	(0.0107)	(0.0229)
$R0_{i,\{t-m,m\geq 3\}} \times Large_i$	-0.1755***	-0.0446***	-0.0852***	-0.1284***
	(0.0112)	(0.0158)	(0.0117)	(0.0256)
$R0_{i,t} \times Giant_i$	-0.1897***	-0.0634***	-0.0523***	-0.1133***
	(0.0114)	(0.0163)	(0.0121)	(0.0231)
$R0_{i,t-1} \times Giant_i$	-0.2147***	-0.0807***	-0.0717***	-0.1892***
	(0.0140)	(0.0200)	(0.0148)	(0.0288)
$R0_{i,t-2} \times Giant_i$	-0.2191***	-0.1025***	-0.1175***	-0.2184***
	(0.0153)	(0.0217)	(0.0160)	(0.0319)
$R0_{i,\{t-m,m\geq 3\}} \times Giant_i$	-0.2451***	-0.1393***	-0.2053***	-0.2703***
	(0.0167)	(0.0236)	(0.0174)	(0.0362)
Observations	457,013	457,013	457,013	157,486
Number of Panel_id	78,407	78,407	78,407	49,071
Control for Spillovers (R1-10)	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-07

Notes: This table reports the heterogeneous inundation effects by firm size. We classify a firm (within an industry) to be large (vs. giant) in a year if its sales revenues are above the 50th-percentile but less than the 90th-percentile (vs. above the 90th-percentile) cutoff of the industry in that year. The firm-specific indicator, $Large_i$ ($Giant_i$), is defined such that it equals 1 if firm i is classified to be large (vs. giant) in the year prior to the treatment for a treated (inundated) firm. The specifications of the remaining variables and controls are the same as in Equation (2). Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.30: (Extended Panel) Heterogeneous Effects on Output by Sector

Sector:	Other manufactures	Recycle and repair	Computers and electronic equipment	Food, beverages, and tobacco	Machinery	Automobiles and transport equipment	Mineral and metal products
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$R0_{i,t}$	-0.1140***	-0.1129***	-0.0912***	-0.0851***	-0.0849***	-0.0836***	-0.0739***
	(0.0419)	(0.0413)	(0.0164)	(0.0176)	(0.0149)	(0.0205)	(0.0134)
$R0_{i,t-1}$	-0.1128**	-0.1778***	-0.1557***	-0.1270***	-0.1883***	-0.1474***	-0.1357***
	(0.0509)	(0.0477)	(0.0187)	(0.0200)	(0.0170)	(0.0234)	(0.0155)
$R0_{i,t-2}$	-0.1722***	-0.2192***	-0.1546***	-0.1812***	-0.1610***	-0.1848***	-0.1570***
	(0.0510)	(0.0494)	(0.0191)	(0.0210)	(0.0174)	(0.0236)	(0.0160)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1442**	-0.3576***	-0.1642***	-0.1949***	-0.1726***	-0.2174***	-0.1523***
	(0.0579)	(0.0560)	(0.0211)	(0.0233)	(0.0194)	(0.0264)	(0.0185)
Observations	7,990	7,049	51,858	36,561	59,522	37,614	62,000
Number of Panel_id	2,760	2,022	10,607	6,737	13,288	7,920	14,734
Control for Spillovers (R1-10)	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14

Sector:	Textile, apparel, and footwear	Paper, printing, and art products	Wood and furniture	Chemical, rubber, and plastic products	Gas, electricity, and water	Mining
	(8)	(9)	(10)	(11)	(12)	(13)
$R0_{i,t}$	-0.0735***	-0.0660***	-0.0500	-0.0474***	-0.0264	0.0253
	(0.0134)	(0.0181)	(0.0338)	(0.0140)	(0.0235)	(0.0390)
$R0_{i,t-1}$	-0.1601***	-0.1196***	-0.1697***	-0.1349***	-0.0561**	-0.0391
	(0.0149)	(0.0207)	(0.0399)	(0.0161)	(0.0259)	(0.0447)
$R0_{i,t-2}$	-0.1811***	-0.1430***	-0.1619***	-0.1294***	-0.0539*	-0.0729
	(0.0151)	(0.0214)	(0.0420)	(0.0166)	(0.0278)	(0.0479)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1984***	-0.1616***	-0.1910***	-0.1697***	-0.0982***	-0.0343
	(0.0170)	(0.0241)	(0.0473)	(0.0185)	(0.0306)	(0.0564)
Observations	61,328	27,769	9,730	60,867	18,353	9,138
Number of Panel_id	10,461	5,184	2,074	12,393	3,037	2,206
Control for Spillovers (R1-10)	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES
Sample Period	2000-14	2000-14	2000-14	2000-14	2000-14	2000-14

Notes: This table reports the inundation effects by sector. We group the original 40 sectors (at 2-digit GB/T level) into 13 broad sectors by similarity of production structures. Sectors are ranked in descending order of the immediate inundation effect (coefficient of $R0_{i,t}$). We estimate the benchmark specification of Equation (2) by sector (dropping the sector-year fixed effect controls). The neighborhood spillover effects are controlled for with the more compact indicator $R1\text{-}10_{i,t-m} \equiv \sum_{k=1}^{10} Rk_{i,t-m}$. Refer to the footnotes in Table A.20 for further details on the estimation method and the sample used.

Table A.31: (Extended Panel) Economy-wide Effect of Inundation on Output

Flood year	# Firms	Immediate effect	Lagged 1-year effect	Lagged 2-year effect	Long-run effect
		(billion RMB)			
Panel A: Inundated firms					
2000	700	-3.5	-6.0	-6.1	-83.1
2002	4339	-16.1	-34.2	-36.3	-441.1
2003	7558	-39.5	-72.0	-86.2	-783.7
2004	4561	-19.7	-46.7	-55.3	-359.2
2005	5092	-32.9	-76.7	-93.5	-511.3
2006	3331	-19.7	-46.6	-35.0	-251.9
2007	6502	-48.7	-71.1	-83.5	-386.7
2008	3186	-25.0	-54.2	-70.2	-258.5
2011	249	-3.2	-7.7	-9.3	-4.0
2012	1480	-22.1	-44.1	-34.2	
2013	1433	-24.7	-30.8		
2014	14102	-295.1			
Total	**52533**	**-550.1**	**-490.0**	**-509.6**	**-3079.5**
Panel B: Non-inundated firms located in the 20km neighborhood					
2000	11261	-0.5	-5.4	8.3	62.1
2002	79075	-9.6	-67.3	41.3	198.1
2003	118211	-18.2	-120.8	67.4	261.9
2004	23742	-6.6	-36.8	7.0	12.9
2005	136063	-22.4	-157.1	89.5	210.4
2006	14000	-4.8	-23.9	3.1	9.7
2007	205536	-50.5	-250.8	98.8	200.7
2008	213250	-32.1	-227.4	203.6	305.9
2011	9657	-2.8	-20.2	21.2	4.9
2012	24850	-9.5	-66.3	29.2	
2013	16758	-8.1	-27.1		
2014	32780	-46.8			
Total	**885183**	**-211.8**	**-1003.2**	**569.5**	**1266.5**

Notes: This table presents the economy-wide impacts of inundation on firm outputs by applying the benchmark estimates of the immediate effects, the lagged effects (cf. Table A.20), and the spillover effects (cf. Figure A.1) to the output matrix of the firms, for each year during 2000–2014 (excluding 2010). Panel A reports the impacts on inundated firms, while Panel B reports the impacts on non-inundated firms located in the 20km neighborhood of the inundation areas. The first column indicates the year when floods occurred, and the second column shows the number of affected firms (inundated, or non-inundated but located within 20 kilometers of the inundation areas). The next four columns report the corresponding dynamic effects.

Table A.32: (Extended Panel) Immediate Effect of Inundation on Output by Province

Province	# Floods	# Inundated firms	Output losses (billion RMB)	Loss share	Loss per firm (million RMB)
Hubei	19	2330	-10.9	2.0%	-4.7
Guangdong	14	22401	-334.6	60.8%	-14.9
Yunnan	13	798	-7.7	1.4%	-9.6
Jiangsu	12	3091	-24.9	4.5%	-8.1
Chongqing	11	1452	-11.0	2.0%	-7.6
Hunan	11	1159	-4.8	0.9%	-4.2
Sichuan	11	3706	-19.3	3.5%	-5.2
Anhui	10	539	-5.1	0.9%	-9.4
Fujian	10	1227	-7.4	1.3%	-6.0
Jiangxi	10	665	-2.4	0.4%	-3.5
Shandong	10	2435	-17.4	3.2%	-7.1
Guangxi	9	1007	-8.3	1.5%	-8.2
Inner Mongolia	9	512	-9.0	1.6%	-17.6
Zhejiang	8	3275	-14.7	2.7%	-4.5
Heilongjiang	7	1777	-11.6	2.1%	-6.5
Guizhou	6	611	-2.6	0.5%	-4.3
Jilin	6	1251	-9.9	1.8%	-7.9
Gansu	4	455	-2.2	0.4%	-4.7
Shanghai	4	877	-12.2	2.2%	-13.9
Hebei	3	43	-0.8	0.1%	-18.5
Ningxia	3	416	-2.5	0.5%	-6.0
Shaanxi	3	174	-0.3	0.1%	-1.8
Henan	2	166	-0.6	0.1%	-3.8
Liaoning	2	1466	-21.4	3.9%	-14.6
Shanxi	2	205	-1.3	0.2%	-6.3
Tianjin	2	293	-3.5	0.6%	-12.0
Beijing	1	153	-3.6	0.7%	-23.7
Total		**52533**	**-550.1**		**-10.5**

Notes: This table reports the immediate effects of floods on inundated firms' outputs by province, using the benchmark estimates reported in Table A.20. The second column lists the number of floods experienced by each province during the period of 2000–2014 (excluding 2010). The third and fourth columns display the number of inundated firms and the aggregate output losses in each province. The next column calculates the output loss share of each province, and the last column presents the average output loss per inundated firm.

Table A.33: (Extended Panel) Immediate Effect of Inundation on Output by Sector

No.	Sector	# Inundated firms	Direct output loss (billion RMB)	Loss share	Loss per firm (million RMB)
1	Mining	1658	0.0	0.0%	0.0
2	Food, beverages and tobacco	4594	-50.6	10.5%	-11.0
3	Textile, apparel and foot wear	6519	-29.1	6.1%	-4.5
4	Wood and furniture	1783	0.0	0.0%	0.0
5	Paper, printing and art products	3315	-22.6	4.7%	-6.8
6	Chemical, rubber and plastics products	6158	-45.8	9.5%	-7.4
7	Mineral and metal products	8078	-71.3	14.8%	-8.8
8	Machinery	5687	-37.0	7.7%	-6.5
9	Automobiles and transport equipments	3553	-45.1	9.4%	-12.7
10	Computers and electronic equipments	6312	-156.3	32.6%	-24.8
11	Other manufacture	1142	-11.4	2.4%	-10.0
12	Recycle and repair	885	-11.2	2.3%	-12.6
13	Gas, electricity and water	1561	0.0	0.0%	0.0
Total		**51245**	**-480.2**		**-9.4**

Notes: This table presents the immediate effects of floods on inundated firms' outputs by sector, using the sector-specific estimates reported in Table A.30. The third and fourth columns report the number of inundated firms and the aggregate output losses in each sector. The last two columns calculate the loss share and loss per inundated firm in each sector.

Table A.34: (Extended Panel) Exposure to Floods via Input-Output Linkages

No.	Sector	Direct output loss (billion RMB)	Loss share (%)	Downstream exposure (billion RMB)	Exposure share (%)	Upstream exposure (billion RMB)	Exposure share (%)
0	Agriculture	-	-	-58.7	5.0	-26.4	1.4
1	Mining	0.0	0.0	-98.0	8.4	-48.5	2.6
2	Food, beverages and tobacco	-50.6	10.5	-23.7	2.0	-40.3	2.2
3	Textile, apparel and foot wear	-29.1	6.1	-32.7	2.8	-62.1	3.3
4	Wood and furniture	0.0	0.0	-6.7	0.6	-52.2	2.8
5	Paper, printing and art products	-22.6	4.7	-32.5	2.8	-64.1	3.4
6	Chemical, rubber and plastics products	-45.8	9.5	-139.8	11.9	-62.8	3.4
7	Mineral and metal products	-71.3	14.8	-219.4	18.7	-78.7	4.2
8	Machinery	-37.0	7.7	-49.1	4.2	-95.2	5.1
9	Automobiles and transport equipments	-45.1	9.4	-77.9	6.6	-102.9	5.5
10	Computers and electronic equipments	-156.3	32.6	-142.1	12.1	-191.6	10.3
11	Other manufacture	-11.4	2.4	-5.7	0.5	-64.3	3.5
12	Recycle and repair	-11.2	2.3	-8.8	0.8	0.0	0.0
13	Gas, electricity and water	0.0	0.0	-60.6	5.2	-53.1	2.9
26	Construction	-	-	-4.4	0.4	-82.5	4.4
27	Transportation and storage	-	-	-57.6	4.9	-49.8	2.7
28	Postal activities	-	-	-0.9	0.1	-46.1	2.5
29	Information and communication	-	-	-16.4	1.4	-83.2	4.5
30	Wholesale and retail trade	-	-	-49.7	4.2	-41.4	2.2
31	Accommodation and food services	-	-	-13.6	1.2	-40.1	2.2
32	Financial and insurance activities	-	-	-21.1	1.8	-29.0	1.6
33	Real estate activities	-	-	-3.8	0.3	-15.4	0.8
34	Rental, leasing and business services	-	-	-27.0	2.3	-101.9	5.5
35	Scientific research	-	-	-1.1	0.1	-93.4	5.0
36	Polytechnic services	-	-	-4.6	0.4	-59.4	3.2
37	Administration of public facilities	-	-	-1.0	0.1	-53.3	2.9
38	Residential and other services	-	-	-7.8	0.7	-47.7	2.6
39	Education	-	-	-1.9	0.2	-30.9	1.7
40	Health care and social welfare	-	-	-3.6	0.3	-67.1	3.6
41	Culture, sports and entertainment	-	-	-3.1	0.3	-45.2	2.4
42	Public administration	-	-	0.0	0.0	-32.0	1.7
	Total	**-480.2**		**-1173.3**		**-1860.5**	

Notes: This table reports the propagation and amplification of the flood impact through input-output linkages. The third column reports the direct output losses in each sector (cf. Table A.33). Since ASIF covers only the industrial firms in Sectors 1–13, based on which our regression analysis was conducted, the direct output losses for the non-industrial sectors are taken to be missing. Column 5 reports the total exposure of each sector to downstream inundations based on the formula: $(\mathbf{I}-\mathbf{A})^{-1}\mathbf{F}-\mathbf{F}$, where $\mathbf{F}$ is the direct exposure vector indicated in Column 3, and $\mathbf{A}$ is the input-output coefficient matrix derived from the 2005 Chinese IO table. Column 7 reports the total exposure of each sector to upstream inundations, defined as: $\left(\mathbf{F}'\left(\mathbf{I}-\mathbf{A}\right)^{-1}-\mathbf{F}'\right)'$.

Table A.35: (DFO I) National Sample and Estimation Sample (2000–2009)
treatment status measured by DFO inundation area based on DFO-identified flood events

National Sample

		firm-year observations			
treated	firm	treated obs.	untreated obs.	total obs.	firm share
0	269,061	0	715,433	715,433	42%
1	170,983	170,983	461,274	632,257	27%
> 1 (2-8)	194,097	558,160	637,692	1,195,852	31%
total	634,141	729,143	1,814,399	2,543,542	
obs. share		29%	71%		

Estimation Sample

		firm-year observations			
treated	firm	treated obs.	untreated obs.	total obs.	firm share
0	42,954	0	170,731	170,731	20%
1	170,983	170,983	461,274	632,257	80%
total	213,937	170,983	632,005	802,988	
obs. share		21%	79%		

Notes: The column 'treated' lists the incidence of inundation. The column 'firm' indicates the firm count for each category of inundation incidence. The columns under 'firm-year obs.' indicates the number of firm-year observations corresponding to the set of firms classified under each category of inundation incidence. For example, in the estimation sample, 170,983 firms were *ever inundated* during 2000–2009, and this set of firms has a total of 170,983 treated firm-year observations, 461,274 untreated firm-year observations, and 632,257 total firm-year observations across years during 2000–2009. The column 'firm share' indicates the proportion in terms of firm count relative to the total firm count for each set of firms. The row 'obs. share' indicates the proportion of treated and untreated firm-year observations relative to the total firm-year observations.

Table A.36: (DFO I) Dynamic and Spatial Spillover Impacts of Floods — Concentric Ring Analysis

	y		k		emp		tfp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control for Spillovers	NO	YES	NO	YES	NO	YES	NO	YES
$R0_{i,t}$	-0.0671***	-0.0687***	-0.0087	-0.0133	-0.0161***	-0.0160***	-0.0875***	-0.0931***
	(0.0054)	(0.0057)	(0.0078)	(0.0082)	(0.0046)	(0.0048)	(0.0102)	(0.0108)
$R0_{i,t-1}$	-0.1235***	-0.1273***	-0.0273***	-0.0312***	-0.0458***	-0.0456***	-0.1427***	-0.1508***
	(0.0065)	(0.0068)	(0.0094)	(0.0098)	(0.0056)	(0.0058)	(0.0158)	(0.0163)
$R0_{i,t-2}$	-0.1434***	-0.1449***	-0.0086	-0.0078	-0.0450***	-0.0399***	-0.1728***	-0.1848***
	(0.0076)	(0.0078)	(0.0109)	(0.0112)	(0.0065)	(0.0067)	(0.0190)	(0.0198)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1759***	-0.1788***	-0.0504***	-0.0535***	-0.0680***	-0.0650***	-0.2066***	-0.2244***
	(0.0100)	(0.0102)	(0.0144)	(0.0147)	(0.0086)	(0.0088)	(0.0256)	(0.0262)
Observations	354,536	354,536	354,536	354,536	354,536	354,536	139,632	139,632
Number of Panel_id	119,235	119,235	119,235	119,235	119,235	119,235	63,463	63,463
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07

Notes: This table reports the counterpart of Table 5 based on an alternative treatment assignment as a robustness check. In the main analysis, treated firms are identified according to the inundation areas mapped by the GFD. In this robustness check, treated firms are instead identified based on the inundation areas mapped by the DFO, according to all flood events catalogued by DFO as documented in Table 1. For further details, refer to the footnotes in Table 5.

Table A.37: (DFO II) National Sample and Estimation Sample (2000–2009)
treatment status measured by DFO inundation area based on GFD-identified flood events

National Sample

treated	firm	firm-year observations: treated obs.	firm-year observations: untreated obs.	firm-year observations: total obs.	firm share
0	308,200	0	864,195	864,195	49%
1	190,871	190,871	580,892	771,763	30%
>1 (2-5)	135,070	327,794	579,790	907,584	21%
total	634,141	518,665	2,024,877	2,543,542	
obs. share		20%	80%		

Estimation Sample

treated	firm	firm-year observations: treated obs.	firm-year observations: untreated obs.	firm-year observations: total obs.	firm share
0	50,499	0	211,789	211,789	21%
1	190,871	190,871	580,892	771,763	79%
total	241,370	190,871	792,681	983,552	
obs. share		19%	81%		

Notes: The column 'treated' lists the incidence of inundation. The column 'firm' indicates the firm count for each category of inundation incidence. The columns under 'firm-year obs.' indicates the number of firm-year observations corresponding to the set of firms classified under each category of inundation incidence. For example, in the estimation sample, 190,871 firms were *ever inundated* during 2000–2009, and this set of firms has a total of 190,871 treated firm-year observations, 580,892 untreated firm-year observations, and 771,763 total firm-year observations across years during 2000–2009. The column 'firm share' indicates the proportion in terms of firm count relative to the total firm count for each set of firms. The row 'obs. share' indicates the proportion of treated and untreated firm-year observations relative to the total firm-year observations.

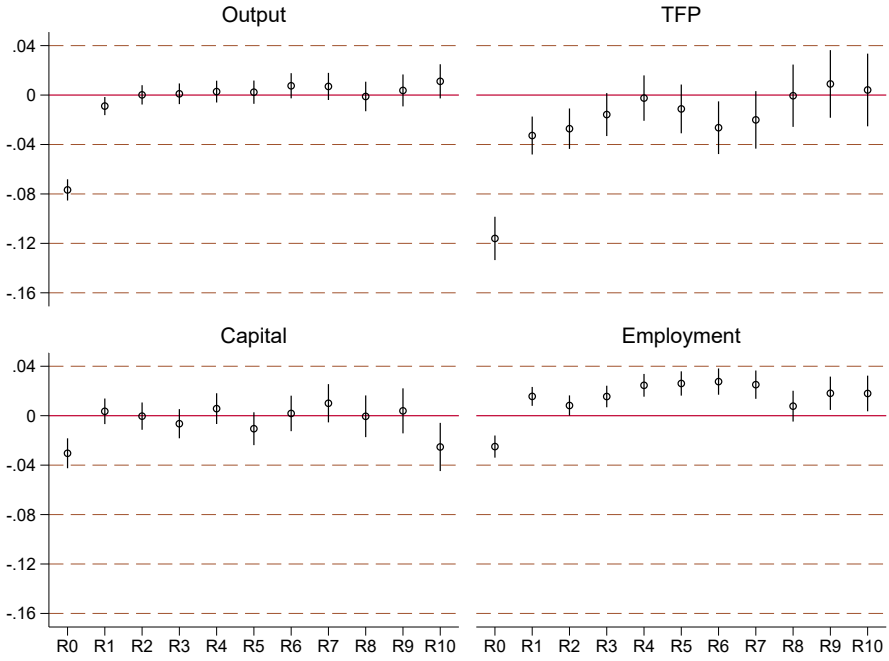
Table A.38: (DFO II) Dynamic and Spatial Spillover Impacts of Floods — Concentric Ring Analysis

	y		k		emp		tfp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control for Spillovers	NO	YES	NO	YES	NO	YES	NO	YES
$R0_{i,t}$	-0.0436***	-0.0460***	-0.0016	-0.0066	-0.0089**	-0.0082*	-0.0746***	-0.0845***
	(0.0047)	(0.0051)	(0.0069)	(0.0075)	(0.0041)	(0.0045)	(0.0085)	(0.0093)
$R0_{i,t-1}$	-0.0771***	-0.0823***	-0.0008	0.0029	-0.0232***	-0.0243***	-0.1000***	-0.1032***
	(0.0054)	(0.0057)	(0.0078)	(0.0083)	(0.0047)	(0.0050)	(0.0141)	(0.0149)
$R0_{i,t-2}$	-0.0787***	-0.0796***	0.0243***	0.0311***	-0.0200***	-0.0184***	-0.1043***	-0.1117***
	(0.0059)	(0.0063)	(0.0085)	(0.0090)	(0.0051)	(0.0054)	(0.0153)	(0.0160)
$R0_{i,\{t-m,m\geq 3\}}$	-0.1171***	-0.1207***	-0.0010	0.0008	-0.0314***	-0.0313***	-0.1373***	-0.1521***
	(0.0081)	(0.0084)	(0.0117)	(0.0122)	(0.0070)	(0.0073)	(0.0224)	(0.0232)
Observations	455,056	455,056	455,056	455,056	455,056	455,056	191,087	191,087
Number of Panel_id	142,444	142,444	142,444	142,444	142,444	142,444	81,456	81,456
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector×Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County-Year Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Sample Period	2000-09	2000-09	2000-09	2000-09	2000-09	2000-09	2000-07	2000-07

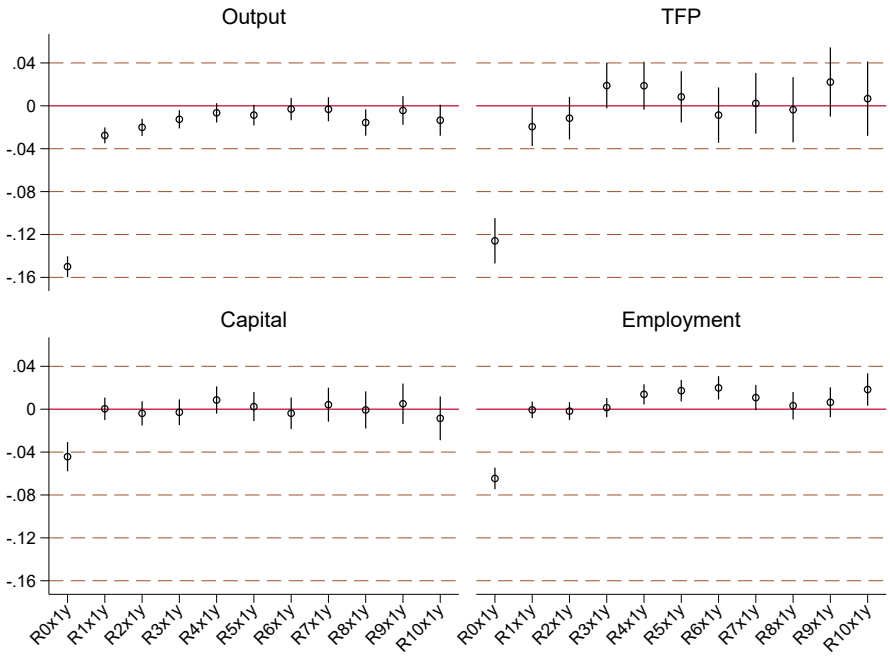
Notes: This table reports the counterpart of Table 5 based on an alternative treatment assignment as a robustness check. In the main analysis, treated firms are identified according to the inundation areas mapped by the GFD. In this robustness check, treated firms are instead identified based on the inundation areas mapped by the DFO, but restricted to the subset of flood events that were successfully verified by the GFD detection algorithm as documented in Table 1. For further details, refer to the footnotes in Table 5.

Figure A.1: (Extended Panel) Spillover Effects on Neighboring Non-inundated Firms

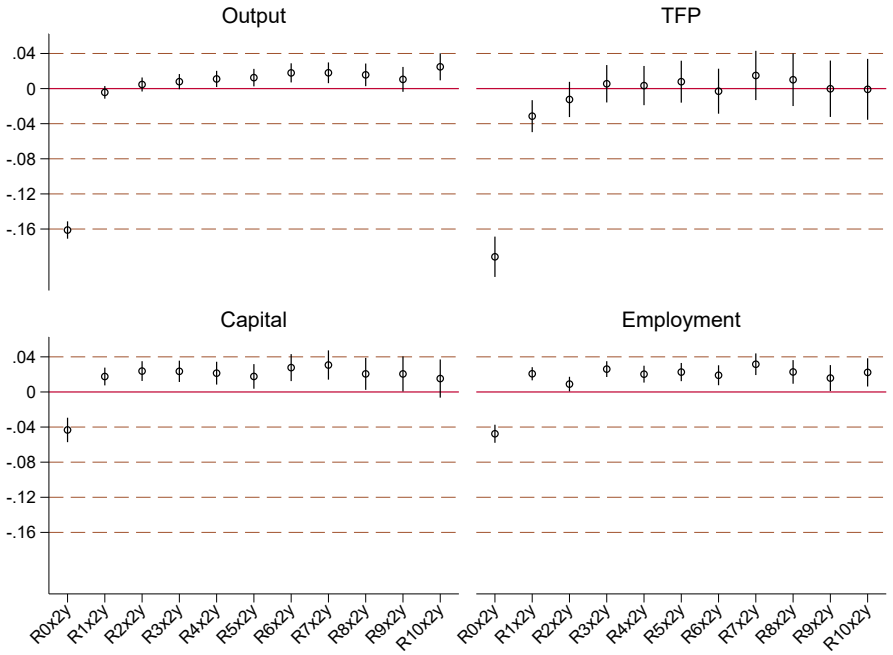
(A) Contemporaneous Effects



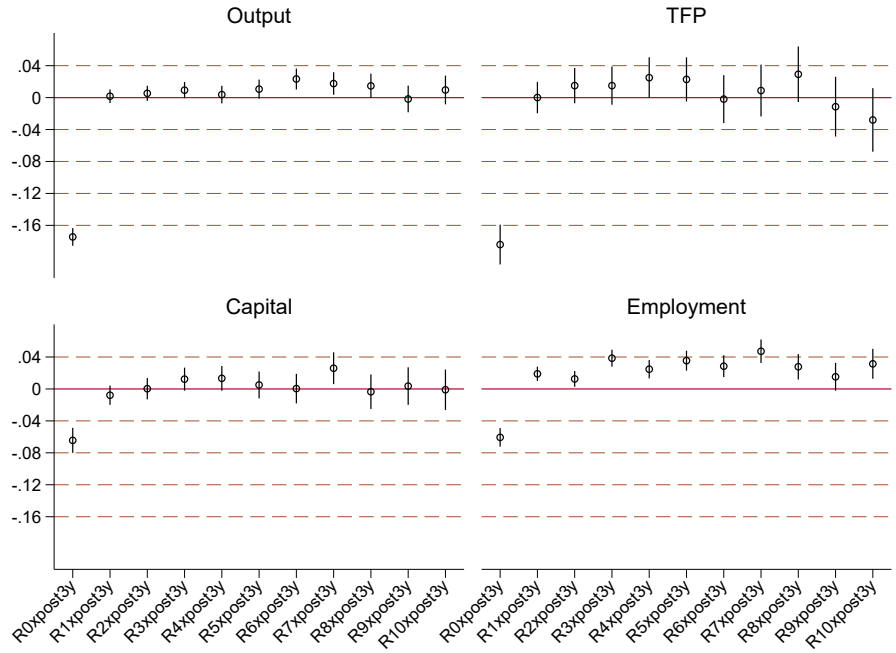
(B) 1-year Lagged Effects



(C) 2-year Lagged Effects



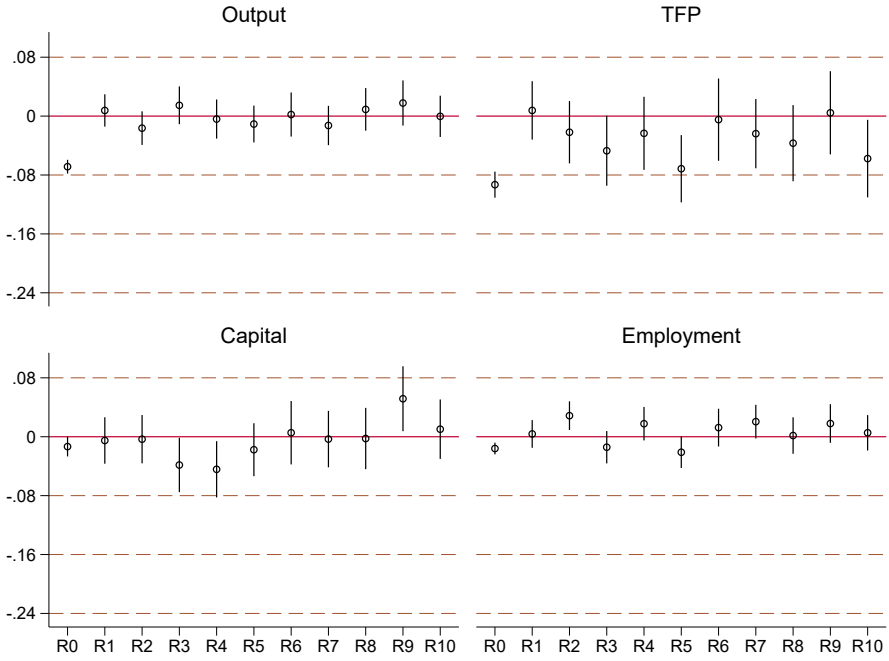
(D) Long-run Effects



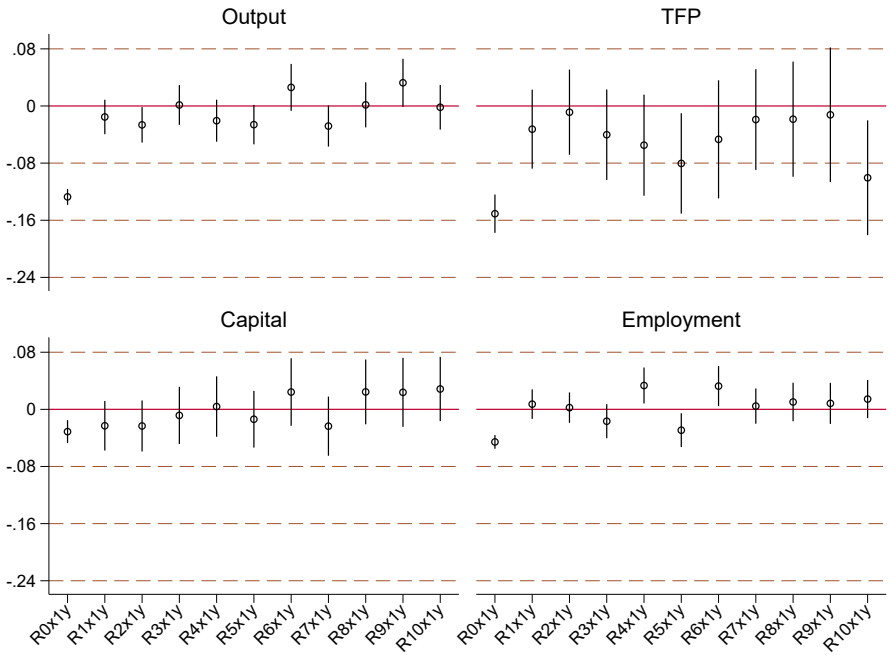
Notes: The figure plots the effects of flooding on the performance measures of the inundated firms (indicated by $R0$) and neighboring non-inundated firms located in each of the ten rings surrounding the inundation area (indicated by Rk for firms in the k-th ring). Point estimates and 90 percent confidence intervals are estimated based on Equation (2). Panels (A)–(D) illustrate the contemporaneous effects, 1-year lagged effects, 2-year lagged effects, and long-run (3-year onwards) lagged effects of the floods, respectively. The estimation sample as documented in Table A.17 is used.

Figure A.2: (DFO I) Spillover Effects on Neighboring Non-inundated Firms

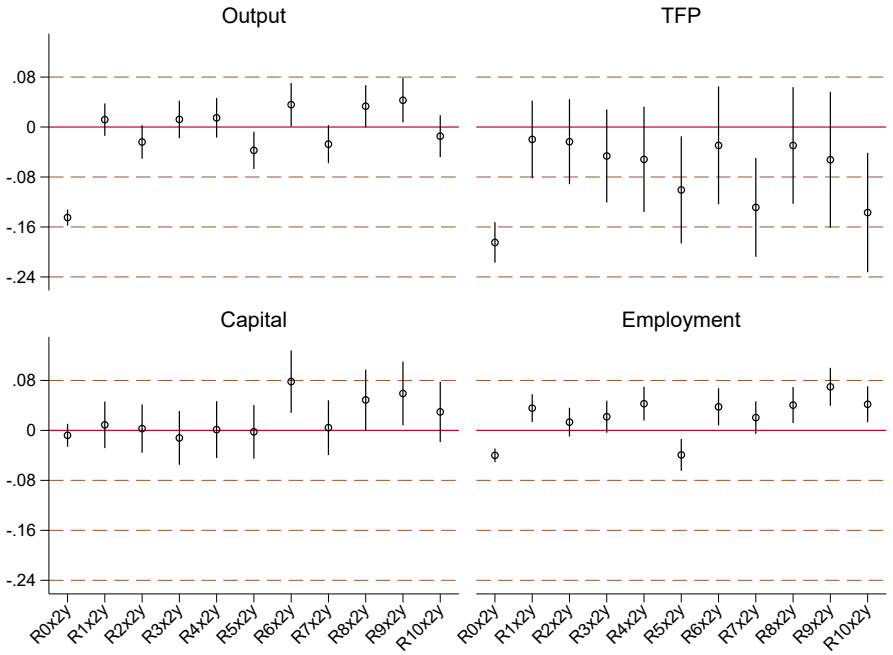
(A) Contemporaneous Effects



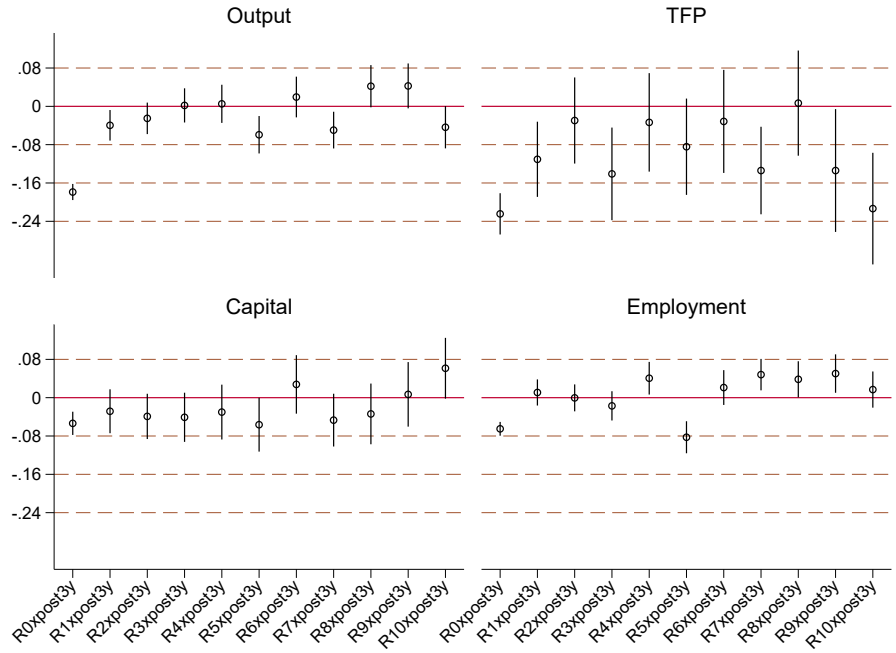
(B) 1-year Lagged Effects



(C) 2-year Lagged Effects



(D) Long-run Effects

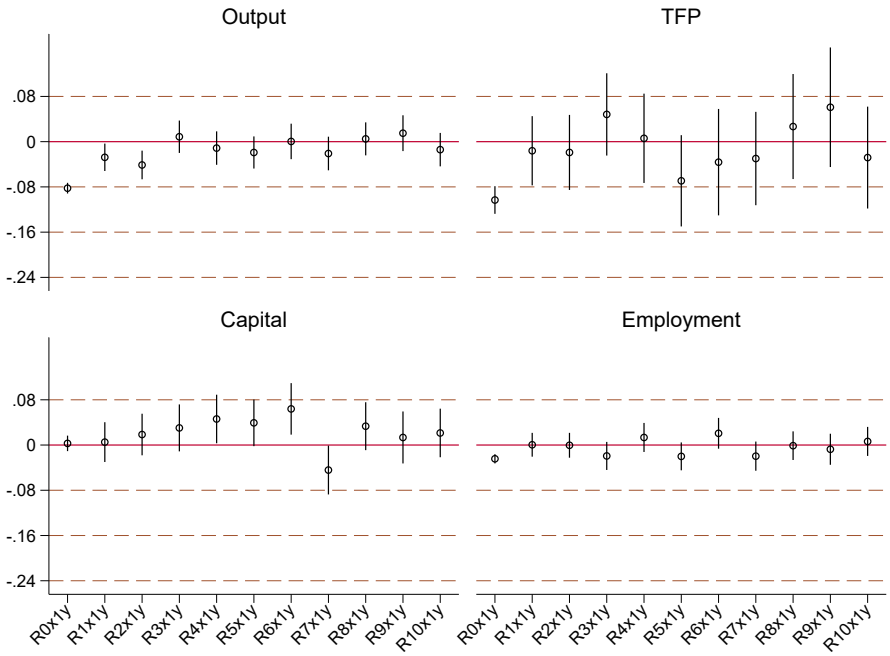


Notes: The figure plots the effects of flooding on the performance measures of the inundated firms (indicated by $R0$) and neighboring non-inundated firms located in each of the ten rings surrounding the inundation area (indicated by Rk for firms in the k-th ring). Point estimates and 90 percent confidence intervals are estimated based on Equation (2). Panels (A)–(D) illustrate the contemporaneous effects, 1-year lagged effects, 2-year lagged effects, and long-run (3-year onwards) lagged effects of the floods, respectively. The estimation sample as documented in Table A.35 is used.

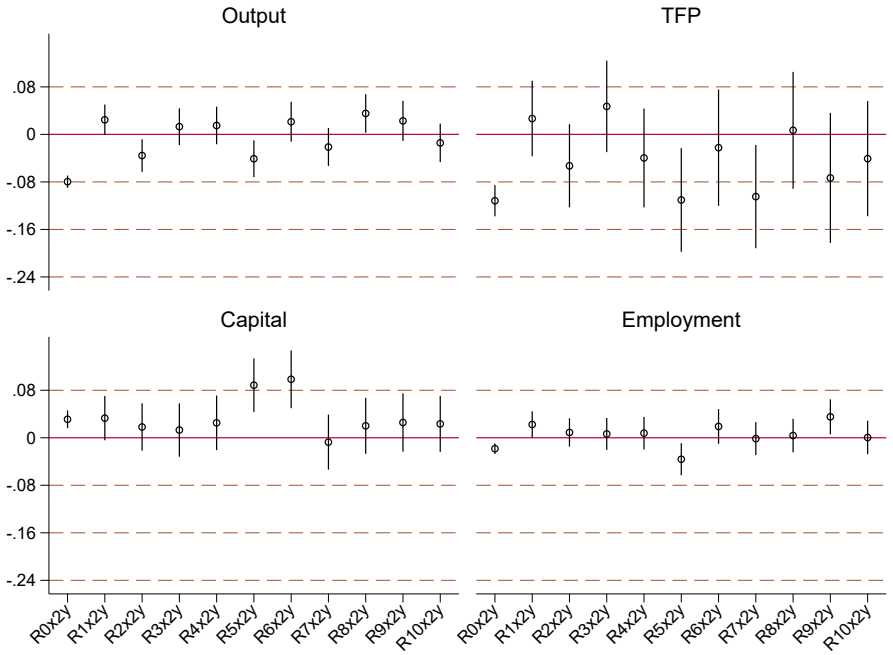
Figure A.3: (DFO II) Spillover Effects on Neighboring Non-inundated Firms

(A) Contemporaneous Effects

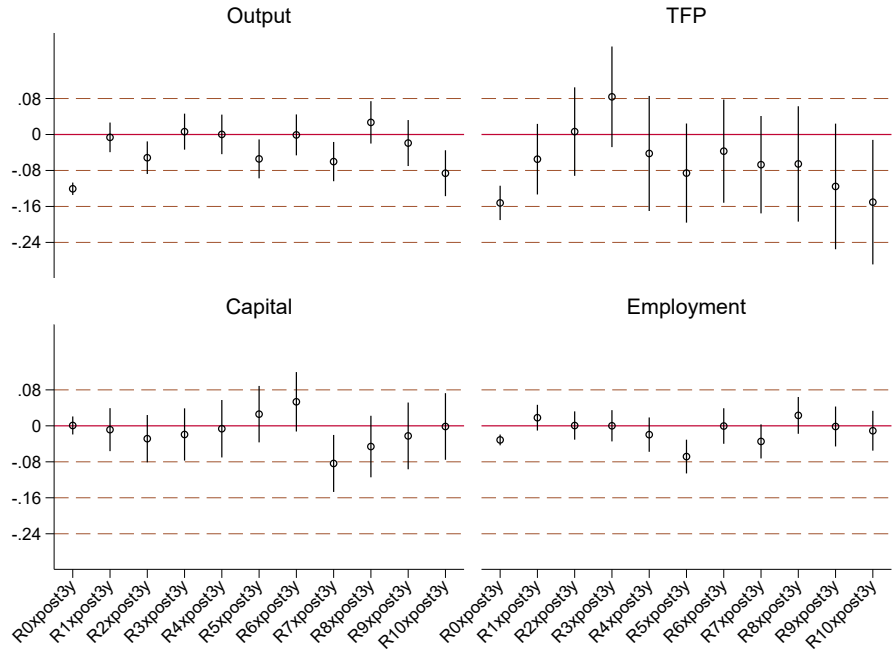
(B) 1-year Lagged Effects



(C) 2-year Lagged Effects



(D) Long-run Effects



Notes: The figure plots the effects of flooding on the performance measures of the inundated firms (indicated by $R0$) and neighboring non-inundated firms located in each of the ten rings surrounding the inundation area (indicated by Rk for firms in the k-th ring). Point estimates and 90 percent confidence intervals are estimated based on Equation (2). Panels (A)–(D) illustrate the contemporaneous effects, 1-year lagged effects, 2-year lagged effects, and long-run (3-year onwards) lagged effects of the floods, respectively. The estimation sample as documented in Table A.37 is used.