Natural disasters and business groups:

Propagation through ownership networks and reshoring dynamics

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Introduction

Background

- Over the last decades, the offshoring of manufacturing activities has reshaped the world economic geography.
- Since the 2008 financial crisis, the world economy entered a new phase, characterised by a stagnation of trade and foreign direct investment.
- Over the last few years, the media provided extensive coverage to some manufacturing companies backshoring activities to their home countries
- More recently, virtually all advanced economies included measures aimed at the repatration of foreign assets of major domestic MNEs in their Recovery Plans.
- Despite some anecdotal evidence, empirical studies have found a only limited effect of reshoring dynamics on home economies.
- Foreign divestment is found to be associated with domestic capital investment rather than employment change in parent firms (De Backer et al., 2016).

Research question

Do idiosyncratic shocks to foreign affiliates lead to reshoring of economic activity to home countries?

If this is the case, do these shocks lead to a restructuring of parent firm skill composition?

Contributions

1. Study the effect of local shocks on foreign affiliates of large multilayer international business groups
2. Investigate the propagation of local shocks through international ownership networks.
3. Analyse how reshoring decisions affect different worker types and firm technology.

Literature (1)

Reshoring decisions

- An interdisciplinary literature investigates the main drivers of reshoring decisions.
- Divestment patterns have been analysed with respect to the performance of the affiliate (Brauer, 2006; Berry 2010, 2013), group characteristics (Berry 2010, 2013), home and host drivers (Berry 2013; Javorcik and Poelhekke, 2017) and tax agreements (Blake and Moschieri, 2017).
- Shift-share instruments proxying world export supply or world input demand are unlikely to be exogenous, given the role played by some BGs play in destination countries.
- We contribute to this literature, exploiting exogenous shocks to identify the causal effect of divestment decisions on domestic employment.

Ownership Networks

- Historically, empirical analysis on MNEs have been limited by the absence of firm-level data on complex ownership structures.
- Recently, the availability of new micro-dataset (i.e. BVD Orbis Historical) and innovative algorithms (Altomonte and Rungi, 2013; Rungi et al., 2017) have shed new light on complex ownership structures.
- Sonno (2020) applies a similar algorithm in a panel setting to map the ownership structures of BGs operating in Africa to study the link between MNE activity and local violence.
- We develop a similar algorithm and analyse changes in BGs' structure.

Literature (2)

Local shocks

- Several studies have analysed the determinants of disaster mortality (Kahn 2005; Anbarci et al. 2005; Escaleras et al. 2007; Plumper and Neumayer 2009, Keefer et al. 2011) and damage (e.g. Mendelsohn and Saher 2011; Schumacher and Strobl 2011).
- Recent studies have highlighted the importance of institutional stability (Cavallo et al., 2010) and disaster propensity (Neumayer et al., 2014).
- Other studies focus on the propagation of natural disasters in production networks (Barrot & Sauvagnat, 2019; Bohem et al. (2019).
- In this study we contribute to the literature on the economic effects of natural disasters, studying the propagation of local shocks through complex international ownership networks.

This paper

1. Analyses the heterogeneous effect of local shocks on foreign subsidiaries
   - Tests the magnitude of the effect for different shock types
   - Analyses firm heterogeneity in response to the shock
2. Investigates how local shocks propagate through the BG to firms and workers in home countries
   - Analyses the average effect on parent firms
   - Studies to what extent the shocks affect firm's technology and skill composition
3. Exploits a unique set of data:
   - A worldwide ownership network dataset,
   - Worldwide regional data on conflicts and natural disasters
   - Firm-product-country level data on international transactions, provided by French Customs.
   - A matched employer-employee dataset, following 1/12 of French workers over time

Findings

Heterogeneous effects on subsidiaries

- Reshoring more likely the longer the ownership distance and the more upstream is the production process

Indirect effects on parent firms

- Ambiguous effect on parent firms' employment.
- A positive effect is recorded on tangible assets and equipment.

Heterogeneous effects on stayers

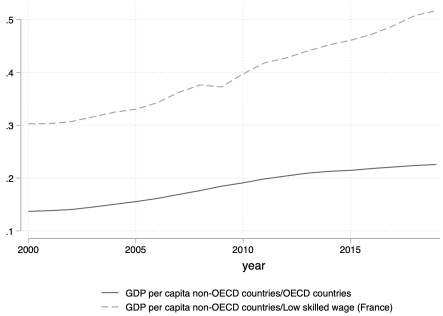
- Limited positive effects on wages
- The effect is more relevant for high skilled workers and can lead to an increase in firm-level wage inequality.

Stylized facts

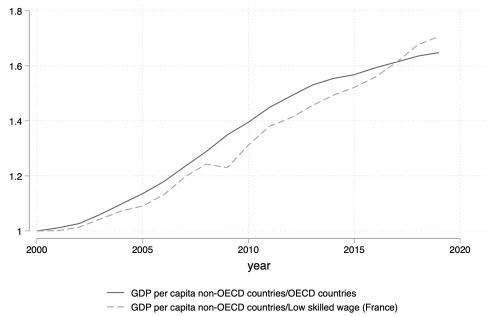
Fact 1: Rising cost of foreign workers

Figure: Labor cost, developed countries vs. RoW

(a) Absolute values



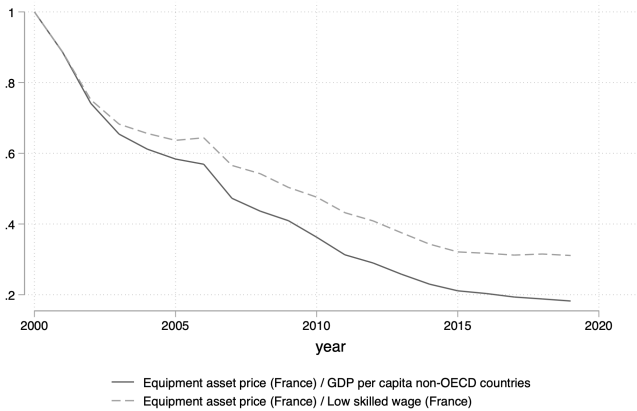
(b) Trends (2000=1)



Sources: DADS, WEO

Fact 2: Rapid decline in the cost of new equipment technologies

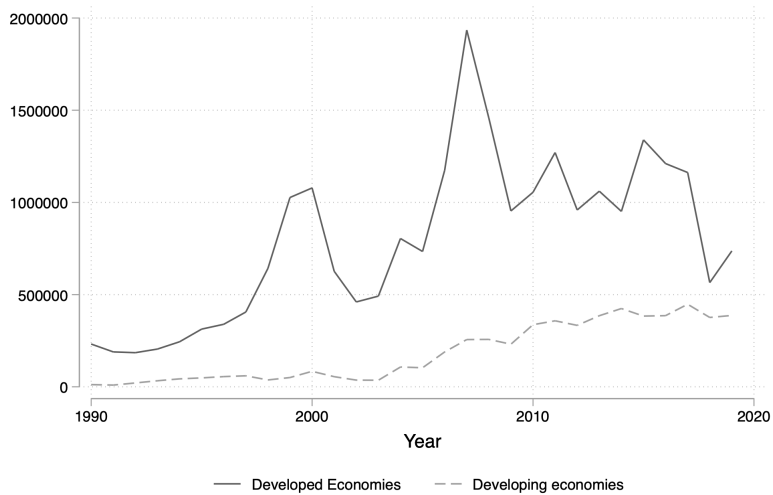
Figure: Equipment asset prices vs. labor cost



Sources: INSEE, WEO

Fact 3: Slowbalisation

Figure: FDI Outflows



Source: UNCTAD, 2022

Theoretical framework

Firm profit functions (1)

- We propose a simple extension of Krenz et al. (2021).
- A representative firm produces Y_t units of a final product using high skilled workers and a measure of one of differentiated intermediate goods, $x(q_t)$.

$$Y_t = L_s^{1-\epsilon} \int_{Q_t}^{Q_t+1} x(q_t)^{\epsilon} dq_t \tag{1}$$

- Firms can produce the intermediate input at home or abroad, using either domestic low-skilled labor, l_{ut}, foreign low-skilled labor, l_{Ft} or domestic automation capital, a_t.

$$x_{Ht} = (l_{ut} + q_t \cdot a_t)^{\alpha}$$
$$x_{Ft} = (l_{Ft})^{\alpha}$$

Firm profit functions (1)

- In order to produce the intermediate input, the firm faces variable costs to remunerate labor ($w_{u,t}l_{u,t}$ or $w_{F,t}l_{F,t}$) and capital ($\eta r a_t$) and potentially a sunk fixed cost required to set up a plant abroad (z_F) or a machine at home (z_a).
- Firms producing abroad face tariffs τ and other trade costs σ if they ship their goods to the home market.
- **We assume imperfect insurance markets: firms are not able to protect their assets**

$$\pi_{H,t} = \epsilon L_s^{1-\epsilon}(l_{u,t} + q_t a_t)^{\alpha\epsilon} - w_{u,t}l_{u,t} - \eta r a_t - (1 - \mathbb{1}_a)z_a$$

$$\pi_{F,t} = \frac{\epsilon L_s^{1-\epsilon}}{\tau\sigma}(l_{F,t})^{\alpha\epsilon} - w_{l,t}l_{F,t} - (1 - \mathbb{1}_F) \cdot z_F$$

$$\mathbb{1}_a = \begin{cases} 0 & \text{if the firm has yet to invest in automation} \\ 1 & \text{if the firm has already invested in automation} \end{cases}$$

$$\mathbb{1}_Z = \begin{cases} 0 & \text{if the firm has yet to invest in the foreign plant} \\ 0 & \text{if } \textbf{the firm has lost the investment as a result of a local shock} \\ 1 & \text{if the firm has already set-up a foreign plant abroad} \end{cases}$$

Firm profit functions (2)

- Every period, profit maximising firms decide whether to change location and/or production process.
- In doing so, they choose the solution that maximises their profit among $\pi_{H,l,t}$, $\pi_{H,A,t}$ and $\pi_{F,t}$.

$$\pi_{H,l,t} = \epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{w_{ut}}\right)^{\frac{1}{1-\alpha\epsilon}}$$

$$\pi_{H,A,t} = \epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon} q_t}{\eta r}\right)^{\frac{1}{1-\alpha\epsilon}} - (1-\mathbb{1})\cdot z_a$$

$$\pi_{F,t} = \epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{w_F \tau\sigma}\right)^{\frac{1}{1-\alpha\epsilon}} - (1-\mathbb{1}_F)\cdot z_F$$

Incumbents

- Firms that have offshored economic activity in time $t-1$ prefer to reshore and hire domestic workers if $\pi^{new}_{H,l,t} > \pi^{inc}_{F,t}$:

$$w_{Ft}(\tau\sigma)^{\frac{1}{\alpha\epsilon}} > \tilde{w}^{l}_{t} \equiv w_{u,t}$$

- Firms that have offshored economic activity in time $t-1$, prefer to reshore and invest in automation if $\pi^{new}_{H,A,t} > \pi^{inc}_{F,t}$:

$$q_t > q^{l}_{F,t} \equiv \left[\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{w_F\tau\sigma}\right)^{\frac{\alpha\epsilon}{1-\alpha\epsilon}} + \frac{z_a}{\epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}}\right]^{\frac{1-\alpha\epsilon}{\alpha\epsilon}} \frac{\eta r}{\alpha\epsilon^2 L_s^{1-\epsilon}}$$

- Firms that have already invested in automation in time $t-1$, prefer to keep exploiting domestic machines rather than offshore if $\pi^{inc}_{H,A,t} > \pi^{new}_{H,l,t}$:

$$q_t > q^{l}_{L,t} \equiv \frac{\eta r}{w_{u,t}}$$

New entrants

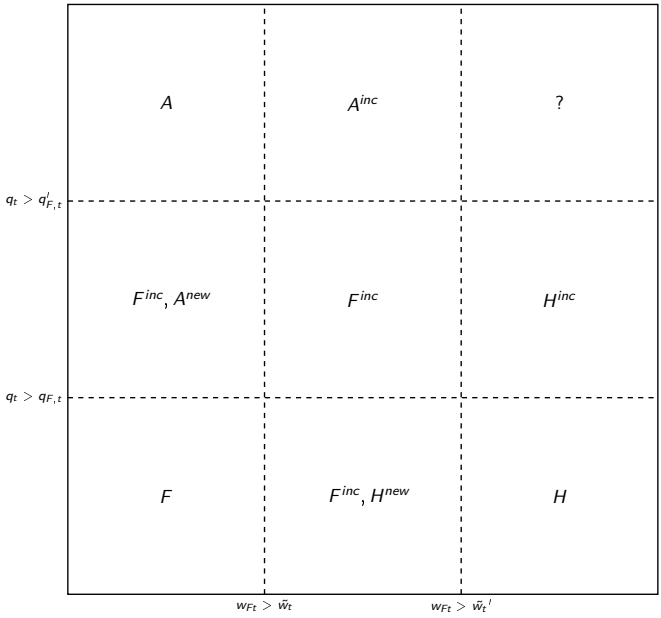
- Firms that have not set up a plant abroad or whose investment has been destroyed by an unexpected shock choose to reshore and hire domestic workers if $\pi^{new}_{H,l,t} > \pi^{inc}_{F,t}$:

$$w_{Ft}(\tau\sigma)^{\frac{1}{\alpha\epsilon}} > \tilde{w}_t \equiv \frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{\left[\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{w_{u,t}}\right)^{\frac{\alpha\epsilon}{1-\alpha\epsilon}} + \frac{z_F}{\epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}}\right]^{\frac{1-\alpha\epsilon}{\alpha\epsilon}}}$$

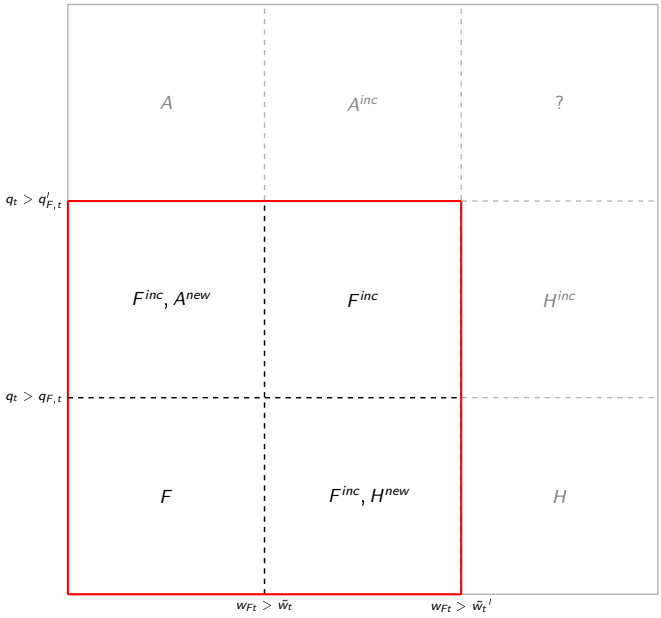
- Firms that have not invested in automation yet prefer to invest in automation rather than offshore if $\pi^{new}_{H,A,t} > \pi^{new}_{F,t}$:

$$q_t > q_{F,t} \equiv \left[\left(\frac{\alpha\epsilon^2 L_s^{1-\epsilon}}{w_F\tau\sigma}\right)^{\frac{\alpha\epsilon}{1-\alpha\epsilon}} + \frac{z_a - z_F}{\epsilon(1-\alpha\epsilon)L_s^{1-\epsilon}}\right]^{\frac{1-\alpha\epsilon}{\alpha\epsilon}} \frac{\eta r}{\alpha\epsilon^2 L_s^{1-\epsilon}}$$

Thresholds


A
A^{inc}
?
$q_t > q^{'}_{F,t}$
F^{inc}, A^{new}
F^{inc}
H^{inc}
$q_t > q_{F,t}$
F
F^{inc}, H^{new}
H
$w_{Ft} > \bar{w}_t$
$w_{Ft} > \bar{w}_t{}^{'}$

Thresholds


A
A^{inc}
?
$q_t > q^{l}_{F,t}$
F^{inc}, A^{new}
F^{inc}
H^{inc}
$q_t > q_{F,t}$
F
F^{inc}, H^{new}
H
$w_{Ft} > \bar{w}_t$
$w_{Ft} > \bar{w}_t{}^{l}$

Propositions

- Proposition 1. If the productivity of automation Q_t or foreign wages w_F increase, the share of firms that offshore their production decreases, which implies reshoring of economic activity.
- Proposition 2. If the firm has not invested in automation or offshored yet, the opportunity cost is lower the more high-skilled workers are employed.
- Proposition 3. Investments in automation or foreign plants fosters stickiness in firm decisions.
- Proposition 4: A natural disaster can force firms that have already invested abroad to replace the lost asset. In this case, incumbent firms face the same trade-off as firms that have not invested abroad yet.

Data

Data: Ownership Network

- Data on global ownership and financial accounts of foreign subsidiaries are retrieved from Orbis, a firm-level database compiled by Bureau Van Dijk.
- BVD collects original information from a variety of national and international registries, regulatory bodies, companies' annual reports, websites and specialised press.
- Following a recent literature (Rungi et al., 2017, Altomonte et al., 2018, Sonno, 2020), we construct business networks using an iterative process.
- The procedure is implemented for the whole period 2010-2019, obtaining a subsidiary-level panel dataset.

Data: Ownership Network

1. Direct control

$$d_{ji} = \begin{cases} 1 \text{ if } \exists j : w_{ji} > 0.5 \\ 0 \text{ if } \exists k \neq j : w_{ki} > 0.5 \\ w_{ji} \text{ otherwise} \end{cases}$$

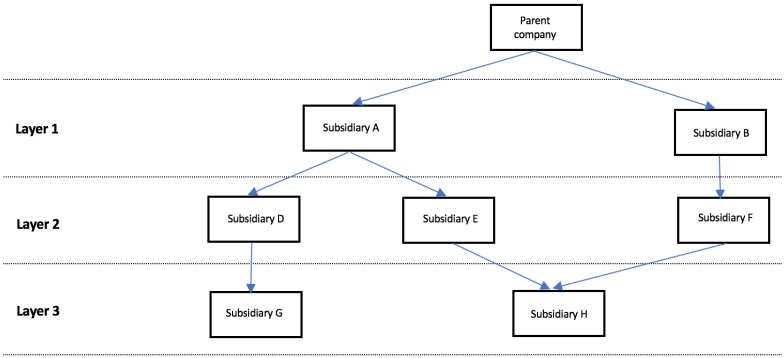
2. Indirect control by transitivity

$$t_{ji} = \begin{cases} 1 \text{ if } \exists j, l : w_{jl} > 0.5 \text{ and } w_{li} > 0.5 \\ 0 \text{ if } \exists k \neq j : w_{kl} > 0.5 \text{ and } w_{li} > 0.5 \\ d_{ji} \text{ otherwise} \end{cases}$$

3. Indirect control by consolidation of voting rights

$$c_{ji} = \begin{cases} 1 \text{ if } t_{ji} + \sum_{q:t_{jq}=1} t_{qi} > 0.5 \\ 0 \text{ if } \exists k \neq j : t_{ki} + \sum_{q:t_{kq}=1} t_{qi} > 0.5 \\ t_{ji} \text{ otherwise} \end{cases}$$

Data: Ownership Network



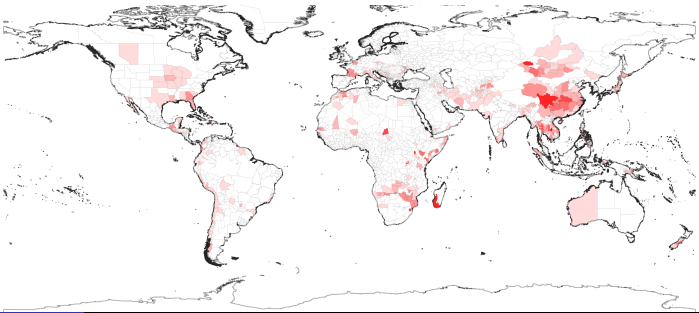
Data: Natural disasters & conflicts

- Data on natural disasters are retrieved from Emergency Disasters Database (EM-DAT), collected by the University of Louvain.
- The dataset currently includes around 24,500 natural disasters from 1900 to present.
- For each disaster-country-year observation, the dataset reports the number of people affected, fatalities and monetary damages.
- We map country-level EMDAT data to a regional-level dataset, comprehensive of 2,800 Global Administrative Units.
- Geologocalised data on conflicts are retrieved from the UCDP/PRIO Armed Conflict Dataset.
- The dataset reports each social conflict involving at least 1 government

Data: Natural disasters

- Following Neumayer et Bartel (2013), We define "relevant shocks" as events where ten or more people were reported as killed, 100 people were reported as affected and a state of emergency was declared.
- We impose 2 further conditions:
  - no event in the same category recorded in the region in the previous 5 years
  - either:
    - a damage/gdp ratio of at least 0.032
    - an affected/population ratio of at least 0.144
    - a death/population ratio of at least 0.0000425

Figure: Relevant disasters, 2000-2018



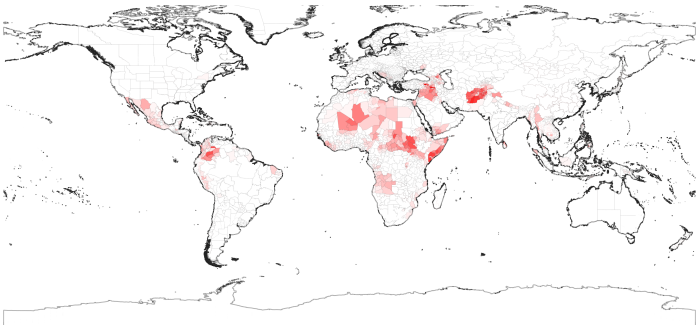
Data: Conflicts

UCDP define an event as: *'An incident where armed force was used by an organised actor against another organised actor, or against civilians, resulting in at least 1 direct death at a specific location and a specific date'*.

We define 'relevant conflicts' as conflicts that fullfill the following 3 conditions:

- at least 5 battle-related deaths per 100,000 people recorded.
- no conflict was recorded in the region the previous 5 years,
- no conflict with more than 100 deaths recorded in the country over the previous 5 years.

Figure: Conflicts, 2000-2018



Data: Domestic Firm-level data

- The production datasets FICUS and FARE, from INSEE/DGFiP, contains balance sheet information for the whole population of private companies operating in France over the period 1993- 2019.
- The data are drawn from compulsory reporting of firms and income statements to fiscal authorities in France.
- This dataset provides us with information on the turnover, employment, value-added, capital and the four-digit sector the firm belongs to.

Data: Trade data

- Trade data are retrieved from an administrative dataset produced by French Customs.
- For each firm, the yearly value of imports and exports (by country of origin/destination and 8-digit CN product) are reported.
- Trade flows are aggregated to the 6 digit level (corresponding to the Harmonised System, HS6), in order to merge them with Comtrade data and construct the instruments.
- The final dataset describes French firm-level trade flows of over 5,000 product varieties from/to 161 countries over the period 1994-2017.

Data: Workers

- The Déclaration Annuelle des Données Sociales (DADS): administrative database of matched employer-employee information collected by the INSEE.
- **DADS Poste** dataset is a cross-section dataset recording on average information about 28,000,000 workers per year (almost 100% of private sector workers in France) for the period 1997-2019.
- **DADS Panel** is a longitudinal dataset recording on average information about 2,000,000 workers per year for the period 2002-2017.
- For each observation, information on gender, year and place of birth, occupation, job spell, full-time/part-time status, earnings, total number of hours worked, education, etc...
- Task content proxies are built on the basis of data retrieved from the US **Occupational Information Network** (O*NET). The dataset provides information on the characteristics of nearly 900 occupations in its latest version. These characteristics are listed in seven broad categories: abilities, interest, knowledge, skill, work activities, work context, and work value.

Empirical Strategy

Empirical Strategy: Subsidiary-level analysis

- The baseline specification is a linear probability model, where the dependent variable is a dummy that takes value equal one if an affiliate active in $t-1$ is divested in t:

$$Divest\_d_{ijt} = \beta_0 + \beta_1 X_{c_i t} + \beta_2 D_{c_i t, c_j t} + \beta_3 Z_{it} + \beta_4 Z_{jt} + \beta_5 T^{v}_{c_i t-1} + \gamma_i + \phi_{m_i t} + \psi_{m_i jt} + e_{ijt}$$

  - $X_{c_i t}$ = vector of host country characteristics
  - $D_{c_i t, c_j t}$ = vector of bilateral gravity controls retrieved from different sources (CEPII, World Bank, WEO)
  - Z_{it} = vector of affiliate characteristics
  - Z_{jt} = vector group-level characteristics
  - $T^{v}_{c_i t}$ dummy taking value of 1 if the host region c_j where the affiliate is located experienced an adverse event v in time t
  - $\psi_{m_i t}$ = subsidiary industry-time fixed effects
  - $\phi_{m_j t}$ = parent industry-time fixed effects
  - γ_i =subsidiary fixed effects

Empirical Strategy: Parent firm-level analysis

- Firm-level analysis:

$$\ln Y_{jt} = \beta_1 X_{jt} + \beta_2 \overline{WT}_{jt} + \gamma_j + \psi_t + e_{jt}$$

- $\ln Y^o_{jt}$ = Firm j, outcome variable
- X_{jt} = vector of time-variant firm j characteristics
- γ_j = firm fixed effects
- ψ_t = time fixed effects

- Weighted disasters:

$$\overline{WT}_{jt} = \sum_{c_i} T_{c_i t} * \frac{E_{ijt-n}}{E_{jt-n}}$$

Empirical Strategy: Worker-level analysis

- Worker-level analysis:

$$\ln Hourly\_Wage_{vjt} = \beta_1 X_{vt} + \beta_2 X_{jt} + \beta_3 \overline{WT}_{jt} + \gamma_{vj} + \psi_t + e_{vjt}$$

- $Hourly\_Wage_{vjt}$ = Hourly wage of worker v in firm j and time t
- X_{vt} = vector of time-variant worker-level characteristics
- X_{jt} = vector of time-variant firm-level characteristics
- γ_{vj} = job-spell fixed effects
- ψ_t = time fixed effects

- Weighted disasters:

$$\overline{WT}_{jt} = \sum_{c_i} T_{c_i t} * \frac{E_{ijt-n}}{E_{jt-n}}$$

Results

Empirical Strategy: Subsidiary-level analysis

- The baseline specification is a linear probability model, where the dependent variable is a dummy that takes value equal one if an affiliate active in $t-1$ is divested in t:

$$Divest\_d_{ijt} = \beta_0 + \beta_1 X_{c_i t} + \beta_2 D_{c_i t, c_j t} + \beta_3 Z_{it} + \beta_4 Z_{jt} + \beta_5 T^{v}_{c_i t-1} + \gamma_i + \phi_{m_i t} + \psi_{m_i jt} + e_{ijt}$$

  - $X_{c_i t}$ = vector of host country characteristics
  - $D_{c_i t, c_j t}$ = vector of bilateral gravity controls retrieved from different sources (CEPII, World Bank, WEO)
  - Z_{it} = vector of affiliate characteristics
  - Z_{jt} = vector group-level characteristics
  - $T^{v}_{c_i t}$ dummy taking value of 1 if the host region c_j where the affiliate is located experienced an adverse event v in time $t-1$
  - $\psi_{m_i t}$ = subsidiary industry-time fixed effects
  - $\phi_{m_j t}$ = parent industry-time fixed effects
  - γ_i =subsidiary fixed effects

Results - Subsidiary-level Analysis (1)

Table: Natural disasters

VARIABLES	(1) Divestment	(2) Divestment	(3) Divestment	(4) asinh Fixed assets	(5) asinh Employment
Relevant Disasters	0.0170***	0.0183***	0.0110***	-0.133***	-0.118***
	(0.00260)	(0.00264)	(0.00265)	(0.0406)	(0.0125)
Investments		-0.0142***	-0.00636***	0.0621***	0.00166
		(0.000179)	(0.000193)	(0.00327)	(0.00112)
Entry cost		-0.000335***	-0.00170***	-0.000660	0.00642***
		(2.25e-05)	(2.82e-05)	(0.000474)	(0.000158)
Taxes		0.00115***	-0.000676***	0.0100***	-0.00350***
		(9.89e-05)	(0.000102)	(0.00150)	(0.000460)
Rule of law		-0.107***	-0.132***	1.253***	0.163***
		(0.00325)	(0.00360)	(0.0581)	(0.0185)
Imports		-0.000868***	-0.000133***	-0.00622***	-0.00435***
		(4.84e-05)	(5.16e-05)	(0.000855)	(0.000275)
Exports		-0.000425***	-0.000490***	-0.000356	0.00280***
		(4.87e-05)	(5.14e-05)	(0.000893)	(0.000281)
Observations	4,314,631	3,848,350	3,580,243	2,390,948	1,809,247
R-squared	0.356	0.356	0.377	0.585	0.807
Bilateral country variables	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Year#IncomeGroup#Region#Nace FE	No	No	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. ??. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Results - Subsidiary-level Analysis (2)

Table: Conflicts

VARIABLES	(1) Divestment	(2) Divestment	(3) Divestment	(4) asinh Fixed assets	(5) asinh Employment
Conflicts	0.169***	0.114***	0.149***	-2.651***	-1.504***
	(0.0305)	(0.0292)	(0.0309)	(0.424)	(0.184)
Investments		-0.0142***	-0.00636***	0.0625***	0.00124
		(0.000179)	(0.000193)	(0.00327)	(0.00112)
Entry cost		-0.000343***	-0.00170***	-0.000546	0.00633***
		(2.25e-05)	(2.82e-05)	(0.000474)	(0.000158)
Taxes		0.00110***	-0.000672***	0.0104***	-0.00387***
		(9.87e-05)	(0.000102)	(0.00149)	(0.000459)
Rule of law		-0.107***	-0.132***	1.248***	0.159***
		(0.00325)	(0.00360)	(0.0581)	(0.0185)
Imports		-0.000856***	-0.000125**	-0.00653***	-0.00442***
		(4.83e-05)	(5.16e-05)	(0.000855)	(0.000275)
Exports		-0.000435***	-0.000492***	-0.000245	0.00278***
		(4.86e-05)	(5.14e-05)	(0.000892)	(0.000281)
Observations	4,314,631	3,848,350	3,580,243	2,390,948	1,809,247
R-squared	0.356	0.356	0.377	0.585	0.807
Bilateral country variables	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Year#IncomeGroup#Region#Nace FE	No	No	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. ??. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Results - Subsidiary-level Analysis (3)

Table: Interactions

VARIABLES	(1) Divestment	(2) Divestment	(3) Divestment	(4) Divestment	(5) Divestment	(6) Divestment
Shock	0.0199		0.245*	-0.0135***		-0.0275***
	(0.0418)		(0.131)	(0.00324)		(0.0107)
Shock#Distance	1.34e-05			8.26e-07		
	(1.22e-05)			(1.04e-06)		
Shock#Upstreamness			-0.0719			0.0115**
			(0.0626)			(0.00558)
Layer 1 # Shock		0.0952**			-0.0361***	
		(0.0426)			(0.00360)	
Layer 2 # Shock		0.00214			0.0473***	
		(0.0644)			(0.00548)	
Layer 3-N # Shock		0.265*			0.101***	
		(0.154)			(0.0118)	
Observations	3,498,292	3,580,116	3,475,216	3,498,292	3,580,116	3,475,216
R-squared	0.390	0.389	0.389	0.390	0.389	0.389
Bilateral country variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year#IncomeGroup#Region#Nace FE	Yes	Yes	Yes	Yes	Yes	Yes
Parent country#year FE	Yes	Yes	Yes	Yes	Yes	Yes
Covariate	Conflict	Conflict	Conflict	relevant disaster	Relevant disaster	Relevant disaster

Notes: This table presents regression results of the model presented in Eq. ??. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Empirical Strategy: Parent firm-level analysis

- Firm-level analysis:

$$\ln E^{o}_{jt} = \beta_1 X_{jt} + \beta_2 \overline{WT}_{jt} + \gamma_j + \psi_t + e_{jt}$$

- $\ln E^{o}_{jt}$ = Employment of v-type workers in firm j, in time t
- X_{jt} = vector of time-variant firm j characteristics
- γ_j = firm fixed effects
- ψ_t = time fixed effects
- Weighted disasters:

$$\overline{WT}_{jt} = \sum_{c_i} T_{c_i t} * \frac{E_{ijt-n}}{E_{jt-n}}$$

Results - Parent firms

Table: Natural disasters

VARIABLES	(1) ln Employment	(2) ln Employment	(3) ln Tangible assets	(4) ln Tangible assets	(5) ln Equipment	(6) ln Equipment
Shock	0.0001	0.0001	0.001***	0.0002	0.0041*	0.0043*
	(0.0005)	(0.0003)	(0.0002)	(0.0003)	(0.0028)	(0.0028)
WES		-0.0458***		-0.0034		0.111
		(0.0216)		(0.0266)		(0.113)
WID		0.0084		0.042		0.0809
		(0.0225)		(0.0280)		(0.101)
Observations	11,528	4,556	7,761	4,015	1,473	1,422
R-squared	0.774	0.794	0.774	0.794	0.889	0.890
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year#industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. **??**. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Results - Parent firms

Table: Natural disasters

VARIABLES	(1) Directors	(2) Directors	(3) Supervisor	(4) Supervisor	(5) Qualified workers	(6) Qualified workers	(7) White collars	(8) White collars	(9) Blue collars	(10) Blue collars
Shock	0.0005***	0.001	0.000	0.004	-0.0001	0.003	-0.0003***	0.0034	-0.0003**	0.0035
	(0.0001)	(0.0010)	(0.0001)	(0.0034)	(0.0027)	(0.0040)	(0.0001)	(0.0047)	(0.0002)	(0.0003)
WES		-0.0033		-0.0388		-0.0419		-0.0075		-0.00677**
		(0.0266)		(0.0269)		(0.0318)		(0.0239)		(0.0335)
WID		0.042		0.002		0.0498*		-0.0013		-0.0204
		(0.0280)		(0.002)		(0.0259)		(0.0222)		(0.0282)
Observations	6,704	2,923	10,271	4,293	7,973	4,022	8,976	4,182	6,161	3,626
R-squared	0.747	0.755	0.948	0.955	0.929	0.934	0.919	0.918	0.938	0.935
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year#industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. **??**. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Results - Parent firms

Table: Conflicts

VARIABLES	(1) ln Employment	(2) ln Employment	(3) ln Tangible assets	(4) ln Tangible assets	(5) ln Equipment	(6) ln Equipment
Shock	0.0001	0.0002	0.0001	0.0002	0.0013***	0.0016***
	(0.0005)	(0.0003)	(0.0005)	(0.0003)	(0.0001)	(0.0001)
WES		-0.0464***		-0.0034		0.119
		(0.0216)		(0.0266)		(0.113)
WID		00.0085		0.042		0.0763
		(0.0162)		(0.0280)		(0.101)
Observations	11,528	4,556	7,761	4,015	1,473	1,422
R-squared	0.774	0.794	0.774	0.794	0.889	0.890
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year#industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. **??**. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Results - Parent firms

Table: Conflicts

VARIABLES	(1) Directors	(2) Directors	(3) Supervisor	(4) Supervisor	(5) Qualified workers	(6) Qualified workers	(7) White collars	(8) White collars	(9) Blue collars	(10) Blue collars
Shock	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	-0.0001	0.0002	-0.0002	-0.0002
	(0.0003)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0001)	(0.0003)	(0.0003)
WES		-0.0034		-0.0399		-0.0424		-0.0078		-0.00683**
		(0.0266)		(0.0269)		(0.0269)		(0.0239)		(0.0335)
WID		0.042		0.002		0.002		-0.0016		-0.0197
		(0.0280)		(0.002)		(0.002)		(0.0222)		(0.0282)
Observations	6704	2923	10271	4293	7973	4022	8976	4182	6161	3626
R-squared	0.747	0.755	0.948	0.955	0.929	0.934	0.919	0.918	0.938	0.935
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year#industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. ??. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Empirical Strategy: Worker-level analysis

- Worker-level analysis:

$$\ln Hourly\_Wage_{vjt} = \beta_1 X_{vt} + \beta_2 X_{jt} + \beta_3 \overline{WT}_{jt} + \gamma_{vj} + \psi_t + e_{vjt}$$

- $Hourly\_Wage_{vjt}$ = Hourly wage of worker v in firm j and time t
- X_{vt} = vector of time-variant worker-level characteristics
- X_{jt} = vector of time-variant firm-level characteristics
- γ_{vj} = job-spell fixed effects
- ψ_t = time fixed effects
- Weighted disasters:

$$\overline{WT}_{jt} = \sum_{c_i} T_{c_i t} * \frac{E_{ijt-n}}{E_{jt-n}}$$

Results - Worker-level analysis

Table: Worker-level Analysis

VARIABLES	(1) ln Hourly Wage	(2) ln Hourly Wage	(3) ln Hourly Wage	(4) ln Hourly Wage	(5) ln Hourly Wage	(6) ln Hourly Wage
Conflict	0.0024***	0.0025***	0.0012***			
	(0.0001)	(0.0001)	(0.0001)			
High skilled		0.0619***	0.0603***			
		(0.005)	(0.005)			
Conflict # High skilled			0.001**			
			(0.0001)			
Natrual disaster				0.0012*	0.0012*	0.0006
				(0.0062)	(0.0062)	(0.0064)
Natrual disaster # High skilled						0.0004*
						(0.0006)
Observations	265,401	227,692	227,692	265,401	227,692	227,692
R-squared	0.876	0.940	0.876	0.876	0.876	0.876
Job-spell FE	YES	YES	YES	YES	YES	YES
Year # Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents regression results of the model presented in Eq. **??**. Robust standard errors are clustered at the school level and reported in parenthesis. ***, ** and * respectively indicate 0.01, 0.05 and 0.1 levels of significance.

Findings

Heterogeneous effects on subsidiaries

- Reshoring more likely the longer the ownership distance and the more upstream is the production process

Indirect effects on parent firms

- Ambiguous effect on parent firms' employment.
- A positive effect is recorded on tangible assets and equipment.

Heterogeneous effects on stayers

- Limited positive effects on wages
- The effect is more relevant for high skilled workers and can lead to an increase in firm-level wage inequality.

Policy implications

- Policies promoting reshoring are unlikely to have significant effects on domestic employment.
- In skill-intensive sectors, foreign workers are instead likely to be replaced with domestic machines.
- A sizable effect on employment could be obtained only for sectors that do not have a mature technology to replace routine tasks.

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