

Internet Appendix for “Board Gender Diversity and Corporate Innovation: International Evidence”

Table IA1. Sample coverage across countries and over time

This table presents the distribution of our main sample across countries and years.

Country name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Obs.
Argentina	0	0	0	1	1	1	3	5	8	8	8	13	13	0	61
Australia	1	4	12	83	160	209	289	366	375	490	530	569	595	540	4,223
Austria	3	3	3	4	5	7	8	32	35	33	29	29	30	27	248
Belgium	10	48	52	56	57	60	57	59	68	68	67	67	65	63	797
Brazil	0	0	0	0	0	4	4	10	16	19	68	69	81	82	353
Canada	1	6	9	88	137	162	228	401	418	451	476	535	593	646	4,151
Chile	0	0	0	0	0	1	1	3	6	6	6	18	20	18	79
China	2	2	1	2	3	17	24	82	102	113	292	314	317	178	1,450
Colombia	0	0	0	0	0	0	0	0	1	1	1	1	10	10	24
Croatia	0	0	0	0	0	0	1	2	1	1	1	1	1	1	9
Czech Republic	0	0	0	0	0	0	0	0	1	1	1	1	1	0	5
Denmark	11	12	13	13	14	19	23	23	22	24	29	32	34	34	303
Finland	5	8	8	9	10	20	24	30	30	30	40	49	51	49	363
France	70	114	127	152	171	207	220	240	246	249	256	295	285	281	2,913
Germany	80	81	86	90	94	138	145	148	154	152	156	227	233	225	2,009
Greece	2	3	7	8	12	17	18	37	41	41	39	42	45	28	340
Hungary	0	0	0	0	0	0	0	1	1	1	1	1	1	0	6
India	0	0	0	0	4	11	54	170	177	198	223	242	262	18	1,359
Indonesia	0	0	0	0	0	0	0	1	1	2	3	5	26	34	72
Ireland	22	43	51	53	56	64	68	69	71	66	65	62	63	26	779
Israel	3	7	13	27	59	68	72	76	77	73	73	75	78	81	782
Italy	26	30	30	35	38	60	65	78	73	74	78	75	78	74	814
Japan	0	0	0	2	2	6	13	27	30	33	60	89	251	246	759
Luxembourg	2	4	8	9	11	15	15	15	21	20	24	29	35	30	238
Malaysia	0	0	0	0	0	0	1	24	28	28	25	27	61	72	266
Malta	0	0	0	0	0	0	0	0	0	1	1	2	1	0	5

Mexico	0	0	0	0	0	2	3	11	22	21	21	38	37	5	161
Morocco	0	0	0	0	0	1	2	2	2	1	1	1	1	0	11
Netherlands	28	62	66	75	78	85	91	90	90	82	81	86	80	74	1,068
New Zealand	0	0	0	1	1	2	3	9	8	14	15	14	30	30	127
Norway	37	47	57	59	67	66	67	66	64	59	67	70	65	60	851
Peru	0	0	0	0	0	0	0	2	2	2	2	2	4	0	14
Philippines	0	0	0	0	0	1	1	0	2	2	2	22	26	13	69
Poland	0	0	0	0	0	0	0	12	13	13	15	14	20	21	108
Portugal	5	6	7	9	9	9	10	21	24	24	23	25	25	5	202
Russian Federation	1	1	1	3	3	9	9	17	18	18	18	22	29	29	180
Singapore	2	2	2	3	3	6	6	19	32	41	164	155	156	69	662
South Africa	0	0	0	0	1	5	7	36	72	82	134	158	158	150	803
Spain	26	29	31	34	35	43	51	52	70	67	77	83	83	81	762
Sweden	75	83	96	110	111	110	113	116	112	107	115	116	116	113	1,493
Switzerland	36	37	40	43	52	63	63	62	65	72	73	76	80	68	831
Thailand	0	0	0	0	0	0	0	0	0	0	1	15	19	24	59
Turkey	0	0	0	0	0	0	0	4	4	4	4	6	17	20	59
United Kingdom	427	495	604	778	965	1,177	1,409	1,378	1,289	1,212	1,164	1,119	1,102	1,013	14,132
United States	1,227	1,368	1,460	2,918	3,285	3,570	3,741	3,717	3,546	3,391	3,326	3,293	3,248	3,326	41,416
Total	2,110	2,505	2,801	4,662	5,451	6,251	6,944	7,533	7,450	7,400	7,827	8,147	8,488	7,847	85,416

Table IA2. Comparing our sample and the universe of Osiris firms

This table compares firm characteristics between our sample and the universe of firms in BvD Osiris. Our sample consists of 85,416 firm-year observations from 45 countries for the period 2001-2014. The BvD Osiris universe consists of 662,809 firm-year observations from 148 countries for the same period. Variable definitions are provided in Appendix I. Panel A compares means and medians of firm characteristics between our sample and the BvD Osiris universe. Panel B presents the percentiles of our sample means/medians relative to the BvD Osiris universe.

Panel A. Comparing means and median of firm characteristics

Variable	Our sample		Osiris universe		P-value	
	Mean	Median	Mean	Median	T test	Wilcoxon test
ROA	-0.02	0.03	-0.01	0.02	0.00	0.00
Ln(total assets)	12.88	12.90	12.90	13.05	0.05	0.00
Ln(firm age)	2.88	2.89	2.86	2.94	0.00	0.70
Tangibility	0.26	0.17	0.31	0.25	0.00	0.00
Stock return volatility	0.11	0.10	0.14	0.12	0.00	0.00
Tobin's Q	1.96	1.38	2.02	1.20	0.00	0.00

Panel B. The percentiles of our sample means/medians in the BvD Osiris universe

	Percentile of our sample mean in BvD Osiris	Percentile of our sample median in BvD Osiris
ROA	52.29	26.29
Ln(total assets)	48.43	48.17
Ln(firm age)	47.02	44.70
Tangibility	36.54	48.69
Stock return volatility	27.45	31.15
Tobin's Q	37.83	57.95

Table IA3. Correlations of country-level variables and the country means of firm-level variables

This table presents the pairwise correlations between country-level variables and the country means of firm-level variables. Superscripts a, b, and c indicate significance at the 1%, 5%, and 10% levels, respectively.

	Regulation_ quota	Regulation_ code	Regulation_ disclosure	Gender gap index	Female labor market participation	Masculinity	Ln(GDP per capita)	Stock mkt /GDP	Female director ratio	Board size	Board independen ce	Female CEO	Ln(total assets)	Ln(firm age)	Tangibility
Regulation_quota	1.000														
Regulation_code	0.131 ^b	1.000													
Regulation_disclosure	0.133 ^a	0.071	1.000												
Gender gap index	0.139 ^a	0.246 ^a	0.287 ^a	1.000											
Female labor mkt participation	0.015	0.021	0.134 ^a	0.643 ^a	1.000										
Masculinity	-0.207 ^a	-0.134 ^a	-0.123 ^b	-0.503 ^a	-0.309 ^a	1.000									
Ln(GDP per capita)	0.168 ^a	0.231 ^a	0.307 ^a	0.457 ^a	0.237 ^a	-0.240 ^a	1.000								
Stock mkt/GDP	-0.104 ^b	0.111 ^b	-0.059	0.060	0.103 ^b	-0.071	-0.023	1.000							
Female director ratio	0.437 ^a	0.060	0.195 ^a	0.537 ^a	0.245 ^a	-0.487 ^a	0.191 ^a	-0.020	1.000						
Board size	-0.118 ^b	0.034	0.045	-0.219 ^a	-0.323 ^a	0.385 ^a	-0.098 ^c	-0.346 ^a	-0.287 ^a	1.000					
Board independence	0.147 ^a	-0.032	-0.095 ^c	0.354 ^a	0.214 ^a	-0.594 ^a	0.072	-0.075	0.424 ^a	-0.251 ^a	1.000				
Female CEO	-0.009	-0.011	0.009	0.147 ^a	0.122 ^b	0.031	0.009	-0.072	0.183 ^a	-0.097 ^c	0.033	1.000			
Ln(total assets)	-0.265 ^a	-0.223 ^a	-0.044	-0.308 ^a	-0.235 ^a	0.010	-0.433 ^a	-0.083	-0.123 ^b	0.288 ^a	0.089 ^c	-0.006	1.000		
Ln(firm age)	-0.058	0.099 ^c	0.151 ^a	-0.035	-0.302 ^a	-0.033	0.016	-0.256 ^a	-0.033	0.565 ^a	0.014	-0.145 ^a	0.371 ^a	1.000	
Tangibility	-0.322 ^a	-0.244 ^a	-0.132 ^a	-0.170 ^a	-0.071	0.113 ^b	-0.408 ^a	0.007	-0.239 ^a	0.208 ^a	0.177 ^a	0.130 ^b	0.462 ^a	0.083	1.000

Table IA4. Instrumented HLM

This table presents the instrumented HLM analyses of Table 4. Panel A presents the first-stage OLS regression results. The dependent variable is *female director ratio*. The samples are the same as in Table 4. Panel B presents the second-stage instrumented HLM results where *female director ratio* is instrumented with the fraction of male directors on a board who sit on other boards on which there are female directors. At the bottom of the panel, summary statistics of the first-stage regressions are reported. Variable definitions are provided in Appendix I. Standard errors are in parentheses and are clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. First stage

Dependent variable in 2 nd stage	Ln(citation-weighted patent count)	Scope	Efficiency_ citation-weighted patents
IV_connection	0.062*** [0.005]	0.046*** [0.008]	0.056*** [0.007]
firmdev_Board size	0.002*** [0.000]	0.003*** [0.001]	0.003*** [0.001]
firmdev_Board independence	-0.001 [0.008]	0.043*** [0.015]	0.014 [0.012]
firmdev_Ln(total assets)	0.004*** [0.001]	0.006*** [0.001]	0.003*** [0.001]
firmdev_Ln(firm age)	0.003*** [0.001]	0.008*** [0.002]	0.005*** [0.001]
firmdev_Tangibility	0.002 [0.004]	0.007 [0.011]	0.016* [0.008]
firmdev_Ln(K/L)	-0.003*** [0.001]	-0.005*** [0.002]	-0.002* [0.001]
firmdev_Ln(R&D stock)	-0.001*** [0.000]	-0.001** [0.000]	
firmdev_Ln(patent stock)		0.001 [0.001]	
ctrymean_Board size	-0.001 [0.001]	-0.005** [0.002]	-0.003** [0.001]
ctrymean_Board independence	0.067*** [0.013]	0.134*** [0.024]	0.090*** [0.017]
ctrymean_Ln(total assets)	-0.005** [0.002]	0.007 [0.005]	-0.004* [0.003]

ctrymean_Ln(firm age)	-0.007 [0.005]	0.021** [0.008]	0.019*** [0.006]
ctrymean_Tangibility	-0.081*** [0.021]	-0.093** [0.044]	-0.126*** [0.031]
ctrymean_Ln(K/L)	0.012*** [0.003]	-0.001 [0.007]	0.013*** [0.004]
ctrymean_Ln(R&D stock)	0.008*** [0.001]	-0.000 [0.002]	
ctrymean_Ln(patent stock)		-0.002 [0.002]	
Female labor market participation	-0.000 [0.000]	0.002 [0.001]	0.000 [0.001]
Masculinity	-0.001*** [0.000]	-0.001** [0.000]	-0.001*** [0.000]
Ln(GDP per capita)	0.005 [0.003]	0.003 [0.007]	0.004 [0.005]
Stock mkt/GDP	-0.000 [0.000]	-0.000** [0.000]	-0.000*** [0.000]
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	45	29	38
No. of observations	38,892	12,534	16,089

Panel B. Second stage of instrumented HLM

	Ln(citation-weighted patent count)		Scope		Efficiency_ citation-weighted patents	
	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>
<u>Firm Characteristics</u>						
Female director ratio	13.233*** [0.452]	5.726 [5.053]	0.349*** [0.122]	-0.392 [0.496]	32.332*** [2.048]	39.732* [21.015]
Board size	0.050*** [0.004]	0.089*** [0.027]	0.002 [0.001]	0.011*** [0.003]	0.179*** [0.017]	-0.061 [0.088]
Board independence	0.533*** [0.073]	0.265 [0.597]	-0.025 [0.026]	-0.092* [0.048]	0.473 [0.326]	-1.513 [2.000]
Ln(total assets)	0.106*** [0.007]	0.424*** [0.059]	0.028*** [0.002]	0.035*** [0.010]	0.082*** [0.028]	1.754*** [0.193]
Ln(firm age)	-0.002 [0.009]	-0.683*** [0.100]	0.011*** [0.003]	-0.017 [0.016]	-0.288*** [0.038]	-3.552*** [0.381]
Tangibility	-0.437*** [0.050]	-2.569*** [0.586]	-0.024 [0.021]	-0.048 [0.086]	-0.065 [0.260]	-6.688*** [2.259]
Ln(K/L)	-0.162*** [0.007]	-0.445*** [0.074]	-0.028*** [0.003]	-0.049*** [0.011]	-0.744*** [0.031]	-1.859*** [0.268]
Ln(R&D stock)	0.100*** [0.002]	0.068** [0.027]	-0.003*** [0.001]	0.001 [0.003]		
Ln(patent stock)			-0.046*** [0.002]	-0.045*** [0.005]		
<u>Country Characteristics</u>						
Female labor market participation		0.039*** [0.015]		-0.004** [0.002]		0.055 [0.053]
Masculinity		0.016** [0.008]		-0.000 [0.000]		0.022 [0.023]
Ln(GDP per capita)		0.548*** [0.131]		0.004 [0.014]		2.215*** [0.437]

Stock mkt/GDP	-0.005*** [0.001]	0.000** [0.000]	-0.006 [0.004]
	<i>Within-country</i> × <i>Cross-country</i>	<i>Within-country</i> × <i>Cross-country</i>	<i>Within-country</i> × <i>Cross-country</i>
<u>Cross-level Interactions</u>			
Female labor market participation × Female director ratio	0.506*** [0.102]	-0.028 [0.032]	0.767 [0.496]
Masculinity × Female director ratio	0.096*** [0.032]	-0.008 [0.010]	0.124 [0.130]
Industry FEs	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
No. of countries	45	29	38
No. of observations	38,892	12,534	16,089
<u>First stage</u>			
IV_connection	0.062*** [0.005]	0.046*** [0.008]	0.056*** [0.007]
F-statistic	147.00	31.52	59.18
P-value of F-statistic	0.00	0.00	0.00
Adjusted R ²	0.184	0.273	0.200

Table IA5. Alternative measures of innovation output based on three-year citations

This table presents robustness checks on our results in Table 4 using forward citations over a three-year window instead of forward citations over a five-year window to weight patents when measuring innovation output and efficiency. The specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(citation-weighted patent count)		Efficiency_citation-weighted patents	
	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>
<u>Firm Characteristics</u>				
Female director ratio	1.286*** [0.093]	1.597** [0.621]	1.151*** [0.278]	8.388*** [1.733]
Board size	0.087*** [0.004]	0.102*** [0.026]	0.163*** [0.010]	-0.000 [0.051]
Board independence	0.835*** [0.065]	0.735 [0.590]	1.027*** [0.199]	-1.992 [1.269]
Ln(total assets)	0.227*** [0.006]	0.766*** [0.057]	0.098*** [0.017]	1.165*** [0.124]
Ln(firm age)	-0.003 [0.008]	-1.292*** [0.113]	-0.184*** [0.024]	-2.649*** [0.245]
Tangibility	-0.559*** [0.044]	-4.482*** [0.545]	0.299* [0.157]	-7.412*** [1.372]
Ln(K/L)	-0.258*** [0.006]	-0.680*** [0.074]	-0.663*** [0.018]	-1.156*** [0.165]
Ln(R&D stock)	0.127*** [0.002]	-0.022 [0.024]		
<u>Country Characteristics</u>				
Female labor market participation		0.067*** [0.014]		0.082*** [0.031]
Masculinity		0.014 [0.010]		0.020 [0.015]
Ln(GDP per capita)		0.251** [0.128]		2.062*** [0.258]
Stock mkt/GDP		-0.005*** [0.001]		-0.013** [0.002]
<u>Cross-level Interactions</u>				
		<i>Within-country</i> × <i>Cross-country</i>		<i>Within-country</i> × <i>Cross-country</i>
Female labor market participation × Female director ratio		0.122*** [0.021]		0.124* [0.072]
Masculinity × Female director ratio		0.019*** [0.006]		-0.003 [0.018]
Year FEs		Yes		Yes
Industry FEs		Yes		Yes
No. of countries		47		38
No. of observations		53,440		22,187

Table IA6. Alternative measures of innovation output and innovative efficiency

This table presents robustness checks on our main results in Table 4 using alternative measures of innovation output and innovative efficiency. In the first four columns, the dependent variables are innovation output measured with simple patent count and citation count. In the next four columns, the dependent variables are innovative efficiency measures based on simple patent count and citation count. The samples and specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(patent count)		Ln(citation count)		Efficiency_patents		Efficiency_citations	
	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>
<u>Firm Characteristics</u>								
Female director ratio	0.967*** [0.057]	1.383*** [0.348]	1.157*** [0.080]	1.799*** [0.520]	0.189*** [0.035]	1.411*** [0.189]	0.601*** [0.104]	3.230*** [0.628]
Board size	0.074*** [0.002]	0.135*** [0.015]	0.075*** [0.003]	0.110*** [0.022]	0.026*** [0.001]	0.020*** [0.006]	0.060*** [0.004]	0.005 [0.019]
Board independence	0.589*** [0.041]	1.549*** [0.375]	0.624*** [0.056]	0.578 [0.511]	0.154*** [0.025]	0.345** [0.171]	0.480*** [0.075]	-0.333 [0.490]
Ln(total assets)	0.161*** [0.004]	0.532*** [0.036]	0.193*** [0.005]	0.686*** [0.050]	0.010*** [0.002]	0.107*** [0.015]	0.067*** [0.006]	0.462*** [0.046]
Ln(firm age)	0.006 [0.005]	-0.950*** [0.074]	-0.002 [0.007]	-1.191*** [0.100]	-0.023*** [0.003]	-0.337*** [0.034]	-0.073*** [0.009]	-1.007*** [0.095]
Tangibility	-0.421*** [0.027]	-4.113*** [0.319]	-0.399*** [0.038]	-4.797*** [0.445]	0.082*** [0.019]	-1.156*** [0.163]	0.046 [0.059]	-3.578*** [0.506]
Ln(K/L)	-0.197*** [0.004]	-0.712*** [0.042]	-0.218*** [0.005]	-0.632*** [0.063]	-0.100*** [0.002]	-0.128*** [0.019]	-0.250*** [0.007]	-0.399*** [0.062]
Ln(R&D stock)	0.086*** [0.001]	-0.087*** [0.014]	0.102*** [0.002]	-0.061*** [0.020]	0.189***	1.411***	0.601***	3.230***
<u>Country Characteristics</u>								
Female labor market participation		0.059*** [0.007]		0.062*** [0.010]		0.030*** [0.003]		0.050*** [0.011]
Masculinity		0.008 [0.009]		0.007 [0.010]		0.006* [0.003]		0.010 [0.006]
Ln(GDP per capita)		-0.008 [0.070]		0.052 [0.101]		0.040 [0.034]		0.238** [0.094]
Stock mkt/GDP		-0.001** [0.001]		-0.002*** [0.001]		0.000 [0.000]		-0.001 [0.001]

	<i>Within- country × Cross- country</i>	<i>Within- country × Cross- country</i>	<i>Within- country × Cross- country</i>	<i>Within- country × Cross- country</i>
<u>Cross-level Interactions</u>				
Female labor market participation × Female director ratio	0.075*** [0.012]	0.096*** [0.018]	0.010 [0.007]	0.056** [0.025]
Masculinity × Female director ratio	0.014*** [0.004]	0.021*** [0.005]	-0.002 [0.002]	0.003 [0.007]
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of countries	51	48	45	39
No. of observations	77,563	61,137	32,636	25,443

Table IA7. Triadic patents

This table presents the effect of female directors on innovation outcomes measured from “triadic” patents, i.e., patents applied for simultaneously at all three major patent offices—the USPTO, the European Patent Office (EPO), and the Japanese Patent Office (JPO). Samples and specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(citation-weighted patent count)		Scope		Efficiency_citation-weighted patents	
	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>	<i>Within-country</i>	<i>Cross-country</i>
<u>Firm Characteristics</u>						
Female director ratio	0.198*** [0.019]	0.508** [0.230]	0.015* [0.008]	0.032 [0.049]	0.146*** [0.031]	0.562** [0.268]
Board size	0.052* [0.030]	0.321 [0.387]	0.019* [0.011]	-0.008 [0.065]	-0.018 [0.051]	0.728* [0.414]
Board independence	-0.102** [0.049]	-1.056 [0.663]	-0.041** [0.019]	0.090 [0.094]	-0.093 [0.090]	-1.534** [0.669]
Ln(total assets)	0.035*** [0.004]	0.085*** [0.023]	0.002 [0.002]	0.005 [0.006]	0.052*** [0.006]	-0.013 [0.028]
Ln(firm age)	0.422*** [0.063]	-0.148 [0.516]	-0.033 [0.036]	-0.185 [0.115]	0.363*** [0.110]	0.114 [0.591]
Tangibility	0.092*** [0.006]	0.322*** [0.052]	0.030*** [0.003]	0.042** [0.017]	-0.024*** [0.009]	0.296*** [0.064]
Ln(K/L)	-0.005 [0.008]	-0.829*** [0.096]	0.013*** [0.004]	-0.051* [0.027]	-0.071*** [0.013]	-0.866*** [0.121]
Ln(R&D stock)	-0.238*** [0.042]	-2.534*** [0.548]	0.040 [0.028]	0.497*** [0.160]	0.283*** [0.089]	-1.585** [0.704]
Ln(patent stock)	-0.098*** [0.006]	-0.315*** [0.066]	-0.028*** [0.003]	-0.044** [0.017]	-0.202*** [0.010]	-0.333*** [0.083]
<u>Country Characteristics</u>						
Female labor market participation		0.022* [0.013]		-0.002 [0.003]		0.010 [0.014]
Masculinity		0.004 [0.007]		0.001 [0.001]		0.004 [0.005]
Ln(GDP per capita)		0.356*** [0.115]		0.017 [0.027]		0.275** [0.110]
Stock mkt/GDP		-0.003** [0.001]		0.000 [0.000]		-0.001 [0.001]

<u>Cross-level Interactions</u>	<i>Within-country</i> × <i>Cross-country</i>	<i>Within-country</i> × <i>Cross-country</i>	<i>Within-country</i> × <i>Cross-country</i>
Female labor market participation × Female director ratio	0.106*** [0.023]	0.039*** [0.014]	0.067 [0.045]
Masculinity × Female director ratio	0.005 [0.006]	0.006* [0.003]	-0.002 [0.010]
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	45	26	38
No. of observations	38,892	7,617	16,089

Table IA8. The non-linear effect of board gender diversity

This table presents the non-linear contrasting effects of female directors by employing a set of indicator variables capturing the number of female directors on a board being above a particular threshold. *Female director count* ≥ 1 is an indicator variable that takes the value of one if a firm-year has one or more female directors, and zero otherwise. *Female director count* ≥ 2 is an indicator variable that takes the value of one if a firm-year has two or more female directors, and zero otherwise. *Female director count* ≥ 3 is an indicator variable that takes the value of one if a firm-year has three or more female directors, and zero otherwise. The sample and specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(citation-weighted patent count)	Scope	Efficiency_citation-weighted patents
<u>Within-country</u>			
Female director count ≥ 1 (1 vs 0)	0.290*** [0.027]	0.006 [0.006]	0.687*** [0.155]
Female director count ≥ 2 (2 vs 1)	0.278*** [0.041]	0.019** [0.008]	0.191 [0.256]
Female director count ≥ 3 (3 vs 2)	0.087 [0.067]	0.002 [0.014]	0.258 [0.449]
<u>Cross-country</u>			
Female director count ≥ 1 (1 vs 0)	1.179*** [0.320]	0.059* [0.033]	6.157*** [1.479]
Female director count ≥ 2 (2 vs 1)	-0.101 [0.535]	-0.050 [0.057]	1.118 [2.165]
Female director count ≥ 3 (3 vs 2)	-0.595 [0.915]	0.053 [0.073]	-3.464 [3.472]
Other controls	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	45	29	38
No. of observations	38,892	12,534	16,089

Table IA9. The effect of board gender diversity by five Fama-French (FF5) industries

This table presents the industry-specific effects of female directors. We interact firm-level female director ratio with five Fama-French industry indicators to obtain the effect of female directors within each industry. The samples and dependent variables are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Coefficient on within-country female director ratio within a FF5 industry	Ln(citation-weighted patent count)	Scope	Efficiency_ citation-weighted patents
Consumer Durables, Non-Durables, Wholesale, Retail, and Some Services (Laundries, Repair Shops)	0.426* [0.242]	0.023 [0.084]	-4.505 [2.405]
Manufacturing, Energy, and Utilities	2.419*** [0.283]	-0.059 [0.062]	5.785*** [1.719]
Business Equipment, Telephone and Television Transmission	3.085*** [0.277]	0.218*** [0.049]	2.574** [1.307]
Healthcare, Medical Equipment, and Drug	3.485*** [0.400]	-0.014 [0.064]	5.466*** [1.704]
Other: Mines, Construction, Building Management, Trans, Hotels, Bus Services, Entertainment, Finance	-0.112 [0.185]	0.143 [0.114]	2.403 [2.224]
Other controls	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	45	29	38
No. of observations	38,892	12,534	16,089

Table IA10. Excluding U.S. firms

This table presents the effects of board gender diversity excluding firm-year observations in the U.S. All variables and specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(citation- weighted patent count)	Scope	Efficiency_ citation-weighted patents
<i><u>Within-country</u></i>			
Female director ratio	0.658*** [0.144]	0.039 [0.065]	0.739*** [0.223]
<i><u>Cross-country</u></i>			
Female director ratio	-0.481 [0.714]	0.005 [0.149]	2.037** [0.880]
Female labor market participation × Female director ratio	0.133*** [0.030]	0.009 [0.011]	0.126** [0.051]
Masculinity × Female director ratio	0.028*** [0.007]	0.007** [0.003]	0.026** [0.011]
Other controls	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	44	28	37
No. of observations	18,624	3,146	7,347

Table IA11. Control for other diversity measures

This table presents the effects of board gender diversity controlling for other measures of board diversity. Specifically, we control for the variance ratios (variance divided by mean) for directors' age, the number of other board seats, or board tenure. We also control for the HHI (Herfindahl–Hirschman Index) for directors' experience in different industries, nationalities, and school affiliations. All other variables and specifications are the same as those in Table 4. Variable definitions are provided in Appendix I. All regressions include year fixed effects and two-digit SIC industry fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Ln(citation-weighted patent count)	Scope	Efficiency_ citation-weighted patents
<i><u>Within-country</u></i>			
Female director ratio	1.446*** [0.126]	0.056* [0.031]	2.742*** [0.798]
Diversity_age	-0.143*** [0.013]	-0.009*** [0.003]	-0.275*** [0.077]
Diversity_boardseats	0.002 [0.002]	-0.001*** [0.000]	-0.031*** [0.010]
Diversity_boardtenure	-0.019*** [0.003]	0.001 [0.001]	-0.119*** [0.021]
Diversity_industryexperience	-0.582*** [0.071]	-0.019 [0.023]	-1.893*** [0.452]
Diversity_nationality	-0.184*** [0.055]	0.029** [0.013]	0.007 [0.323]
Diversity_school	0.396*** [0.104]	0.106*** [0.041]	-2.484*** [0.728]
Board size	0.091*** [0.005]	0.003*** [0.001]	0.341*** [0.030]
Board independence	0.697*** [0.091]	-0.028 [0.026]	0.729 [0.580]
Ln(total assets)	0.241*** [0.008]	0.029*** [0.002]	0.120** [0.048]
Ln(firm age)	0.021* [0.011]	0.010*** [0.003]	-0.313*** [0.067]
Tangibility	-0.567*** [0.058]	0.031 [0.019]	0.710 [0.448]
Ln(K/L)	-0.287*** [0.008]	-0.027*** [0.002]	-1.588*** [0.052]
Ln(R&D stock)	0.146*** [0.003]	-0.003*** [0.001]	
Ln(patent stock)		-0.043*** [0.001]	
<i><u>Cross-country</u></i>			
Female director ratio	-0.472 [0.938]	-0.122 [0.132]	11.108** [5.123]
Diversity_age	-0.533** [0.208]	0.130*** [0.026]	-1.606* [0.922]
Diversity_boardseats	0.112*** [0.024]	-0.003 [0.002]	0.335*** [0.098]
Diversity_boardtenure	0.008 [0.053]	-0.006 [0.006]	0.014 [0.219]

Diversity_industryexperience	-2.805*** [0.851]	0.236** [0.106]	-16.167*** [4.181]
Diversity_nationality	-2.021*** [0.582]	-0.194*** [0.074]	-6.226** [2.989]
Diversity_school	6.919*** [1.324]	0.425** [0.174]	23.237*** [7.702]
Board size	0.068** [0.033]	0.008*** [0.003]	-0.047 [0.155]
Board independence	-1.164 [0.773]	-0.006 [0.060]	-10.189*** [3.726]
Ln(total assets)	0.747*** [0.073]	0.044*** [0.010]	1.967*** [0.363]
Ln(firm age)	-0.800*** [0.174]	-0.027 [0.018]	-4.287*** [0.734]
Tangibility	-2.982*** [0.770]	0.044 [0.096]	-8.930** [3.903]
Ln(K/L)	-0.732*** [0.094]	-0.055*** [0.013]	-2.205*** [0.478]
Ln(R&D stock)	0.074** [0.035]	-0.001 [0.003]	
Ln(patent stock)		-0.036*** [0.006]	
Female labor market participation	0.037** [0.018]	-0.003 [0.002]	0.067 [0.086]
Masculinity	0.019** [0.010]	-0.000 [0.000]	0.042 [0.035]
Ln(GDP per capita)	0.553*** [0.163]	-0.009 [0.015]	2.207*** [0.691]
Stock mkt/GDP	-0.003** [0.001]	0.001*** [0.000]	0.000 [0.007]
Female labor market participation × Female director ratio	0.129*** [0.032]	-0.001 [0.009]	0.082 [0.228]
Masculinity × Female director ratio	0.027*** [0.008]	0.006*** [0.002]	0.012 [0.051]
Year FEs	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
No. of countries	45	29	38
No. of observations	38,892	12,534	16,089