城市经济学——2024年春季学期硕士生课程

外商直接投资与区域经济发展

第2课 FDI溢出效应

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暨南大學 JINAN UNIVERSITY

回顾与展望

- 上一节课：企业为何有激励去进行FDI
- 这一节课：一个国家或地区为何有激励去吸引FDI

议程

- 鼓励FDI的经济学逻辑

世界各国政府都在努力争取FDI（跨国公司）

- Alfaro-urena, Manelici and Vasquez（2022）
  - The competition in investment incentives for MNCs is so high that governments are adopting ever more sophisticated approaches such as special tax incentives focused on intangible assets (UNCTAD 2018a).
  - Moreover, the number of Special Economic Zones—the mainstay of investment promotion and facilitation policies—rose from 76 in 1986 (spread across 47 countries) to over 4,500 in 2018 (spread widely across the world) (UNCTAD 2018b).
- 中国：
  - 1985 《国务院关于华侨投资优惠的暂行规定》
  - 1988 《国务院关于鼓励台湾同胞投资的规定》
  - 1990《国务院关于鼓励华侨和港澳台同胞投资的规定》
  - 经济特区/沿海开放城市
  - 95/97/02/04/07/11/15/17/20/22《外商投资指导目录》
  - 直到2008年中国才取消了对外资企业的所得税优惠
- 为什么？

鼓励FDI的经济学逻辑

- 鼓励FDI意味放弃政策的中立性（policy neutrality）
  - 对外资企业的待遇优于本土企业
- FDI资本雄厚、技术先进……
  - 为什么不能鼓励同等条件的本土企业呢？
- FDI可以带来投资、就业、GDP、出口……
  - 为什么不能由本土企业来进行呢？
- FDI必须带来对本土产业额外的溢出作用（**spillover**）

跨国企业进入与本地产业发展的关系

- 悲观的观点：MNC和本土企业在消费市场、要素市场上竞争，提高本土企业的经营成本，降低本土企业的利润，从而阻碍本土企业的成长
- 乐观的观点：MNC通过示范效应、上下游关联带动本土产业发展壮大
- Markusen and Venable（1999）：MNC进入和本土产业规模的关系
  - 替代效应：降低本土企业在消费品市场的份额
  - 互补效应：增加对本土上游企业产品的需求
  - **如果限定MNC必须出口则促进效应会更高（东亚模式）**
- 产业规模显然只是我们考量本土产业发展的维度之一
- 更重要的是：**引进FDI能否培育出具有竞争力（高生产率）的本土企业？**

议程

- 鼓励FDI的经济学逻辑
- 测算FDI溢出效应

FDI溢出效应

- 溢出效应（spillover）是各国吸引FDI的政策逻辑出发点
- FDI溢出效应体现在哪些方面？怎么发挥作用？

FDI溢出效应的方向

1. 内部：企业内部（引入外资股东）
2. 水平：同行业之间
3. 垂直：上下游之间

水平生产率溢出效应（Aitkin and Harrison, 1999）

- 估计如下的回归方程：

$$Y_{it} = \text{Constant} + \beta_1 \text{DFI\_Plant}_{ijt} + \beta_2 \text{DFI}_{\text{Sector}_{jt}} + \beta_3(\text{DFI\_Plant}_{ijt} \times \beta_2 \text{DFI\_Sector}_{jt}) + \beta_4 Z_{ijt} + \alpha_i + \tau_t + \varepsilon_{it}$$

- i：企业；j：行业；t：年份
- Y：TFP；Z：控制变量
- 其中：

$$\text{DFI\_Sector}_{jt} = \frac{\sum_{i \in j} \text{DFI\_Plant}_{ijt} \times \text{Employment}_{ijt}}{\sum_{i \in j} \text{Employment}_{ijt}}$$

- $\widehat{\beta_1} > 0$：**合资企业（JV）可能是比较有效的获取溢出效应的形式**
- 无个体或区域固定效应时，$\widehat{\beta_2} > \approx 0$；控制后，$\widehat{\beta_2} < 0$ **(外资内生选址)**

垂直生产率溢出效应（Javorcik, 2004）

- 估计如下的回归方程：

$$\ln Y_{ijrt} = \alpha + \beta_1 \ln K_{ijrt} + \beta_2 \ln L_{ijrt} + \beta_3 \ln M_{ijrt} + \beta_4 \, Foreign\ Share_{ijrt} + \beta_5 \, Horizontal_{jt} + \beta_6 \, Backward_{jt} + \beta_7 \, Forward_{jt} + \alpha_t + \alpha_r + \alpha_j + \varepsilon_{ijrt}.$$

(2) $Horizontal_{jt}$

$$= \left[\sum_{i \text{ for all } i \in j} Foreign\ Share_{it} * Y_{it} \right] \Big/ \sum_{i \text{ for all } i \in j} Y_{it}.$$

垂直生产率溢出效应（Javorcik, 2004）

- 估计如下的回归方程：

$$\ln Y_{ijrt} = \alpha + \beta_1 \ln K_{ijrt} + \beta_2 \ln L_{ijrt} + \beta_3 \ln M_{ijrt} + \beta_4 \, Foreign\ Share_{ijrt} + \beta_5 \, Horizontal_{jt} + \beta_6 \, Backward_{jt} + \beta_7 \, Forward_{jt} + \alpha_t + \alpha_r + \alpha_j + \varepsilon_{ijrt}.$$

(3) $$Backward_{jt} = \sum_{k \text{ if } k \neq j} \alpha_{jk} \, Horizontal_{kt}$$

(4) $$Forward_{jt} = \sum_{m \text{ if } m \neq j} \sigma_{jm} \left[\left[\sum_{i \text{ for all } i \in m} Foreign\ Share_{it} * (Y_{it} - X_{it}) \right] \Big/ \left[\sum_{i \text{ for all } i \in m} (Y_{it} - X_{it}) \right] \right]$$

垂直生产率溢出效应（Javorcik, 2004）

TABLE 7—RESULTS FROM OLS AND OLLEY-PAKES REGRESSIONS

Panel A—Regressions in First Differences

			Olley-Pakes method	
	All	Domestic	All	Domestic
Foreign share	0.0006		0.0009	
	(0.0007)		(0.0007)	
Backward	0.0382***	0.0360***	0.0407**	0.0347*
	(0.0101)	(0.0103)	(0.0163)	(0.0193)
Forward	−0.0050	−0.0073**	−0.0060	−0.0118*
	(0.0033)	(0.0034)	(0.0055)	(0.0063)
Horizontal	−0.0003	−0.0006	−0.0019	−0.0022
	(0.0013)	(0.0013)	(0.0025)	(0.0024)
H4	0.0000	0.0000	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Demand	0.6103***	0.6752***	0.3699	0.5341*
	(0.1945)	(0.1929)	(0.2934)	(0.2806)
Number of observations	6,853	5,916	3,765	3,084
R^2	0.49	0.49	0.08	0.08

◆ **MNC的上游行业（供应商），生产率得到显著提高**

上述发现的局限性

- 宏观发现的相关性并不能够作为溢出效应的绝对性证据
  - 第一，缺乏因果识别，可能是伪相关
  - 第二，无法提供具体的机制解释
- 更微观、细致的数据可以帮助我们更好地理解FDI溢出效应
  - 企业贸易网络数据（Alfaro-urena, Manelici and Vasquez，2022）
  - 工人-企业匹配数据（Poole，2013）
  - 企业-产品匹配的数据（Bai et al. 2020）

议程

- 鼓励FDI的经济学逻辑
- 测算FDI溢出效应
- FDI溢出效应的机制

机制1：加入跨国企业供应链，产能、声誉、技术提升（Alfaro-urena, Manelici and Vasquez, 2022）

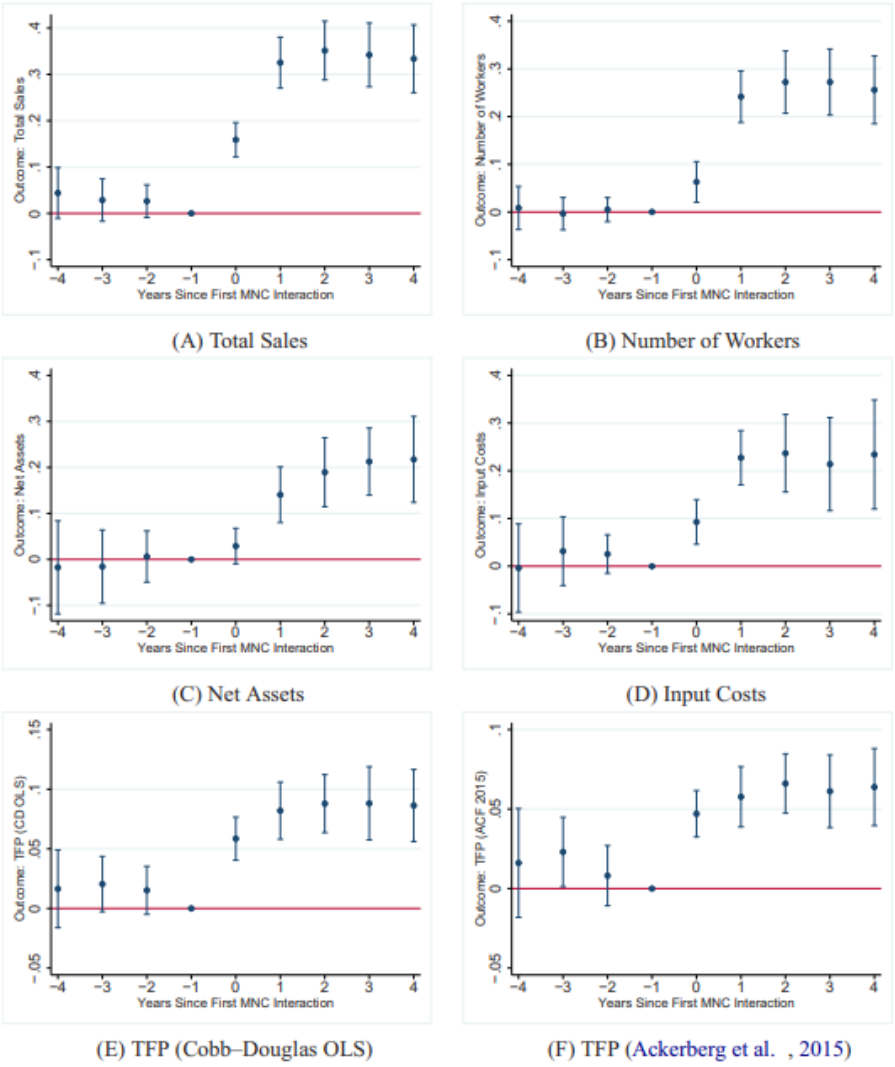


FIGURE I

Domestic Firms Increase Their Size and TFP after Starting to Supply to MNCs

机制1：加入跨国企业供应链，产能、声誉、技术提升（Alfaro-urena, Manelici and Vasquez, 2022）

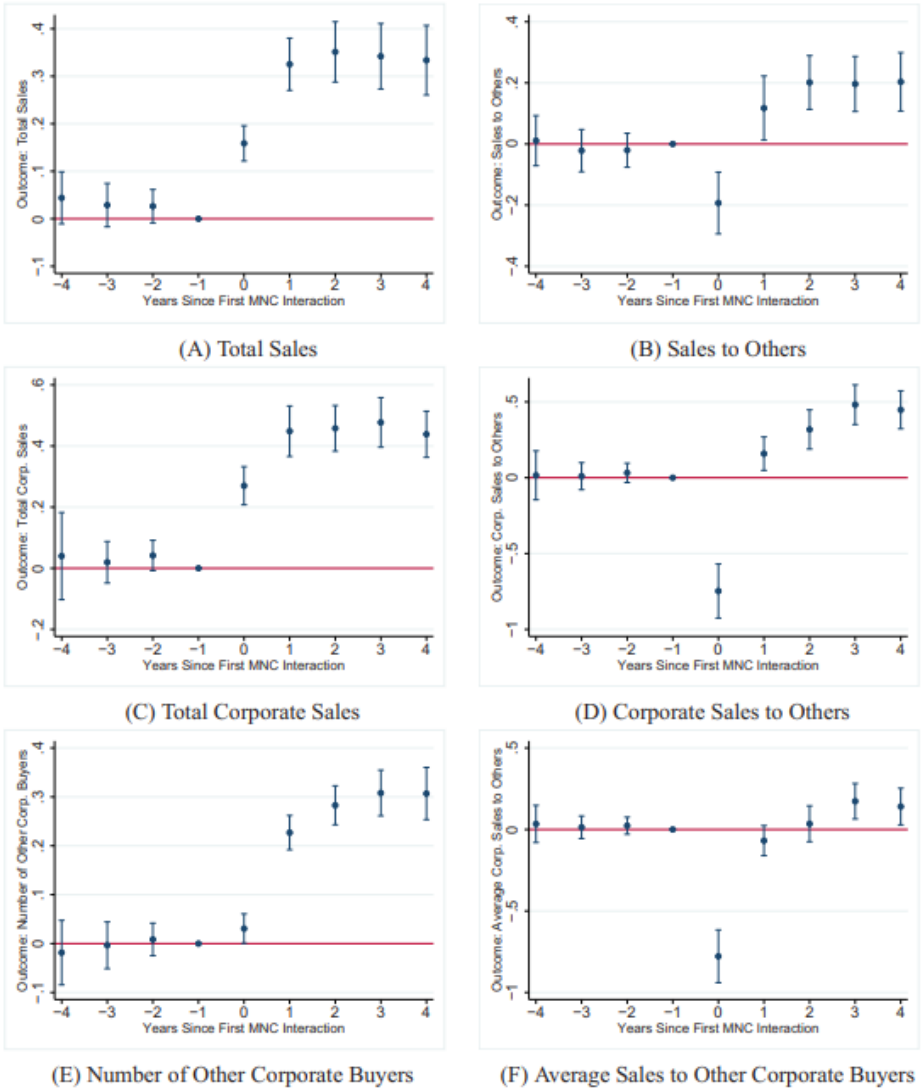
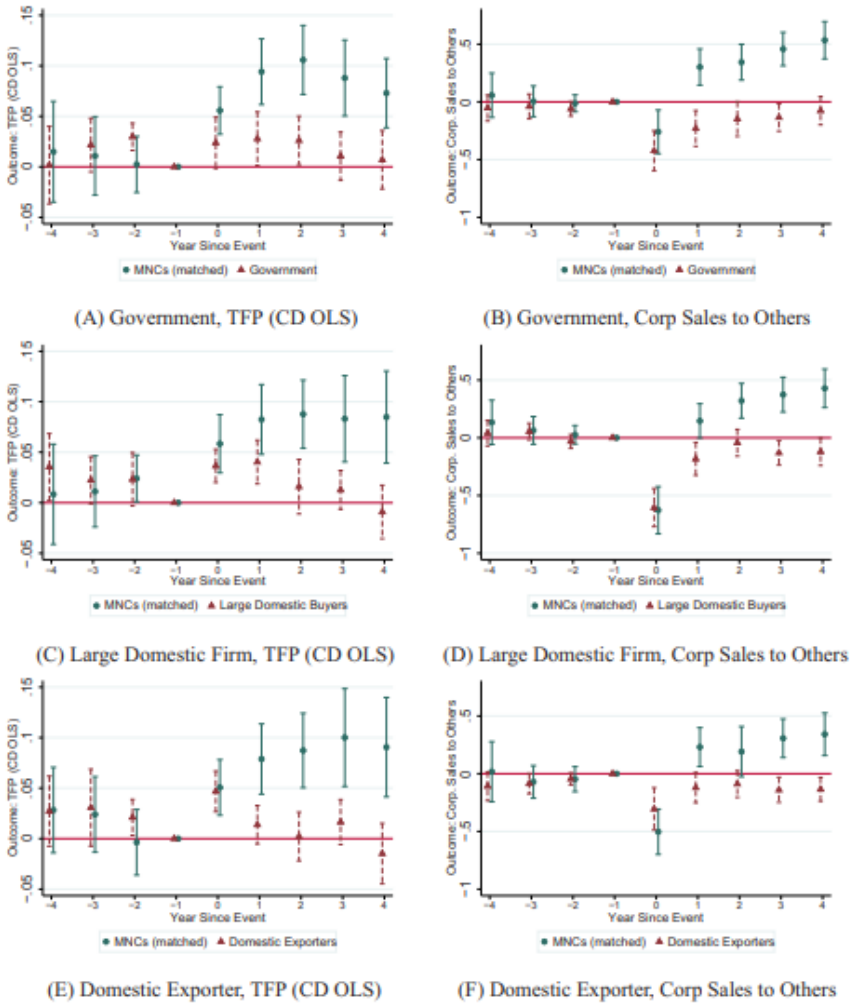


FIGURE II

Domestic Firms Improve Their Sales to Others after Starting to Supply to MNCs

机制1：加入跨国企业供应链，产能、声誉、技术提升（Alfaro-urena, Manelici and Vasquez, 2022）



(A) Government, TFP (CD OLS)

(B) Government, Corp Sales to Others

(C) Large Domestic Firm, TFP (CD OLS)

(D) Large Domestic Firm, Corp Sales to Others

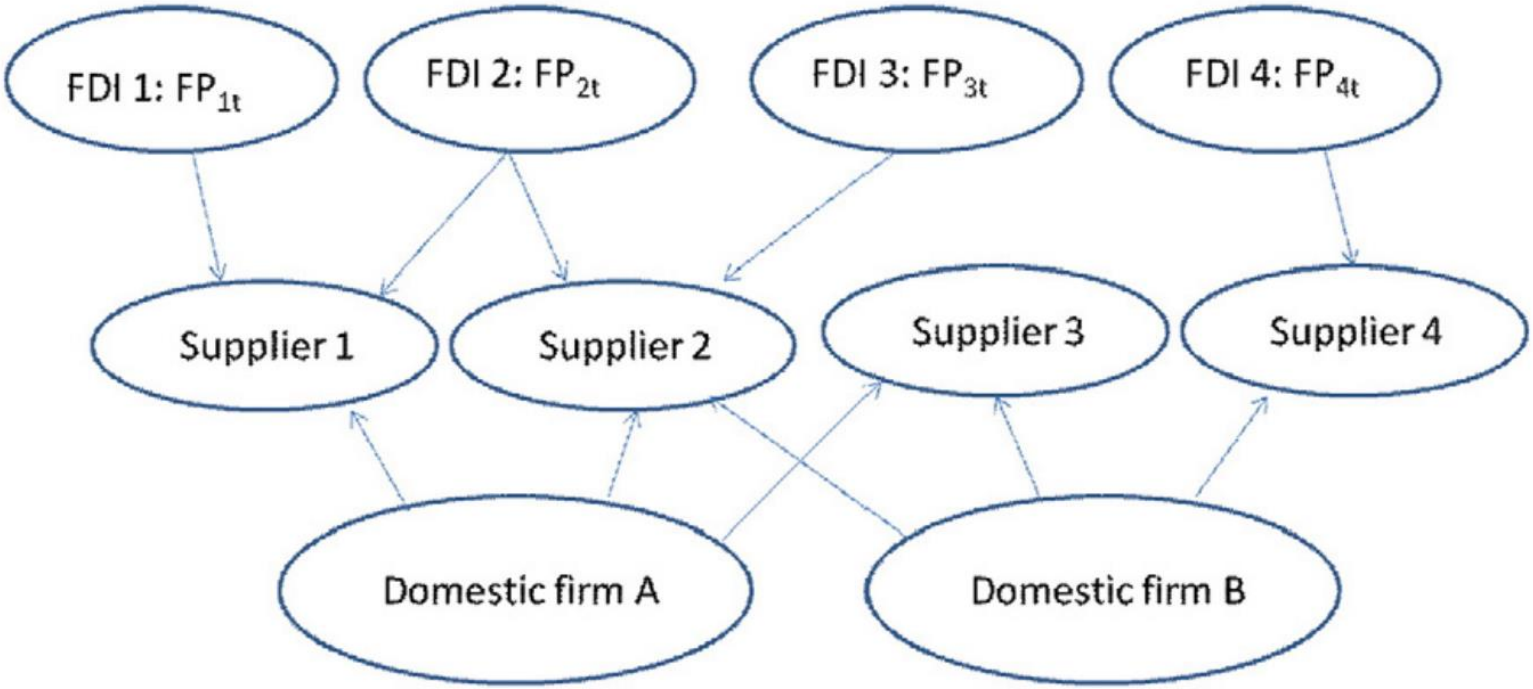
(E) Domestic Exporter, TFP (CD OLS)

(F) Domestic Exporter, Corp Sales to Others

FIGURE III

The Effects of Three Placebo Events—First Time Supplying to the Government, Large Domestic Buyer, or Domestic Exporter—versus the First Time Supplying to an MNC Event

机制1：加入跨国企业供应链，产能、声誉、技术提升（Kee, 2015）



Industry foreign presence = $FP_{1t}+FP_{2t}+FP_{3t}+FP_{4t}$

Foreign sibling presence for A = $(FP_{1t}+FP_{2t})+(FP_{2t}+FP_{3t})$

Foreign sibling presence for B = $(FP_{2t}+FP_{3t})+FP_{4t}$

机制2：劳动力流动与知识转移（Poole, 2013）

- 使用数据：巴西工人-企业匹配数据
- 估计如下的方程：

$$\ln y_{ijt} = \gamma_M S_{jt}^M + \gamma_D S_{jt}^D + \psi_i + \lambda_{j(i)} + \delta_t + \beta_1 X_{it} + \beta_2 Z_{jt} + \epsilon_{ijt},$$

- i：个人；j：公司；t：年份
- S_{jt}^M：公司j中在年份t有多少比例的工人有跨国企业工作经历
- S_{jt}^D：公司j中在年份t有多少比例的工人有其他本土企业工作经历

机制2：劳动力流动与知识转移（Poole, 2013）

TABLE 2.—MULTINATIONAL SPILLOVERS, 1996–2001

Dependent Variable: Log Annual Wages	(1)	(2)	(3)	(4)
$\gamma_M - \gamma_D$	0.258***	0.277***	0.048*	0.051**
F-statistic	35.46	41.32	3.37	4.21
p-value	0.00	0.00	0.07	0.04
γ_M	0.259***	0.279***	0.053**	0.056**
	(0.043)	(0.043)	(0.026)	(0.025)
γ_D	0.001	0.003	0.005***	0.006***
	(0.004)	(0.004)	(0.002)	(0.002)
Year FE	No	Yes	Yes	Yes
Establishment FE	No	No	Yes	Yes
Individual FE	No	No	No	Yes
Number of observations	96,560	96,560	96,560	96,560
R^2	0.5075	0.5101		
Within R^2			0.3402	0.1792

Robust standard errors, clustered at the establishment-year level, are in parentheses. Significant at ***1%, **5%, and *10%. See section III for other independent variables included in the estimation (not reported here).

Source: RAIS, 1% random sample, RDE-IED, 1996–2001.

机制2：劳动力流动与知识转移（Bai et al., 2020）

Panel A: All Workers

Old Job	New Job: JV		Independent		Affiliated		Total	
	No.	%	No.	%	No.	%	No.	%
JV	152	40.5	132	35.2	91	24.3	375	100.0
Independent	148	27.6	215	40.0	174	32.4	537	100.0
Affiliated	237	32.9	279	38.8	204	28.3	720	100.0
Total							1,632	

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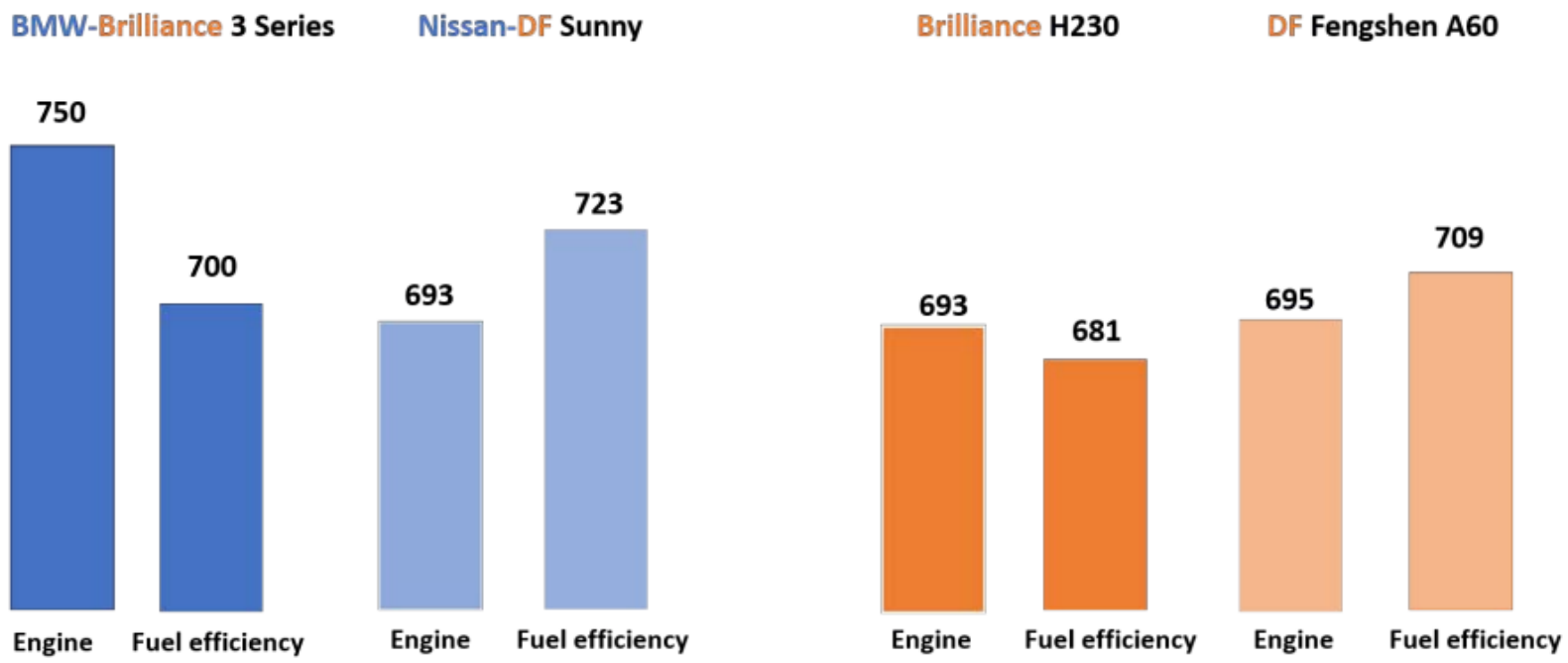
Panel B: Skilled Workers

Old Job	New Job: JV		Independent		Affiliated		Total	
	No.	%	No.	%	No.	%	No.	%
JV	64	36.6	74	42.3	37	21.1	175	100.0
Independent	94	25.9	147	40.5	122	33.6	363	100.0
Affiliated	120	30.6	175	44.6	97	24.7	392	100.0
Total							930	

Note: The data are based on the work history from LinkedIn (China) users who have worked in one of the automakers in our analysis. This table only focuses on the workers who have changed employer at least once based on the online profile. Skilled workers are defined as those whose positions are in areas of engineering, design, IT, procurement and research.

机制3：示范效应/模仿效应（Bai et al., 2020）



Notes: The bars show the quality scores for engine and fuel efficiency dimensions. The two models on the left are produced by JVs and those on the right are indigenous brands by affiliated domestic automakers.

机制3：示范效应/模仿效应（Bai et al., 2020）

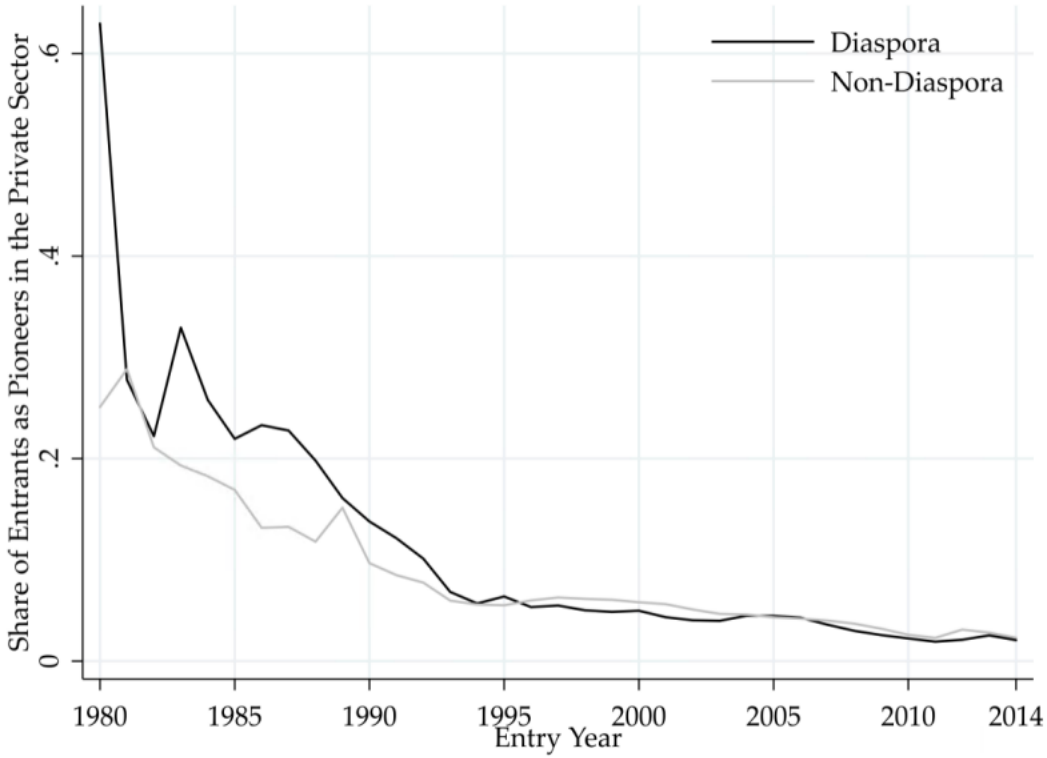
Table 3: Knowledge Spillover from JVs to Domestic Firms

	(1)	(2)	(3)	(4)	(5)	(6)
JVScore	-0.001	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
× SameGroup	0.026***	0.002	0.004	0.011	0.005	0.004
	(0.013)	(0.013)	(0.010)	(0.015)	(0.012)	(0.014)
× SameSeg		0.002	0.004	0.003	0.005***	0.002
		(0.003)	(0.002)	(0.004)	(0.002)	(0.002)
× SameGroup × SameSeg		0.131***	0.107***	0.137***	0.113***	0.138***
		(0.018)	(0.019)	(0.020)	(0.017)	(0.021)
Observations	591,280	591,280	591,280	591,280	591,280	591,280
Partialling out:						
Firm FE	✓	✓				
Firm-year FE			✓		✓	
Model FE				✓	✓	
Model-year FE						✓
Dimension-year FE	✓	✓	✓	✓	✓	✓
Dimension-Segment FE	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is the quality score of a domestic model. We consider all pairs of models produced by JVs and domestic automakers. The unit of observation is a pair-year-quality dimension. Both leader (JV) and follower (domestic) scores are residualized scores after taking out various fixed effects. SameGroup is an indicator variable that equals to 1 if the two models belong to a pair of affiliated automakers. SameSeg is an indicator variable that equals to 1 if the two models belong to the same vehicle segment. Standard errors are clustered at FollowerFirm-Dimension and LeaderFirm-Dimension level. *** implies significance at 0.01 level, ** 0.05, * 0.1.

其他方面的溢出效应：先驱作用
Chen, Xiong and Zhang (2022)

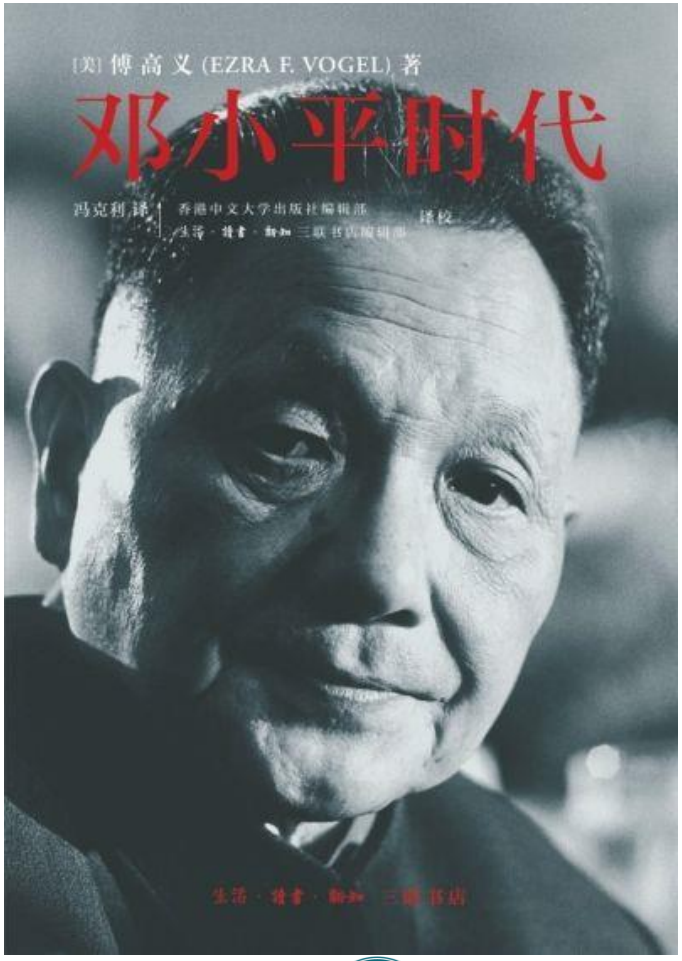
Figure 5: Shares of Diaspora and Non-Diaspora Pioneering Firms



Note: This figure plots the share of diaspora pioneering firms among all diaspora entrants and the share of non-diaspora pioneering firms among all non-diaspora entrants by year of entry. A pioneering firm is defined as the first private entrant in a prefecture for a 4-digit industry.

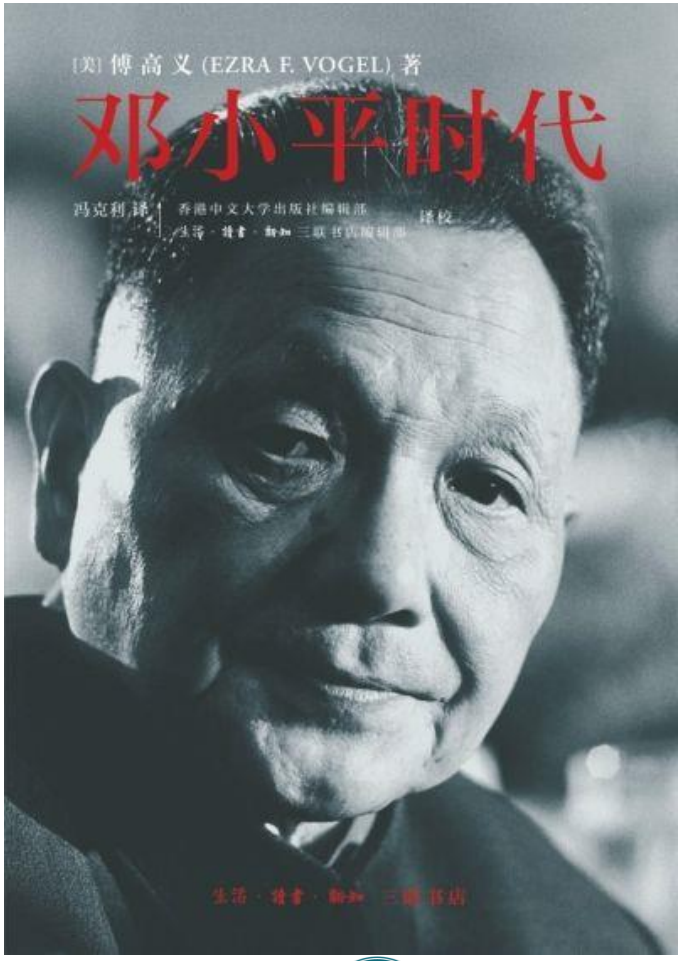
其他方面的溢出效应：制度&管理&观念（傅高义，2013）

- “早期的外来投资者为了安排电力、运输、建材和劳动力，拿到各种批文，必须跟不同的官僚机构打交道，这让他们不胜其烦。到了1980年代中期，最能吸引外来公司的地区是那些对政府机构进行重组、将决策集中的地方……”
- “地方干部发现，过去几年做得好的地方，都是尊重协议的地方……一个地方的干部队伍靠得住，能在早期野蛮的、不讲章法的中国市场上解决不可预期的问题，必要时还能在解决问题时发挥创造性，他们当然愿意继续投资……”



其他方面的溢出效应：制度&管理&观念（傅高义，2013）

- “在外资公司工作的当地经理也学会按时完成任务……学会了现代会计制度——如何编制进度表、如何计算成本、如何使用计算器和后来的计算机……”
- “来广东的工厂和商店打工的农村人，很快就学会了守时以及如何在工作中与他人协作。拿计件工资的人学会了如何在给玩具填充海绵或为各种消费品安装零件时提高效率。他们养成了洗手和其他卫生习惯。他们平生头一次跟来自天南海北的工友一起工作，这也使他们的眼界变得开阔。”



其他方面的溢出效应：性别平等

Table 3: Gender Cultural Transfer

	(1)	(2)	(3)	(4)
Sample:	All Foreign Invested Firms in 2004			
Dependent Variable:	Female Share in Total Emp	Female Share in Total Emp	Prob. of Female Manager	Female Share in Total Emp
Gender inequality index (GII)	-0.059	-0.099	-0.123	0.015
	(-2.14)**	(-4.34)***	(-1.75)*	(0.24)
GII * Female comp. advantage				-0.306
				(-2.93)***
ln(GDP/pop)		0.003	0.005	0.001
		(0.87)	(0.78)	(0.16)
Controls	-	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y
Province fixed effects	Y	Y	Y	Y
Number of Obs.	12,345	11,504	7,884	10,693
Adj. R-sq	0.515	0.568	0.156	0.576

Notes: Firms' R&D intensity, skill intensity, computer intensity, ln(capital intensity), ln(TFP), ln(wage rate), ln(firm age) and ln(firm output) are included as control variables. t-statistics based on standard errors clustered at the country level are reported in the parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

来源：Tang and Zhang (2021)

其他方面的溢出效应：性别平等

Table 5: Gender Cultural Spillover (Across Industries)

	(1)	(2)	(3)	(4)
Sample:	2004 Domestic Firms		2004-2007 Domestic Firm Panel	
Dependent Variable:	Female Labor Share	Prob. of Female Manager	Female Labor share	
FDI_{ind}	0.321	0.047	0.032	0.045
	(4.11)***	(3.43)***	(5.21)***	(4.21)***
FDI_{ind} x GII_{ind}				-0.049
				(-3.33)***
$(Import/\ Output)_{ind}$	-0.132	-0.213	-0.017	-0.016
	(-3.62)***	(-1.93)*	(-1.53)	(-2.53)**
$Herfindahl_{ind}$	-0.122	0.025	-0.035	-0.055
	(-3.69)***	(0.56)	(-2.34)**	(-3.69)***
Controls	Y	Y	Y	Y
Province fixed effects	Y	Y	-	-
Year fixed effects	-	-	Y	Y
Firm fixed effects	-	-	Y	Y
Number of Obs.	187,885	155,717	800,907	800,907
Adj. R-sq	0.138	0.046	0.754	0.794

Notes: FDI_{ind} stands for the share of output by FIEs in the industry. GII_{ind} is the weighted averages of the FIEs' home countries' GII, with weights equal to each FIE's output share in the industry. All regressions include R&D intensity, ln(TFP), ln(capital intensity), ln(output), ln(wage rate) and ln(firm age) as control variables. The 2004 regressions include the control of skill intensity, which is not available in other years. See Table A2 in the appendix for the definition and construction of each variable. t-statistics based on standard errors clustered at the four-digit industry are reported in the parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

来源：Tang and Zhang (2021)

其他方面的溢出效应：性别平等

Table 6: Gender Cultural Spillover (Across Cities)

	(1)	(2)	(3)	(4)
Sample:	2004 Domestic Firms		2004-2007 Domestic Firm Panel	
Dependent Variable:	Female Labor Share	Prob. of Female Manager	Female Labor share	
FDI_{city}	0.095 (4.57)***	0.048 (4.52)***	0.092 (5.17)***	0.108 (5.36)***
FDI_{city} x GII_{city}				-0.152 (1.89)*
$(Avg\ Import/\ Output)_{city}$	-0.121 (-2.72)***	-0.015 (-2.04)**	-0.017 (-2.46)***	-0.019 (-3.07)***
$(Avg\ Herfindahl)_{city}$	-0.434 (-1.51)	-0.124 (-2.89)***	-0.027 (-0.85)	-0.038 (-1.70)*
Controls	Y	Y	Y	Y
Year fixed effects	-	-	Y	Y
Firm fixed effects	-	-	Y	Y
Number of Obs.	187,885	149,594	765,457	765,457
Adj. R-sq	0.068	0.015	0.797	0.810

Notes: FDI_{city} stands for the share of output by FIEs in the city. GII_{city} is the weighted averages of the FIEs' home countries' GII, with weights equal to each FIE's output share in the industry. (Avg Import/ Output)city and (Avg Herfindahl)city are the weighted averages of the import-to-output ratios and Herfindahl index, respectively, across industries in the city, with weights equal to the output share of each industry. All regressions include R&D intensity, ln(TFP), ln(capital intensity), ln(output), ln(wage rate) and ln(firm age) as control variables. The 2004 regressions include the control of skill intensity, which is not available for other years. See Table A2 in the appendix for the definition and construction of each variable. t-statistics based on standard errors clustered at the four-digit industry are reported in the parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

来源：Tang and Zhang (2021)

议程

- 鼓励FDI的经济学逻辑
- 测算FDI溢出效应
- FDI溢出效应的机制
- FDI在中国的溢出效应

水平溢出效应不显著；垂直溢出效应为主

	Dependent variable: lnTFP			
	Fixed effect	Random effect	Fixed effect	Random effect
Horizontal	−0.086	−0.091	−0.106	−0.109
	(0.079)	(0.167)	(0.078)	(0.168)
Forward	4.560***	2.799***	4.563***	2.892***
	(0.305)	(0.484)	(0.300)	(0.482)
Backward	1.357***	1.329***	1.268***	1.305***
	(0.100)	(0.212)	(0.096)	(0.211)
CR8			−0.292***	−0.215***
			(0.027)	(0.064)

Notes: this table reports the estimation results of Eq. (7). Numbers in parentheses are standard errors corrected for sector/year clustering. Total number of observations is 1,048,386. *Denotes statistical significance at the 0.10 level. **Denotes statistical significance at the 0.05 level. ***Denotes statistical significance at the 0.01 level.

来源：Lin et al.（2009）

以外商指导目录变化为IV，水平溢出效应为负

$$FDI\_Sector_{it} = \alpha_f + \gamma_t + \eta Treatment_i \times Post02_t + \mathbf{X}'_{fit}\boldsymbol{\psi} + \zeta_{fit},$$

$$y_{fit} = \alpha_f + \gamma_t + \delta FDI\_Sector_{it} + \mathbf{X}'_{fit}\boldsymbol{\lambda} + \varepsilon_{fit},$$

	IV	IV	IV	Reduced-form	OLS
	(1)	(2)	(3)	(4)	(5)
Panel A. First-stage estimation (dependent variable: FDI sector).					
Treatment × Post02	0.014**	0.014**	0.014**		
	(0.007)	(0.007)	(0.007)		
Panel B. Second-stage estimation (dependent variable: log firm TFP).					
FDI sector	−3.414***	−3.396***	−3.407***		
	(0.115)	(0.114)	(0.114)		
Panel C. Weak instrument test					
Anderson–Rubin Wald test	(5.45)**	(5.49)**	(5.48)**		
Stock–Wright LM S statistic	(9.87)***	(10.14)***	(10.69)***		
Panel D. Reduced-form and OLS estimation (dependent variable: log firm TFP).					
Treatment × Post02				−0.048**	
				(0.021)	
FDI sector					−0.182***
					(0.064)
Firm fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
FDI determinants × year dummies	Y	Y	Y	Y	Y
Tariff reductions × year dummies	Y	Y	Y	Y	Y
SOE privatization × year dummies	N	Y	Y	Y	Y
Time-varying firm controls	N	N	Y	Y	Y
Observations	1,368,957	1,368,957	1,368,957	1 ,368,957	1,368,957

Note: Panels A and B report the results of first and second-stage IV estimation, respectively. Panel C reports the results of the weak instrument test. Panel D reports the reduced-form and OLS estimations. The sample for our analysis is that of domestic firms. Determinants of changes in FDI regulations include new product intensity, export intensity, number of firms, and average age of firms at the four-digit industry level in 1998. Tariff reductions include output tariff, input tariff, and export tariff at the four-digit industry level in 2001. SOE privatization is a ratio of state-owned enterprises in the total number of firms at the four-digit industry level in 2001. Time-varying firm controls include firm output, export status, capital-labor ratio, and SOE dummy. In Panels A and D, robust standard errors are clustered at the four-digit industry level in parentheses. In Panel B, bootstrapped standard errors are clustered at the four-digit industry level in parentheses.

*** Denotes significance at the 1%level.

** Denotes significance at the 5% level.

来源：Lu et al.（2017）

对上述结果的批判

- 样本问题
  - 只覆盖1998-2007期间；1980s和1990s前期被忽略
  - 只涵盖制造业
  - 工业企业数据库只包含>500M销售额的企业
- 只关注了生产率这一个指标
  - 没考虑企业进入的问题
  - 溢出效应在0到1阶段和1到N阶段、N到Q阶段的意义不同
- 并未探讨中国FDI最显著的一个特点：侨商比例极高
- 忽略了**《目录》是由相对技术水平内生决定的**
  - 毛纺、棉纺：1995年至2004年限制，2007年开始鼓励
  - 冰箱、冰柜、洗衣机： 1995年至1997年限制，2002年开始鼓励
  - 汽车：一直限制，直到2021年才取消

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