

Online Supplement

Table S1. Sample Distribution

A. Distribution by region

	East Asia	South Asia
	6,697	9,757

B. Distribution by industry

Industry	N
Other Manufacturing	3,047
Food	1,906
Manufacturing	1,515
Garments	1,249
Rubber & Plastics Products	1,195
Chemicals & Chemical Products	1,062
Non-Metallic Mineral Products	1,054
Textiles	963
Fabricated Metal Products	912
Machinery & Equipment	751
Electronics & Communications Equip.	730
Basic Metals & Metal Products	646
Motor Vehicles	599
Leather Products	218
Electronics	196
Textiles & Garments	166
Machinery & Equipment & Electronics	121
Furniture	85
Motor Vehicles & Transport Equip.	39

C. Distribution by country

Afghanistan, Bangladesh, Bhutan, Cambodia, China, Fiji, India, Indonesia, Lao PDR, Malaysia, Micronesia, Fed. Sts., Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Vanuatu, Vietnam.

Notes. Data obtained from WBES— employed in recent studies (e.g., Assenova and Sorenson 2017, McCann and Bahl 2017, Lee and Weng 2013). Detailed information is available at <http://www.enterprisesurveys.org/about-us>.

Table S2. Description of Control Variables

Variables	Description
Country	25 countries in South Asia and East Asia.
Industry	19 industries (represented using Standardized Industry Code).
Year	Categorical variable representing the year of data collection for a given firm. Observations across 10 years from 2007 to 2016 were collected for firms in our study sample.
Firm Size	Logged value of number of full time employees.
Firm Productivity	Logged value of sales divided by number of full time employees. The sales are calculated by first converting the sale in the local currency to the U.S. dollars in that year, and then being deflated to 2009 using the U.S. GDP deflators from the reference fiscal year.
Firm Age	Logged value of number of years a firm has been in existence since establishment.
Legal Status:	Firms can operate with one of the following legal status: public, private limited liability, sole proprietorship, partnership, limited partnership, or others. We use five indicator variables to code the legal status, using public firm as the base reference category.
Legal Status - Private	Coded as one if a firm operates as a private limited liability firm and zero otherwise.
Legal Status - Sole Proprietorship	Coded as one if the firm operates as a sole proprietorship firm and zero otherwise.
Legal Status - Partnership	Coded as one if the firm operates as a partnership firm and zero otherwise.
Legal Status - Limited Partnership	Coded as one if the firm operates as a limited partnership firm and zero otherwise.
Legal Status - Other	Coded as one if the firm operates with other types of legal status and zero otherwise.
Target Market:	Firms may target different markets for their operations. Some may focus on local markets, some on the national market, and others on international markets. We use two indicator variables to code the market focus categories, using local markets as the base category.
Target Market - National	Coded as one if the firm focuses on the national market and zero otherwise.
Target Market - International	Coded as one if the firm focuses on international market and zero otherwise.
Ownership - Public	Coded as one if government ownership is 40 percent or higher and zero otherwise.
Ownership - Foreign	Coded as one if foreign ownership is 40 percent or higher and zero otherwise.
Exporter	Coded as one if the firm is an exporter and zero otherwise.
Credit Access	Coded as one if the firm has credit access to bank loans and zero otherwise.
Multi-Plant	Coded as one if the firm has more than one plant and zero otherwise.
Informal Competition	Coded as one if the firm competes against unregistered/informal firms and zero otherwise.
Competition Constraint	Coded as one if the firm identifies practices of competitors in the informal sector as major constraint and zero otherwise.

Notes. Industry distribution is shown in Table S1.

Table S3. Propensity Score Matching – Alternative Prediction Models
(Dependent Variable: Technology Licensing)

Variables	Probit Model	Cauchit Model
Firm Size	0.266 (0.012) ***	0.642 (0.037) ***
Firm Productivity	0.090 (0.010) ***	0.253 (0.029) ***
Firm Age	-0.058 (0.022) ***	-0.173 (0.070) **
Legal Status: Private	-0.178 (0.076) **	-0.386 (0.178) **
Legal Status: Sole Proprietorship	-0.064 (0.077)	-0.140 (0.186)
Legal Status: Partnership	-0.083 (0.080)	0.059 (0.190)
Legal Status: Limited Partnership	-0.202 (0.080) **	-0.260 (0.190)
Legal Status: Other	-0.540 (0.137) ***	-1.985 (0.779) **
Target Market: National	-0.078 (0.035) **	-0.214 (0.120) *
Target Market: International	-0.081 (0.059)	-0.317 (0.161) **
Ownership: Public	-0.508 (0.161) ***	-1.250 (0.620) **
Ownership: Foreign Entities	0.489 (0.059) ***	1.087 (0.131) ***
Exporter	0.133 (0.044) ***	0.434 (0.107) ***
Credit Access	0.018 (0.030)	0.145 (0.087) *
Multi-Plant	-0.132 (0.037) ***	-0.360 (0.098) ***
Informal Competition	0.071 (0.030) **	0.326 (0.088) ***
Competition Constraint	-0.143 (0.047) ***	-0.491 (0.160) ***
Intercept	-3.139 (0.200) ***	-8.146 (0.664) ***
Log Likelihood	-5311.472	-5444.216
Number of observations	15,759	15,759

Notes. *** p < 0.01, ** p < 0.05, *p < 0.1. Robust standard errors are reported in the parentheses.

Table S4. Effects of Technology Licensing on Productivity Growth – Alternative Matching Specifications

Matching Method	Technology Licensing	Mean	SD	Mean Difference	t-test
Propensity Score Matching (Probit Model)	No (n = 2,108 firms)	0.968	26.793	-3.565	-4.405 ***
	Yes (n = 2,108 firms)	-2.597	25.743		
Propensity Score Matching (Cauchit Model)	No (n = 2,108 firms)	0.750	27.324	-3.347	-4.094 ***
	Yes (n = 2,108 firms)	-2.597	25.743		
Coarsened Exact Matching (Weighted Calculation)	No (n = 3,013 firms)	-4.457	20.890	-1.435	-2.001 **
	Yes (n = 1,116 firms)	-4.616	20.230		

Notes. *** p < 0.01, ** p < 0.05, *p < 0.1. Standard errors in the parentheses. We use the weights from the coarsened exact matching procedure to calculate the weighted mean difference between treatment and control groups (in order to carry out this analysis, we do not use the sample stratification weights).

Table S5. Heckman Selection Analysis: Accounting for Potential Endogeneity of Corruption

Variables	First Stage	Second Stage
	Probit Selection Model DV = Corruption Level	Fixed Effects Model DV = Productivity Growth
Intercept	1.243 (0.810)	-
Firm Size	0.058 (0.021) ***	0.705 (0.475)
Firm Productivity	-0.024 (0.019)	2.785 (0.375) ***
Firm Age	-0.017 (0.041)	-1.555 (0.677) **
Legal Status - Private	0.019 (0.117)	1.730 (1.754)
Legal Status - Sole Proprietorship	-0.325 (0.124) ***	-0.995 (2.306)
Legal Status - Partnership	0.041 (0.127)	3.183 (2.237)
Legal Status - Limited Partnership	-0.012 (0.125)	0.774 (1.880)
Legal Status - Other	0.015 (0.251)	3.000 (3.694)
Target market - National	0.099 (0.068)	-0.688 (1.128)
Target market - International	-0.005 (0.096)	-3.676 (1.659) **
Ownership - Public	0.012 (0.325)	2.017 (5.442)
Ownership - Foreign Entities	-0.085 (0.083)	-1.341 (1.560)
Exporter	0.070 (0.070)	0.625 (1.175)
Credit Access	0.341 (0.053) ***	3.662 (1.528) **
Multi-Plant	0.020 (0.062)	1.138 (1.101)
Informal Competition	0.230 (0.054) ***	2.654 (1.674)
Competition Constraint	-0.095 (0.082)	3.452 (2.373)
Corruption Intensity	-4.894 (1.043) ***	
Inverse Mills Ratio (IMR)		12.066 (5.212) **
Technology Licensing		-9.422 (1.412) ***
Formal Workforce Training Program		-4.603 (1.575) ***
Corruption Level		-2.649 (1.515) *
Infrastructure Constraint Level		1.701 (0.771) **
Technology Licensing × Formal Workforce Training Program		7.003 (1.702) ***
Technology Licensing × Corruption Level		6.052 (2.034) ***
Technology Licensing × Infrastructure Constraint Level		-1.700 (0.915) *
Log Likelihood	-1789.479	-
R-squared	-	0.152
Number of observations	4,216	4,216

Notes. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Matched sample is used in the estimations. For the first stage probit selection model, robust standard errors are reported in the parentheses. For the second stage model, we include country-year and industry-year fixed effects and clustered standard errors by industry-year. *Corruption Intensity* measures the average of corruption level for all other firms located within the same country-industry-year as the focal firm.

Table S6. Fixed Effects Model Predicting Productivity Growth – Using Alternative Measures of Corruption

Variables	City Corruption Level (Weighted by Industry)	Alternative Measure of Corruption (% of Annual Sales)	Alternative Measure of Corruption (Composite Score)
Technology Licensing	-8.397 (1.214) ***	-8.314 (1.733) ***	-8.317 (1.233) ***
Formal Workforce Training Program	-4.502 (1.580) ***	-5.773 (2.292) **	-4.623 (1.620) ***
Corruption Level	-12.303 (7.097) *	-0.496 (0.090) ***	-0.677 (0.551)
Infrastructure Constraint Level	2.022 (0.857) **	2.366 (0.963) **	2.014 (0.823) **
Technology Licensing × Formal Workforce Training Program	7.604 (1.687) ***	7.865 (2.248) ***	7.388 (1.662) ***
Technology Licensing × Corruption Level	10.689 (4.992) **	0.415 (0.208) **	1.456 (0.809) *
Technology Licensing × Infrastructure Constraint Level	-1.897 (0.968) *	-2.820 (1.037) ***	-1.970 (0.991) **
R-squared	0.120	0.144	0.119
Number of observations	4,216	2,709	4,216
Industry-Year Fixed Effects	Yes	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes

Notes. *** p < 0.01, ** p < 0.05, * p < 0.1. Robust standard errors clustered by industry-year in the parentheses.

Table S7. Propensity Score Matching for Firms in High Income Countries
(Dependent Variable: Technology Licensing)

Variables	Using Logit Model
Intercept	-3.508 (0.799) ***
Firm Size	0.227 (0.049) ***
Firm Productivity	0.143 (0.052) ***
Firm Age	-0.072 (0.083)
Legal Status - Private	-0.224 (0.174)
Legal Status - Sole Proprietorship	-0.196 (0.266)
Legal Status - Partnership	-0.570 (0.559)
Legal Status - Limited Partnership	-0.128 (0.759)
Legal Status - Other	-0.688 (0.647)
Target Market - National	0.105 (0.131)
Target Market - International	0.111 (0.203)
Ownership - Public	-1.820 (1.117)
Ownership - Foreign Entities	0.627 (0.160) ***
Exporter	-0.136 (0.154)
Credit Access	0.130 (0.115)
Multi-Plant	-0.472 (0.152) ***
Informal Competition	0.240 (0.140) *
Competition Constraint	-0.165 (0.155)
Log Likelihood	-1,278.355
Number of observations	3,257

Notes. *** p < 0.01, ** p < 0.05, * p < 0.1. Robust standard errors in the parentheses. We include country-year and industry fixed effects in the logit model. The matching procedure uses nearest neighbor one-to-one propensity score matching within the same industry and country-year. The analysis sample is slightly lower than the initial sample due to missing data on matching variables and exclusion of observations from countries in which none of the firms used technology licensing in a given year. In this sample, the list of high income countries based on World Bank classification includes: Chile, Croatia, Czech Republic, Estonia, Israel, Latvia, Lithuania, Poland, Russian Federation, Slovak Republic, Slovenia, Sweden, and Uruguay.

Table S8. Effect of Technology Licensing on Productivity Growth in High Income Countries

Matching Method	Technology Licensing	Mean	SD	t-test
Propensity Score	No (n = 505 firms)	6.952	22.163	0.364
Matching (Logit Model)	Yes (n = 505 firms)	7.484	24.190	

Notes. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The difference in productivity growth of treatment group firms (i.e., firms with technology licensing) and control group firms (i.e., comparable firms without technology licensing) is statistically insignificant ($t = 0.364$, $p = 0.716$).

Table S9. Fixed Effects Analysis Predicting Productivity Growth – For Firms in High Income Countries

(Dependent Variable: Productivity Growth)

Variables	Model 1	Model 2	Model 3
Technology Licensing	0.554 (1.373)	0.418 (1.452)	0.302 (2.362)
Formal Workforce Training Program		0.856 (1.608)	0.877 (1.994)
Corruption Level		1.905 (3.280)	-0.423 (4.307)
Infrastructure Constraint Level		-0.372 (1.049)	0.598 (0.977)
Technology Licensing × Formal Workforce Training Program			-0.265 (2.600)
Technology Licensing × Corruption Level			3.947 (5.533)
Technology Licensing × Infrastructure Constraint Level			-1.897 (1.822)
R-squared	0.105	0.106	0.107
Number of observations	1,010	1,010	1,010
Industry-Year Fixed Effects	Yes	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes

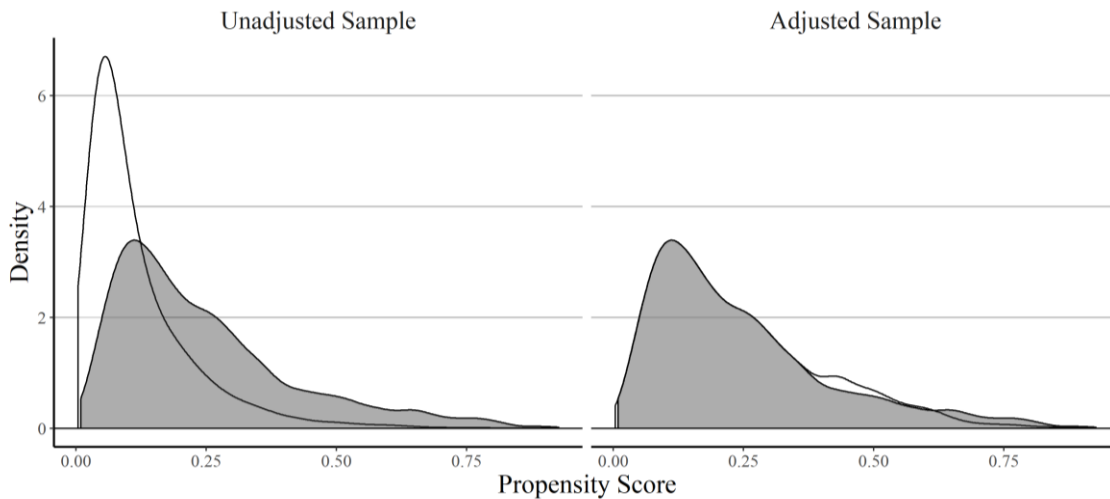
Notes. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors clustered by industry-year in the parentheses.

**Table S10. Fixed Effects Model – Controlling for Internal R&D
(Dependent Variable: Productivity Growth)**

Variables	Model 1:	Model 2:	Model 3:	Model 4:
	Control for Internal R&D Main Effects	Control for Interaction between Internal R&D and Technology Licensing	Control for Interaction between Internal R&D and Corruption	Control for Interactions between: (i) Internal R&D and Technology Licensing, and (ii) Internal R&D and Corruption
Technology Licensing	-9.340 (1.314) ***	-10.703 (2.111) ***	-9.243 (1.330) ***	-10.479 (2.157) ***
Formal Workforce Training Program	-4.457 (1.620) ***	-4.281 (1.721) **	-4.401 (1.617) ***	-4.245 (1.715) **
Corruption Level	-2.907 (1.474) **	-2.872 (1.491) *	-5.973 (2.756) **	-5.810 (2.820) **
Infrastructure Constraint Level	1.876 (0.803) **	1.934 (0.803) **	1.909 (0.800) **	1.960 (0.800) **
Technology Licensing × Formal Workforce Training Program	7.223 (1.661) ***	6.985 (1.814) ***	7.100 (1.669) ***	6.892 (1.817) ***
Technology Licensing × Corruption Level	5.586 (2.007) ***	5.480 (2.039) ***	5.324 (1.967) ***	5.243 (1.998) ***
Technology Licensing × Infrastructure Constraint Level	-1.811 (0.917) **	-1.906 (0.919) **	-1.850 (0.914) **	-1.934 (0.917) **
Additional Controls				
Internationally Recognized Quality Certification	-2.489 (0.870) ***	-2.078 (1.070) *	-2.224 (0.979) **	-1.879 (1.299)
External Auditing	0.747 (1.222)	0.023 (1.741)	0.122 (1.290)	-0.524 (1.754)
Owning a Website	1.822 (1.246)	1.245 (1.625)	1.534 (1.653)	1.059 (1.995)
Technology Licensing × Internationally Recognized Quality Certification		-0.823 (1.695)		-0.726 (1.636)
Technology Licensing × External Auditing		1.497 (2.354)		1.374 (2.340)
Technology Licensing × Owning a Website		1.238 (1.631)		1.079 (1.607)
Corruption Level × Internationally Recognized Quality Certification			-1.185 (2.625)	-1.108 (2.568)
Corruption Level × External Auditing			3.650 (2.270)	3.536 (2.313)
Corruption Level × Owning a Website			1.361 (2.672)	1.230 (2.619)
R-squared	0.122	0.122	0.123	0.123
Number of Observations	4,216	4,216	4,216	4,216
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Country-Year Fixed Effects	Yes	Yes	Yes	Yes

Notes. *** p < 0.01, ** p < 0.05, * p < 0.1. Robust standard errors clustered by industry-year are reported in the parentheses. *Internationally Recognized Quality Certification* is coded as one for firms with certification like ISO 9000, 14000, or HAPC, and zero otherwise. *External Auditing* is coded as one for firms with annual financial statements checked and certified by an external auditor, and zero otherwise. *Owning a Website* is coded as one for firms with its own website, and zero otherwise.

Figure S1. Distribution of Propensity Scores across Treatment and Matched Control Groups



Notes. The Kolmogorov-Smirnov test for equality of distributions fails to reject the null hypothesis of equality of distributions between the treatment and matched control groups ($D = 0.029$, $p = 0.341$).