

Do Multinationals Transfer Culture?

Evidence on Female Employment in China

Heiwai Tang (Johns Hopkins SAIS); Yifan Zhang (CUHK)

Harvard University - Chinese Economy Seminar

February 1, 2017

Foreign Direct Investment (FDI) and Cultural Convergence

- ▶ Multinationals have been an important vehicle for cross-country flows of ideas, capital, and technology.
- ▶ Social scientists have long written about how multinationals can also shape host countries' social norms and values, leading to cultural convergence across countries.
- ▶ Research on the cultural effects of foreign direct investment (FDI) has been sparse, due to challenges in quantifying culture, let alone identifying its diffusion.

What is our paper about?

- ▶ Theoretically and empirically examine whether and how multinationals transfer home culture to their foreign affiliates (**transfer**) and domestic firms (**spillover**), focusing on gender norms.
- ▶ Develop a multi-sector task-based model, with firm heterogeneity in productivity and biases towards women, as well as learning between firms.
- ▶ Use the macro framework of Hsieh and Klenow (2009) on resource misallocation to quantify the effects of gender discrimination on aggregate TFP, as well as the cultural effects of FDI.

Results

Using comprehensive manufacturing Chinese firm data (2004-2007)

1. Transfer

- ▶ Foreign affiliates tend to hire more women and appoint female managers.
- ▶ particularly among those from countries with a more gender-equal culture.

2. Spillover

- ▶ Domestic firms in industries and cities where there is a larger foreign share (output or emp) tend to hire more women.
- ▶ Stronger spillover from foreign firms with a more gender-equal cultural origin.
- ▶ in female labor-intensive sectors.

3. Macro Effects

- ▶ Eliminating gender discrimination altogether is estimated to raise China's agg TFP by about 5%.
- ▶ The cultural effect of FDI is estimated to raise its aggregate TFP by about 1%.

Why would multinationals transfer culture across border?

Transfer

- ▶ Standardized corporate policies (e.g. Coca Cola and Walmart have explicit policies to maintain a certain fraction of female workers (World Economic Forum, 2007)).
- ▶ Expatriate managers.
- ▶ Taking advantage of the distorted labor market (Siegel, Pyun, and Cheon, 2014).

Spillover

- ▶ Competition and survival (Becker, 1957);
- ▶ Imitating profitable technology (gender-biased)
- ▶ Learning (Beaman, Chattopadhyay, Duflo, Pande and Topalova, 2009)

Data

- ▶ China National Bureau of Statistics (NBS) industrial firm survey data (2004-2007).
 - ▶ 270,000 - 330,000 manufacturing firms each year
 - ▶ around 28,000 foreign invested firms each year (excl Hong Kong, Macau and Taiwan's firms).
 - ▶ 2004 data: emp by gender and edu level.
 - ▶ 2005-2007 panel data: emp by gender only.
- ▶ China's Ministry of Commerce (MOFCOM) FIE Surveys.
 - ▶ Foreign firms' country of origin.
 - ▶ About 52% of the 2004 observations (after excluding HKMT) can be merged with the NBS industrial firm survey.

▶ On gender of managers

Data - Measures of Country Gender-Related Culture

- ▶ UNDP Gender Inequality Index (GII) in 2012
- ▶ A composite measure that captures the loss of achievement due to gender inequality.
- ▶ Three dimensions:
 - ▶ reproductive health;
 - ▶ empowerment;
 - ▶ labor market participation.
- ▶ 149 countries.

Data - Measures of Country Gender-Related Culture

- ▶ World Value Surveys (2005 wave)
 - ▶ Question V44: Men should have more right to a job than women.
 - ▶ Question V61 On the whole, men make better political leaders than women do.
 - ▶ Question V63: Men make better business executives than women do.
- ▶ The country WVS score is the mean of the three scores. Higher value indicates lower gender discrimination.
- ▶ Only 53 countries.

Countries' Gender Inequality Ranking

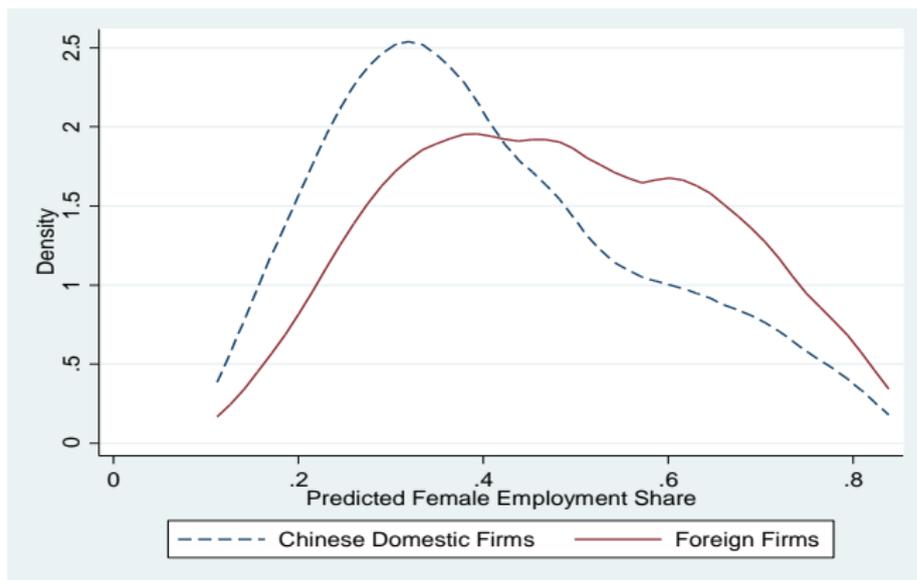
Table 1: Country-Level Gender Inequality Indices

Country	Index	Country	Index		
Panel A: UNDP Gender Inequality Index (High value means more unequal)					
<u>Top 5</u>		<u>Bottom 5</u>			
1	Sweden	0.065	1	Saudi Arabia	0.685
2	Denmark	0.068	2	India	0.637
3	Netherlands	0.077	3	UAE	0.602
4	Norway	0.083	4	Indonesia	0.549
5	Switzerland	0.084	5	Cambodia	0.548
Panel B: World Value Survey Index (High value means more equal)					
<u>Top 5</u>		<u>Bottom 5</u>			
1	Sweden	0.876	1	India	0.446
2	Norway	0.875	2	Iran	0.497
3	France	0.815	3	Malaysia	0.556
4	Finland	0.797	4	Indonesia	0.569
5	Canada	0.792	5	Vietnam	0.571

Source: United Nations Development Program (UNDP) and World Value Survey (WVS).

Distribution of Firm Female Labor Shares

Figure 2: Density of Female Share in Firm Employment (2004)
(controlling for 4-digit industry Fixed Effects)



► controlling for industry and province fixed effects.

► Regressions

Multinationals' Cultural Transfer Regression

- ▶ Using the foreign firm sample of the 2004 cross-section

$$\left(\frac{f}{f+m}\right)_{ic} = \beta_0 + \beta_1 GII_c + \beta_2 \ln(GDP/Pop)_c + \mathbf{X}'_i \gamma + \{FE\} + \varepsilon_{ic},$$

- ▶ firm i and country of origin c
- ▶ $\left(\frac{f}{f+m}\right)_{ic}$ is the share of female workers or probability of hiring a female manager.
- ▶ GII_c is a measure of gender inequality for country c .
- ▶ X_i is a vector of firm i 's characteristics: productivity, age, R&D, computer, capital, and skill intensity, etc.
- ▶ $\{FE\}$ includes industry (4-digit) and province fixed effects.

Evidence - Multinationals' Cultural Transfer

Table 3: Gender Cultural Transfer

	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	All Foreign Invested Firms in 2004					
Dependent Variable:	Female Share in Total Emp	Female Share in Total Emp	Female Share in Unskilled Emp	Female Share in Skilled Emp	Prob. of Female Manager	Female Share in Total Emp
Gender inequality index (GII)	-0.059 (-2.14)**	-0.099 (-4.34)***	-0.113 (-3.98)***	-0.073 (-3.56)***	-0.123 (-1.75)*	0.015 (0.24)
GII * Female CA						-0.306 (-2.93)**
Controls	ln(gdppc), Computer intensity, R&D intensity, ln(TFP), Skill intensity ln(capital intensity), ln(output), ln(wage rate), ln(firm age)					
Industry fixed effects	Y	Y	Y	Y	Y	Y
Province fixed effects	Y	Y	Y	Y	Y	Y
Number of Obs.	12,345	11,504	10,416	11,465	7,884	10,693
Adj. R-sq	0.515	0.568	0.463	0.363	0.156	0.576

Notes: 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.

Evidence - Multinationals' Cultural Spillover

- ▶ Using the domestic firm sample for the 2004 cross-section or 2004-2007 panel

$$\left(\frac{f}{f+m}\right)_{ik} = \gamma_0 + \gamma_1 FDI_k + \mathbf{X}'_{ik}\gamma + \{FE\} + \varepsilon_{ik},$$

- ▶ i = firm and k = industry (or city).
- ▶ $\left(\frac{f}{f+m}\right)_{ik}$ is the share of female workers or the probability that the manager of the firm is a woman.
- ▶ FDI_k is the foreign output (or employment) share in the same industry (city).
- ▶ $\{FE\}$ includes year and firm fixed effects.

FDI Gender Cultural Spillover (Across Cities)

Table 6: Gender Cultural Spillover (Across Cities)

	(1)	(2)	(3)	(4)
Sample:	2004 Domestic Firms	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)***
$FDI_{city} \times \text{average GII}$				-0.152 (1.89)*
$(\text{Import}/ \text{Output})_{ind}$	-0.121 (-2.72)***	-0.015 (-2.04)**	-0.017 (-2.46)***	-0.019 (-3.07)***
Herfindhal index $_{ind}$	-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: All regressions include R&D intensity, $\ln(\text{TFP})$, $\ln(\text{capital intensity})$, $\ln(\text{output})$, $\ln(\text{wage rate})$ and $\ln(\text{firm age})$ as control variables. The 2004 regressions include the control of skill intensity, which is not available for other years. 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.

Structure of the Model

A multi-sector model based on the task-based approach by Acemoglu and Autor (2011).

- ▶ 4 layers: J sectors, N firms, M male workers, and F of female workers; a continuum of tasks to produce each good.
- ▶ Each tasks can be completed using skill or brawn inputs (Pitt, Rosenzweig and Hassan, 2012).
- ▶ Workers of the same gender have identical productivity, while women having a comparative advantage in skills.
- ▶ Sectors differ in the intensities of skills and brawn \Rightarrow Cobb-Douglas production function with constant cost shares of female and male workers:

$$y_{ij} = \varphi_i \mu_j f_i^{\beta_j} m_i^{1-\beta_j}$$

Firm Heterogeneity

- ▶ A firm draws its productivity φ from a cumulative distribution function $G(\varphi)$.
- ▶ A firm holds a prior belief that the marginal cost of female labor γ (Becker's taste-based discrimination) is log-normally distributed:

$$\log(1 + \gamma) \sim N(\psi, \nu).$$

- ▶ Assume $\psi > 0$ and $\nu > 0$ (i.e., Information-based discrimination (Phelps, 1972; Fang and Moro, 2010))
- ▶ Cultural diffusion through learning (e.g., Jovanovic, 1982; Bisin and Verdier, 2001).

Firm Problem

- ▶ Consider a firm with (φ, γ) . Under monopolistic competition with the CES utility, a firm maximizes its profit by choosing male (m) and female (f) employment:

$$\pi(\varphi, \gamma) = \max_{f, m} \{R(\varphi, \gamma) - w_f(1 + \gamma)f - w_m m - \phi\},$$

- ▶ Firms' maximization yields the following female-male labor ratio:

$$\frac{f}{m} = \frac{\beta}{(1 - \beta)(1 + \gamma)} \frac{w_m}{w_f}.$$

Firms' Female Employment with Prejudice

Hypothesis

Firms from countries that hold a more biased view about female labor costs (i.e., a higher ψ) have a lower average female-to-male labor ratio within an industry. The relationship is quantitatively stronger in female labor-intensive industries (a higher β).

Hypothesis

All else being equal, firms that are more biased against women have lower profits, especially in the more female labor-intensive industries.

Prices and Revenue TFP

- ▶ Firms' goods' prices will adjust to equalize firm's supply with the demand for its goods, according to the *subjective* cost of hiring female workers and therefore an inefficient level of female employment.
- ▶ Using the firm's demand curve and firm supply:

$$p_i(\varphi, \gamma_i) = \frac{w_m^{1-\beta} [(1 + \gamma_i) w_f]^\beta}{\varphi \eta D};$$

$$TFPR_i = p_i(\varphi, \gamma_i) \varphi = \frac{w_m^{1-\beta} [(1 + \gamma_i) w_f]^\beta}{\eta D},$$

- ▶ where D is a sector-level demand shifter.

Hypothesis

A larger variation in firms' gender biases within an industry is associated with a lower industry TFP, thereby reducing aggregate TFP.

Learning

- ▶ A domestic firm observes signals from foreign firms, who hold different priors about female labor productivity: some noise:

$$z = \psi^* + \varepsilon^* + \xi,$$

where ψ^* is the mean of the belief about subjective female labor costs, held by firms from a foreign country; ε^* is the error of the those firm's perceptions.

- ▶ $\xi \sim N(0, v_w)$ is the observational white noise, assumed to be iid from the signal and from ε^* .

Learning (cont')

- ▶ Rewrite the signal equation as

$$z = \psi^* + \lambda^*,$$

where λ^* is normally distributed with mean 0 and variance $\omega = \nu^* + \nu_w$.

- ▶ Based on \bar{z} 's inferred from n neighbors, the firm updates its prior to the posterior as (Degroot (2004))

$$\psi' (n, \bar{z}) = E [\log(1 + \gamma) | n, \bar{z}] = \delta \bar{z} + (1 - \delta) \psi,$$

where the observed (sample) mean $\bar{z} = \frac{1}{n} \sum_{j=1}^n z_j$.

$$\delta (n, \nu, \omega) = \frac{n\nu}{\omega + n\nu} = \left(1 + \frac{1}{n} \frac{\omega}{\nu} \right)^{-1}.$$

Learning (cont')

- ▶ Learning (cultural spillover):

$$\frac{\partial (\psi')}{\partial n \partial (\bar{z})} > 0$$

- ▶ The spillover effect are larger in sector where women have a comparative advantage:

$$\frac{\partial (f/m)}{\partial \beta \partial (\psi')} > 0.$$

- ▶ Variance in the posterior of $\log(1 + \gamma)$ is decreasing in FIEs' dispersion of gender distortions.

$$v'(n, v, \omega) = \frac{\omega v}{\omega + nv} = \left(\frac{1}{v} + \frac{n}{\omega} \right)^{-1},$$

About Cultural Spillover

Hypothesis

Domestic firms' female labor shares are increasing in the prevalence of FDI in the same industry or city, if the average FIEs' belief is more gender-equal.

Hypothesis

The spillover of gender norms from foreign affiliates to domestic firms is stronger in female-labor-intensive industries.

▶ Model on Learning

Male labor-intensive sector



Female Comparative Advantage

Table A3: Top and Bottom 10 Three-Digit Industries Based on Female Comparative Advantage

Industry Code	Top 10 Industries	Female Labor Share	Industry Code	Bottom 10 Industries	Female Labor Share
181	Apparel	0.650	312	Cement Products	0.103
192	Leather Products	0.602	311	Cement	0.103
193	Fur Accessories	0.595	322	Steel Smelting	0.131
296	Rubber Shoes	0.563	323	Steel Rolling	0.131
191	Leather Accessories	0.563	324	Ferroalloy	0.131
182	Textile Shoes	0.563	321	Iron	0.131
183	Hat, Cap, and Millinery	0.563	334	Non-Ferrous Metall Alloys	0.150
176	Knit Fabric	0.561	201	Saw, Wood Chips	0.150
171	Cotton and Chemical Fiber	0.540	291	Automobile Tires	0.156
174	Silk and Thin Silk	0.538	361	Petroleum Special Equipment	0.163

Note: U.S. female share in total employment by sector. Source: Do, Levchenko, and Raddatz (2016).

Female Employment and Profits

Table 4: Firms' Female Labor Share and Profitability - 2004-2007 Panel Regressions

	(1)	(2)	(3)	(4)
Sample:	All Firms	Domestic Firms	All Firms	Domestic Firms
Dependent Variable:	Profit/ Sales			
Female labor share	0.003 (3.13)***	0.002 (1.75)*	-0.002 (0.96)	-0.003 (1.03)
Female labor share x female CA			0.015 (2.36)**	0.016 (2.78)***
Controls	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Number of Obs.	1,060,883	832,271	1,060,883	832,271
adj. R-sq	0.542	0.549	0.548	0.533

Notes: Firms' R&D intensity, capital intensity, wage rate, firm age and firm employment are included as control variables. 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.

Estimating Firm-level Distortions

- ▶ Adjustments at the intensive margin due to the convergence of firms' female employment shares to the optimal one.
- ▶ Based on the literature on resource misallocation (e.g., Hsieh and Klenow, 2009):

$$1 + \tau_{K_i} = \frac{1 - \alpha_j}{\alpha_j (1 - \beta_j)} \frac{w_m m_i}{r k_i};$$
$$1 - \tau_{Y_i} = \frac{1}{\eta_j \alpha_j (1 - \beta_j)} \frac{w_m m_i}{R_i};$$
$$1 + \gamma_i = \frac{\beta_j}{1 - \beta_j} \frac{w_m m_i}{w_f f_i}.$$

Gauging the Effects on Aggregate TFP

$$TFPR_i = \frac{w_m^{\alpha_j(1-\beta_j)} [(1 + \gamma_i) w_f]^{\alpha_j\beta_j} [(1 + \tau_{\kappa_i}) r]^{1-\alpha_j}}{\eta_j (1 - \tau_{\gamma_i}) \Lambda_j}.$$

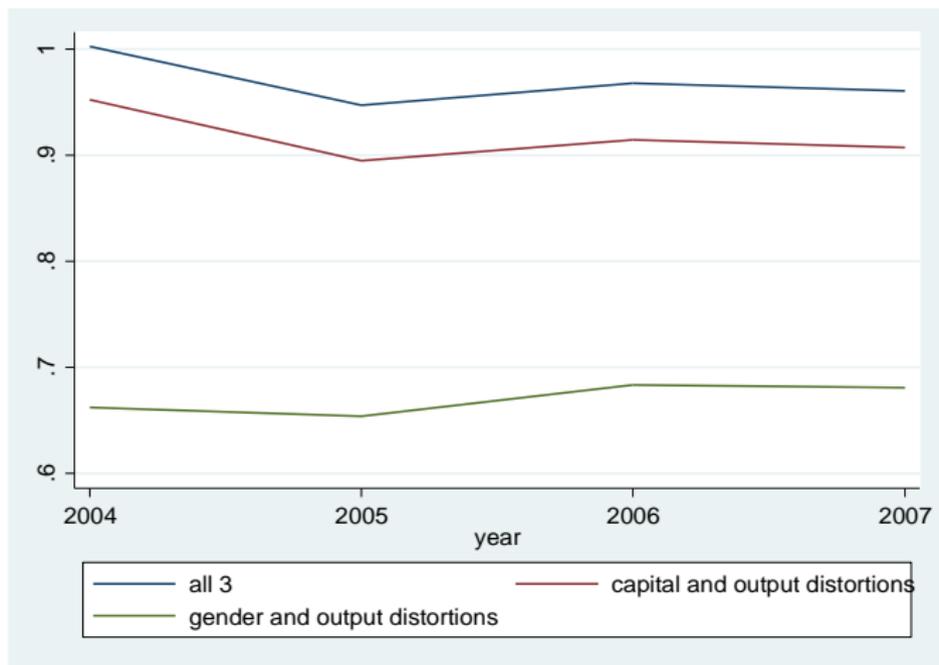
$$\varphi_i = \kappa_j \frac{R_i^{\frac{\sigma}{\sigma-1}}}{\left(f_i^{\beta_j} m_i^{1-\beta_j}\right)^{\alpha_j} k_i^{1-\alpha_j}}$$

Sector-level TFP (166 3-digit sectors):

$$TFP_j = \left[\sum_{i=1}^{N_j} \left(\varphi_i \frac{\overline{TFPR}_j}{TFPR_i} \right)^{\sigma_j-1} \right]^{\frac{1}{\sigma_j-1}}$$

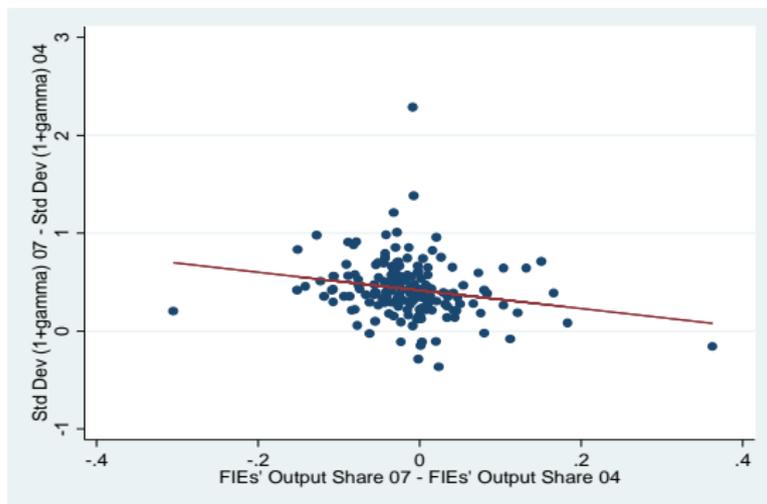
Aggregate TFP Gains by Removing ...

$$\frac{TFP^e}{TFP} = \prod_{j=1}^J \left(\frac{TFP_j^e}{TFP_j} \right)^{\theta_j} - 1$$



Evidence on FDI and the Dispersion of $(1+\gamma)$

Figure 3: Long Diff in Standard Deviation of $\log(1+\gamma)$ and Multinationals' Output Share by Sector (2004-2007)



Source: NBS annual survey of industrial firms (2004) and authors' calculation

Quantitative Assessment

- ▶ Counterfactual: Reduce the foreign firms' output share from 34% (sectoral average) to half of it (17%) and zero
- ▶ With the slope equal to -0.929.
- ▶ std dev $\log(1 + \gamma)$ will increase by around 0.16 and 0.32.
- ▶ Given that the average std dev of $\log(1 + \gamma)$ over 2004-2007 is 1.67, the FDI-related increase in the dispersion of $\log(1 + \gamma)$ is about 9.6% and 19.2%, respectively.
- ▶ The cultural effects of FDI, through reducing the dispersions of firms' discriminating behaviors, contributes about 1% of aggregate TFP (19% of 5%).

Conclusions

- ▶ Multinationals transfer culture across countries, in addition to knowhow and technology.
- ▶ FDI can overturn the long-run prejudice against women through cultural spillover, above and beyond the competition effect proposed by Becker (1957).
- ▶ Estimate the aggregate productivity effects (discrimination viewed as a type of resource misallocation).
- ▶ Eliminating gender discrimination altogether would raise China's aggregate TFP by about 5%.
- ▶ The cultural effect of FDI is estimated to have raised its aggregate TFP by about 1%.

Summary Statistics

Table 2: Summary Statistics of the 2004 Data

Variable	N	Mean	St Dev.
Country Level			
Gender inequality index	137	0.419	0.195
World Value Survey score	58	0.649	0.124
ln(GDP per capita)	137	8.060	1.671
Industry Level (Four Digit Industry Code)			
Female comparative advantage	482	0.268	0.105
FDI presence (4-digit industry)	482	0.344	0.218
Herfindhal index	482	0.049	0.076
City Level (Four Digit Geographic Code)			
FDI presence (city)	345	0.155	0.182
Firm Level			
Female employment share			
all workers	258,899	0.411	0.243
unskilled workers	240,787	0.437	0.299
skilled workers	255,239	0.370	0.230
domestic Chinese firms	202,536	0.390	0.236
foreign invested enterprises (FIEs)	28,450	0.482	0.256
Likelihood of a female manager			
all firms	217,181	0.246	0.277
domestic Chinese firms	170,501	0.243	0.277
foreign invested enterprises (FIEs)	23,243	0.255	0.273

FDI Premium on Female Employment

FDI Premium in Female Share of Employment and Female Probability of Legal Person Representatives (2004-2007 Panel)

	(1)	(2)	(3)
Panel A: Female Share of Employment			
FDI dummy	0.077 (25.29)***	0.025 (10.18)***	0.020 (19.18)***
Year FE	No	Yes	Yes
Industry (4-digit) FE	No	Yes	No
Provincial FE	No	Yes	No
Firm FE	No	No	Yes
N	982,219	982,219	982,219
Panel B: Female Probability of Legal Person Representative			
FDI dummy	0.007 (7.54)***	0.001 (0.88)	0.009 (5.33)***
Year FE	No	Yes	Yes
Industry (4-digit) FE	No	Yes	No
Provincial FE	No	Yes	No
Firm FE	No	No	Yes
N	805,990	805,990	805,990

Notes: 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.

Data - Manager/ CEO

- ▶ No info on the gender of the manager of a firm (legal representatives).
- ▶ Use the last character of the Chinese name of a firm's legal representative to "estimate" his/her gender.
 - ▶ more feminine names and more masculine names.
- ▶ We use a random sample of 2005 1% population survey.
 - ▶ 2.5 million names (35-65 years old) in 2005
- ▶ For each Chinese character in the name, we calculate the probability of its association with a female:

$$female_prob = \frac{frequency_female}{frequency_female + frequency_male}$$

The Ranking of Femininity of Chinese Names

Ranking of Femininity of Chinese Name Characters

Characters with the highest female name probability			Characters with the lowest female name probability	
Rank	Character	female prob.	Character	female prob.
1	娟	0.997	彪	0.008
2	媛	0.996	法	0.012
3	娥	0.996	刚	0.012
4	娇	0.995	财	0.018
5	婵	0.994	山	0.019
6	姐	0.992	豪	0.022
7	菊	0.992	泰	0.023
8	花	0.990	强	0.024
9	翠	0.989	武	0.025
10	莉	0.988	魁	0.026

Source: Authors' calculation using 20% extract of the 2005 1% Population Survey.