

## **Supplementary appendix of results for**

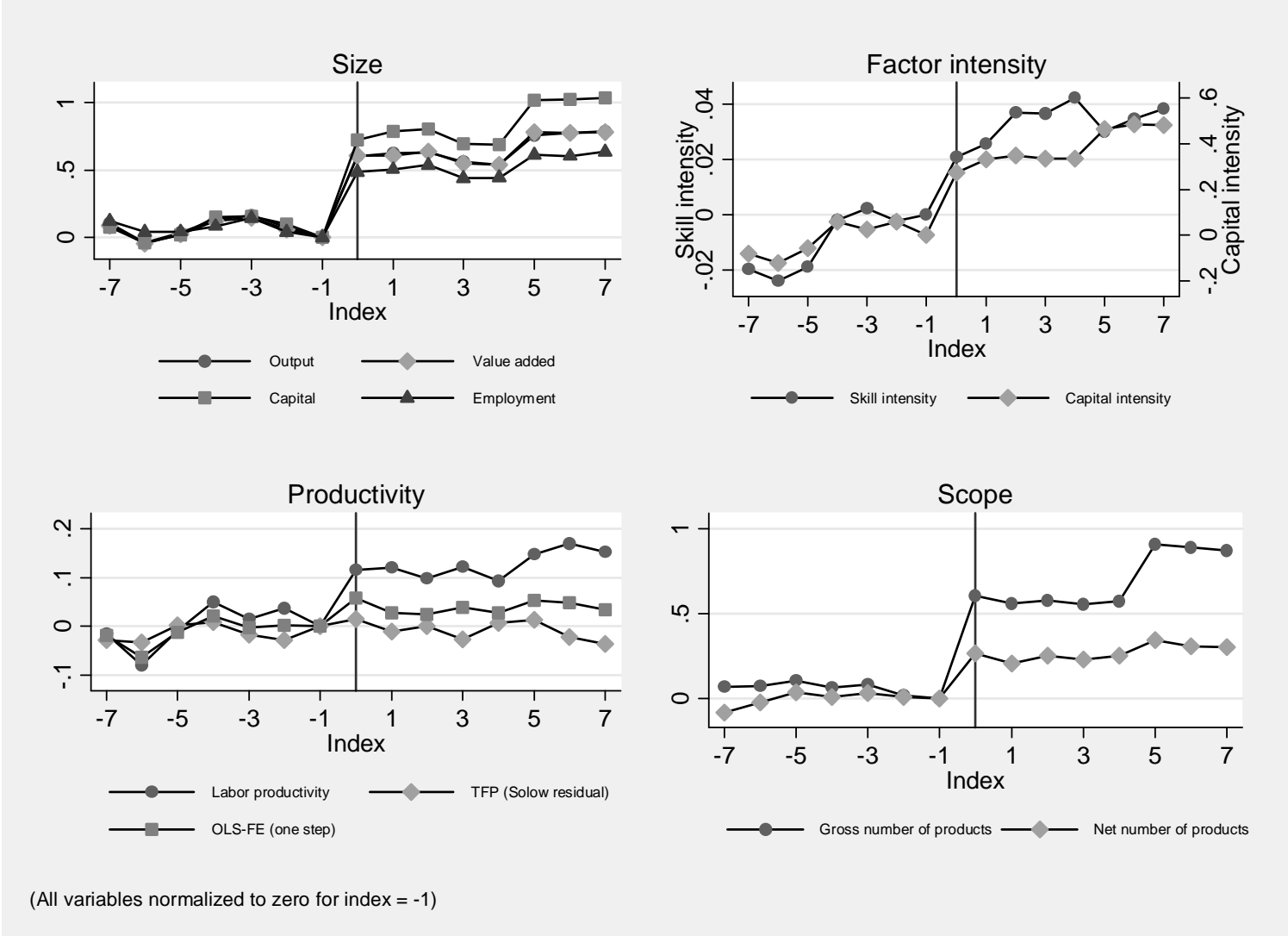
“What happens when firms patent? New evidence from US economic census data”, by Natarajan Balasubramanian<sup>1</sup> and Jagadeesh Sivadasan<sup>2</sup>, 2009

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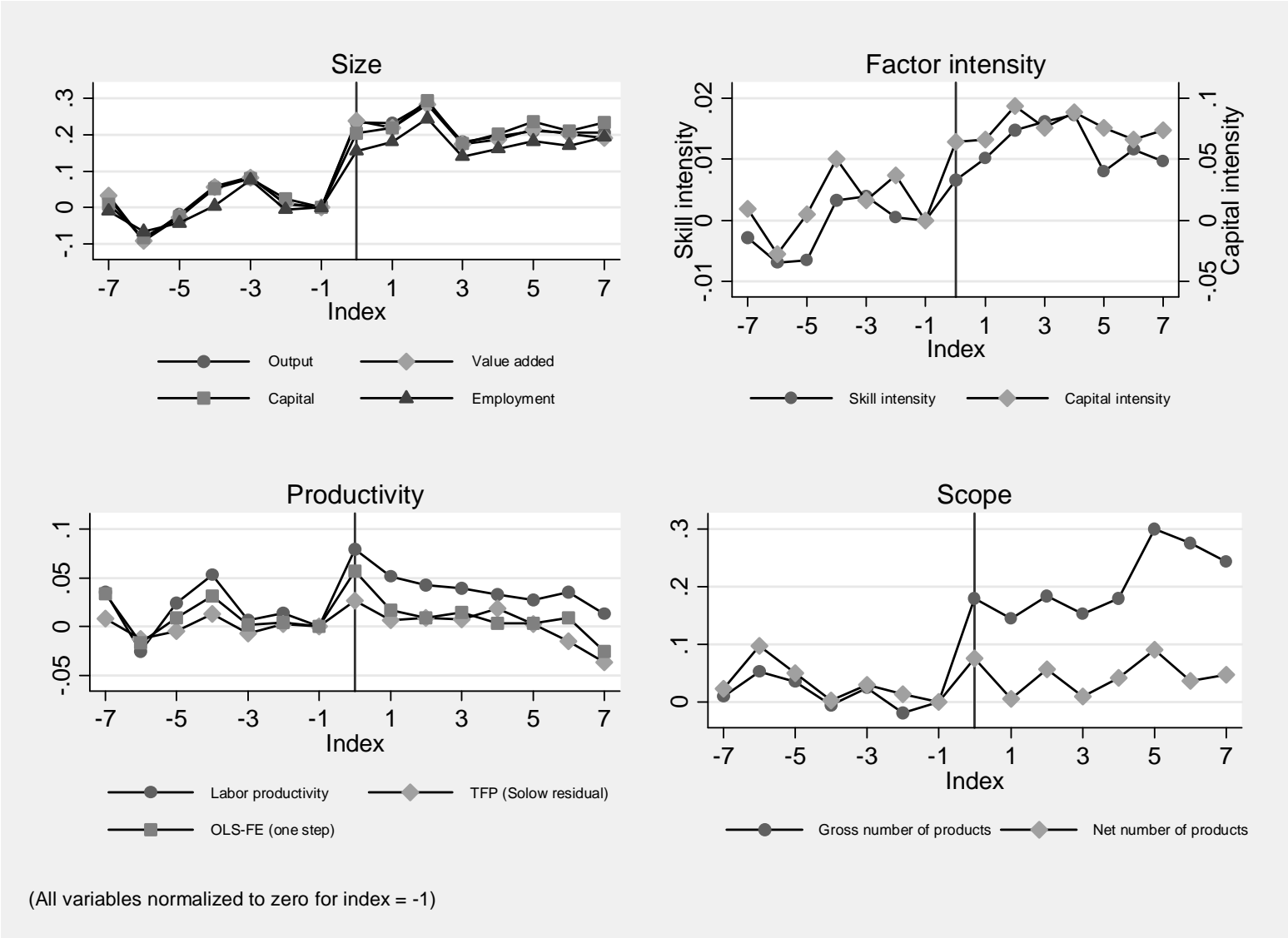
<sup>2</sup> jagadees@umich.edu, University of Michigan

Figure A.1: Event study analysis: Before-after effects



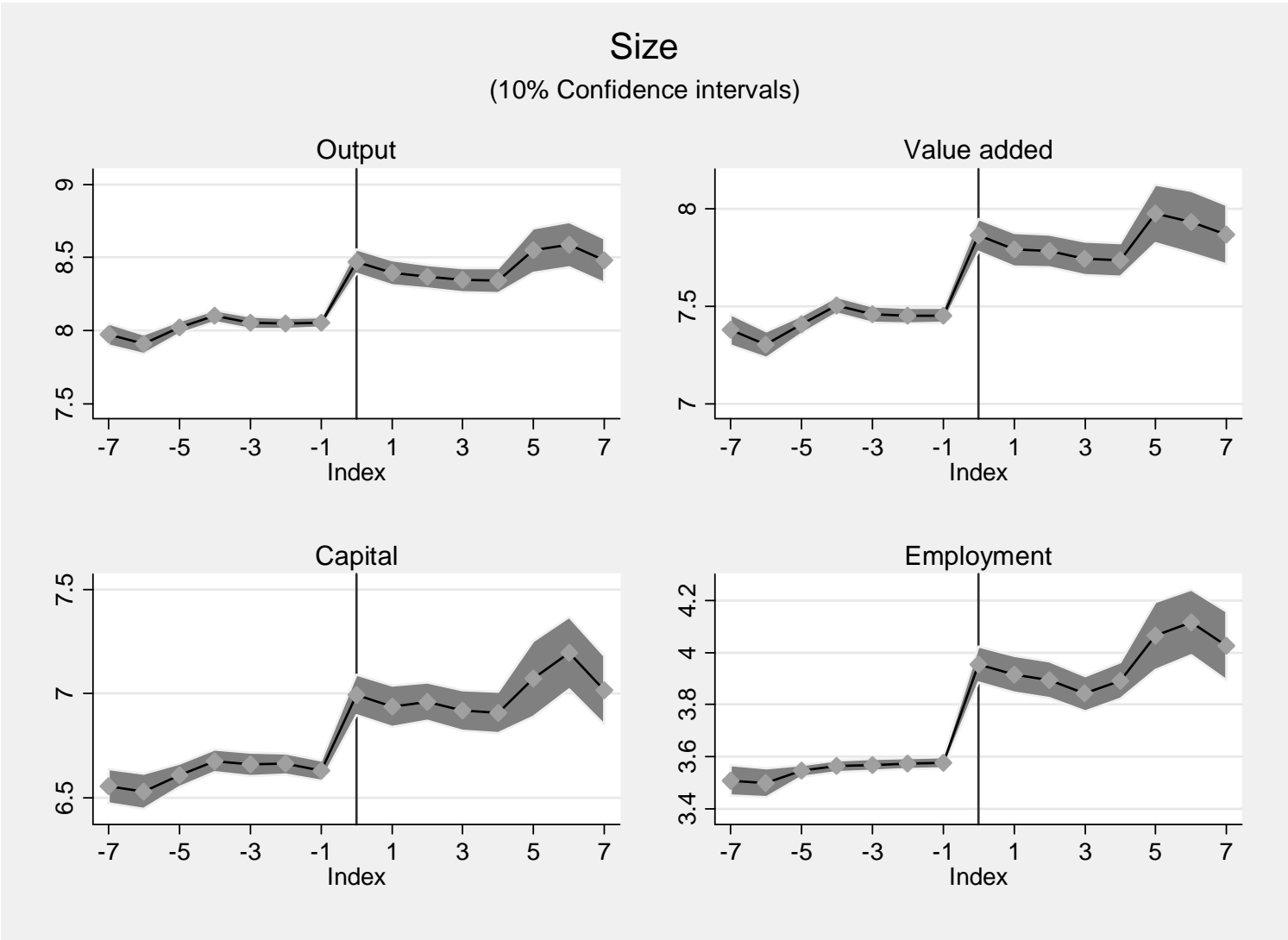
**Notes:** i) Points on the graph are coefficients on a dummy indicator variable, which equals 1 if the firm applied (successfully) for a patent, interacted with an index indicating the number of years from patenting. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) Specifications include no fixed effects, so that dummy coefficient reflects the mean for each index. (iii) The underlying sample consists only of “switchers” i.e. firms that switch status from non-patentee to patentee. The number of observations in each of the underlying regressions is 18,572.

Figure A.2: Event study analysis (Industry-year-age effects)



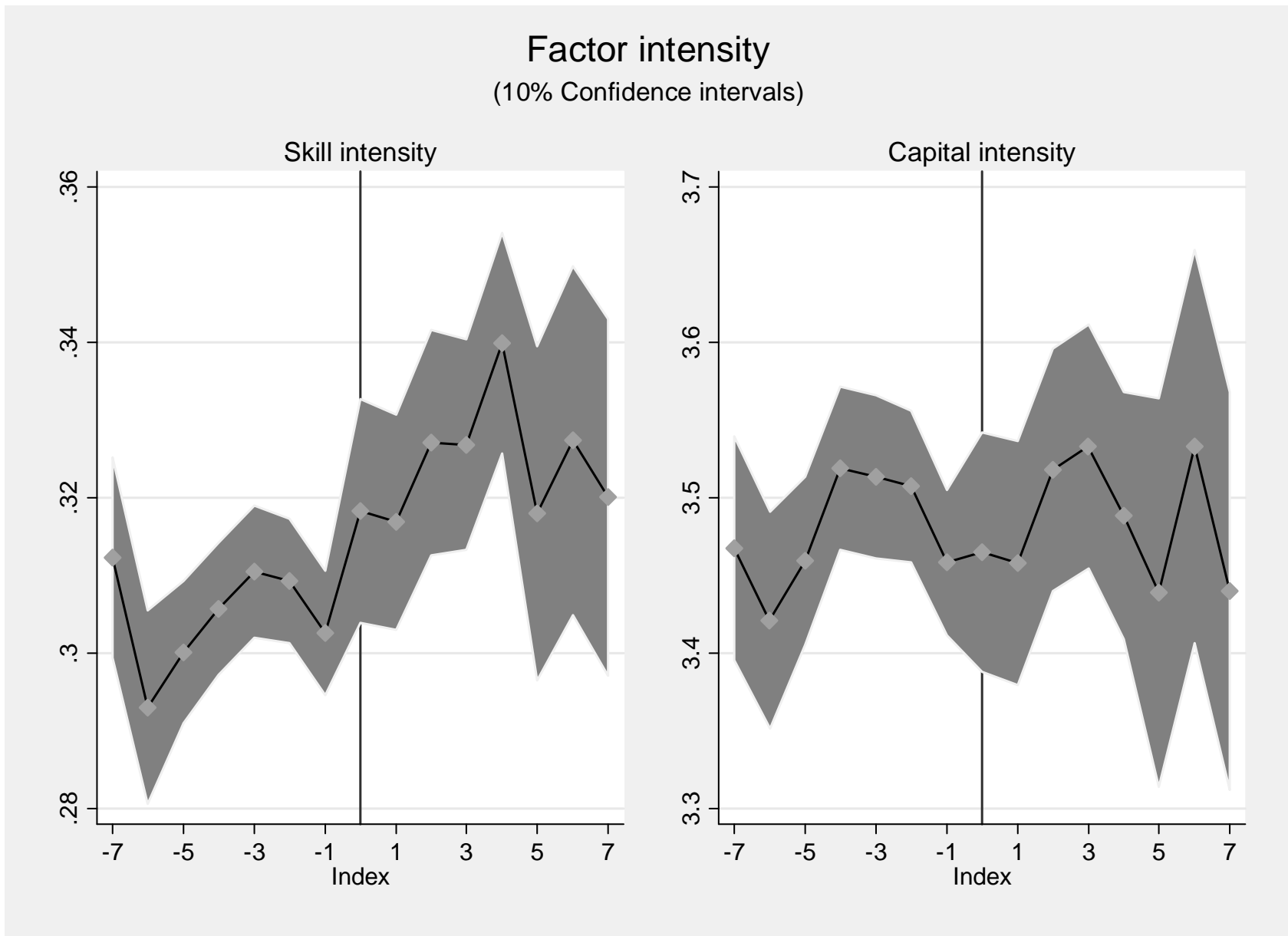
Notes: i) Points on the graph are coefficients on a dummy indicator variable, which equals 1 if the firm applied (successfully) for a patent, interacted with an index indicating the number of years from patenting. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All specifications include 4-digit industry-year-age quintile fixed effects. (iii) The underlying sample consists of “switchers”, i.e., firms that switch status from non-patentee to patentee, and non-patentees. The number of observations in each of the underlying regressions is 18,572. (iv) All variables are normalized to zero for index=-1.

Figure A.3a: Size variables (with nearest neighbor cell-year effects)



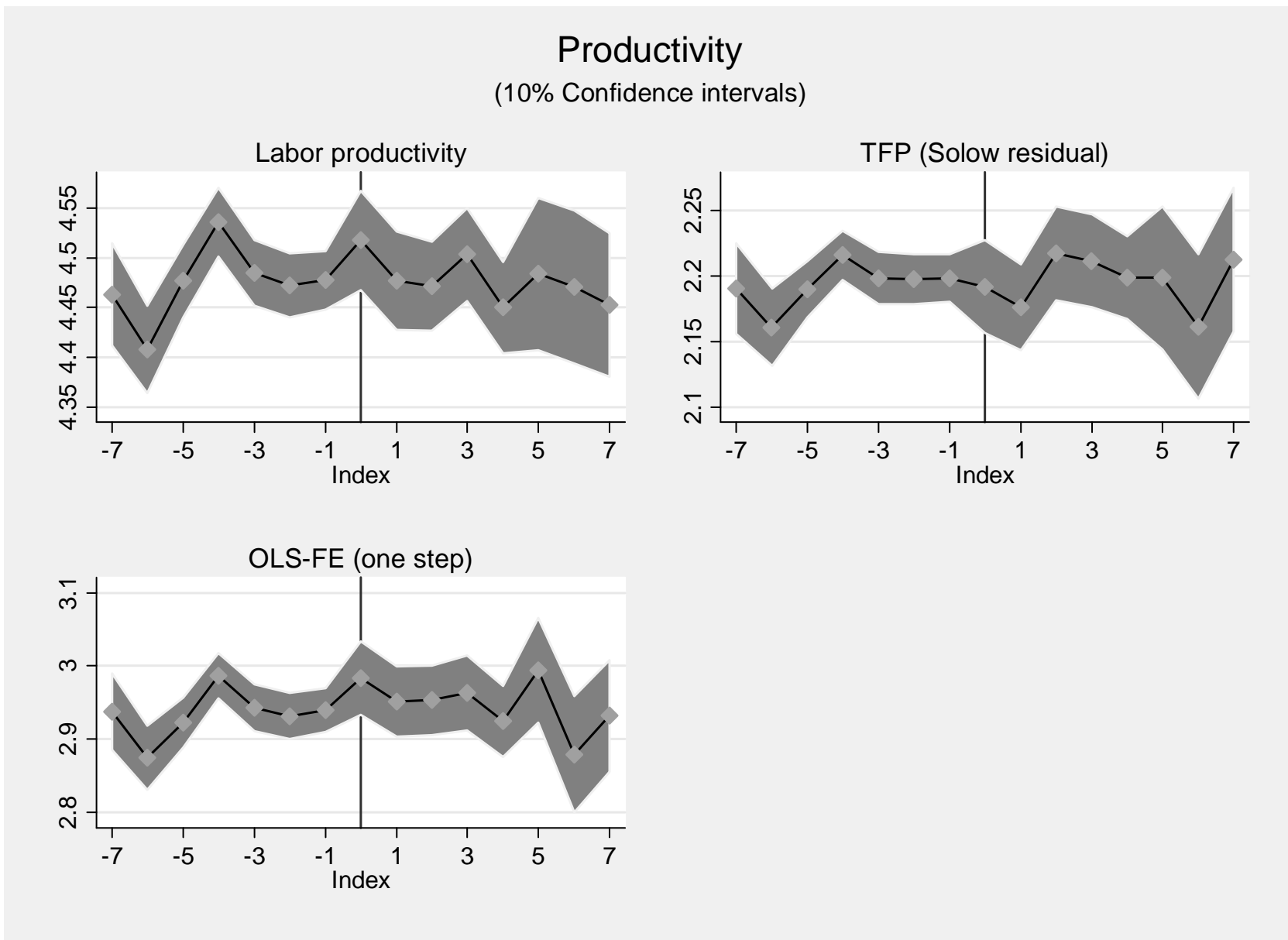
**Notes:** i) Points on the graph are coefficients on a dummy indicator variable, which equals 1 if the firm applied (successfully) for a patent, interacted with an index indicating the number of years from patenting. (ii) Specifications include cell-year fixed effects, where each cell consists of exactly one “switcher” (i.e., a firm that switches status from non-patentee to patentee), and one control firm which is a non-patentee firm in the same 4 digit industry and same age as the switcher, and nearest in employment size to the switcher firm in the closest data year prior to patenting. (iii) The underlying sample consists of approximately 8000 switchers and equal number of non-patentee control firms.

Figure A.3b: Factor intensity variables (with nearest neighbor cell-year effects)



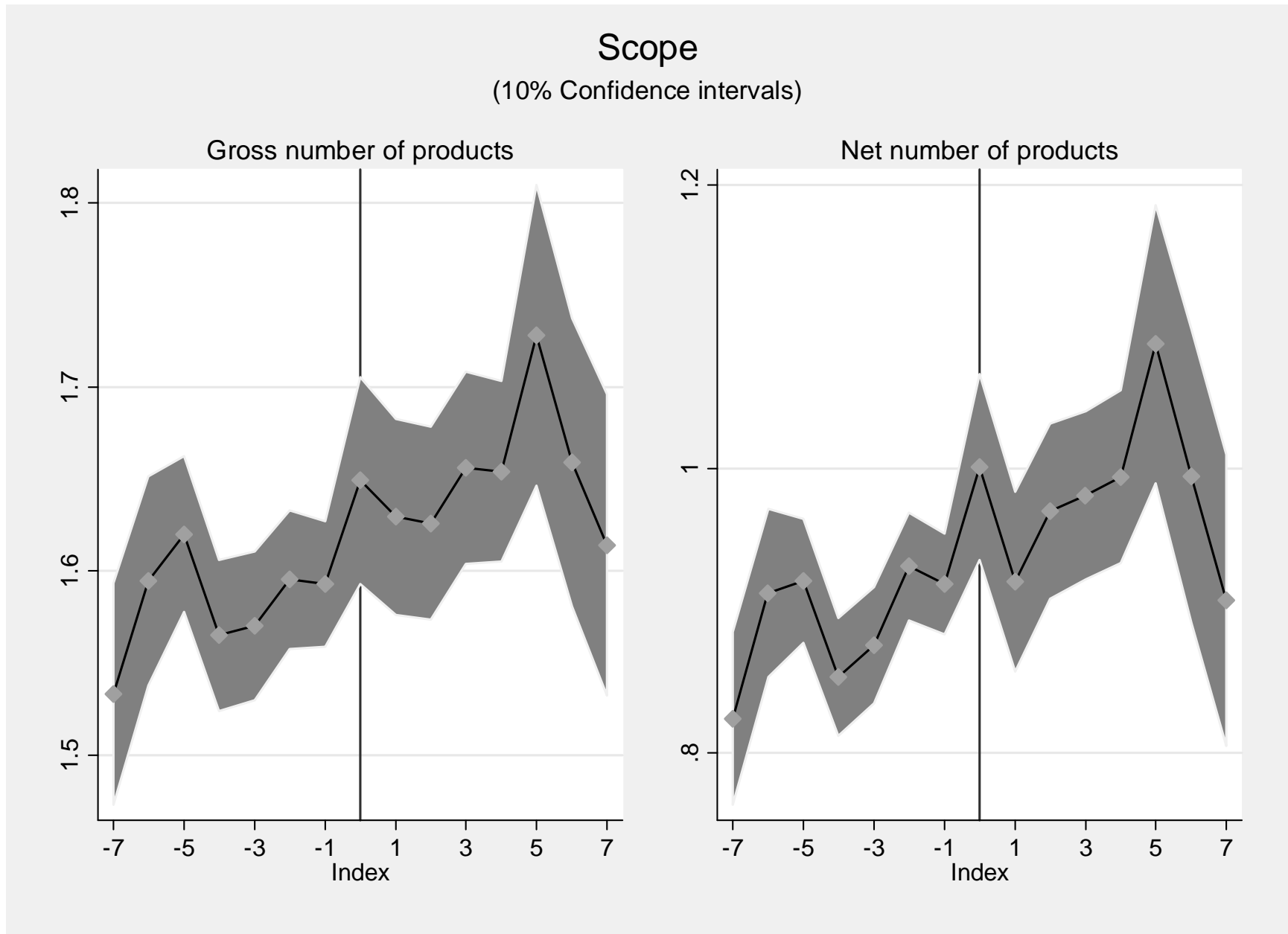
Notes: See notes to Figure A.3a

Figure A.3c: Productivity variables (with nearest neighbor cell-year effects)



Notes: See notes to Figure A.3a

Figure A.3d: Scope variables (with nearest neighbor cell-year effects)



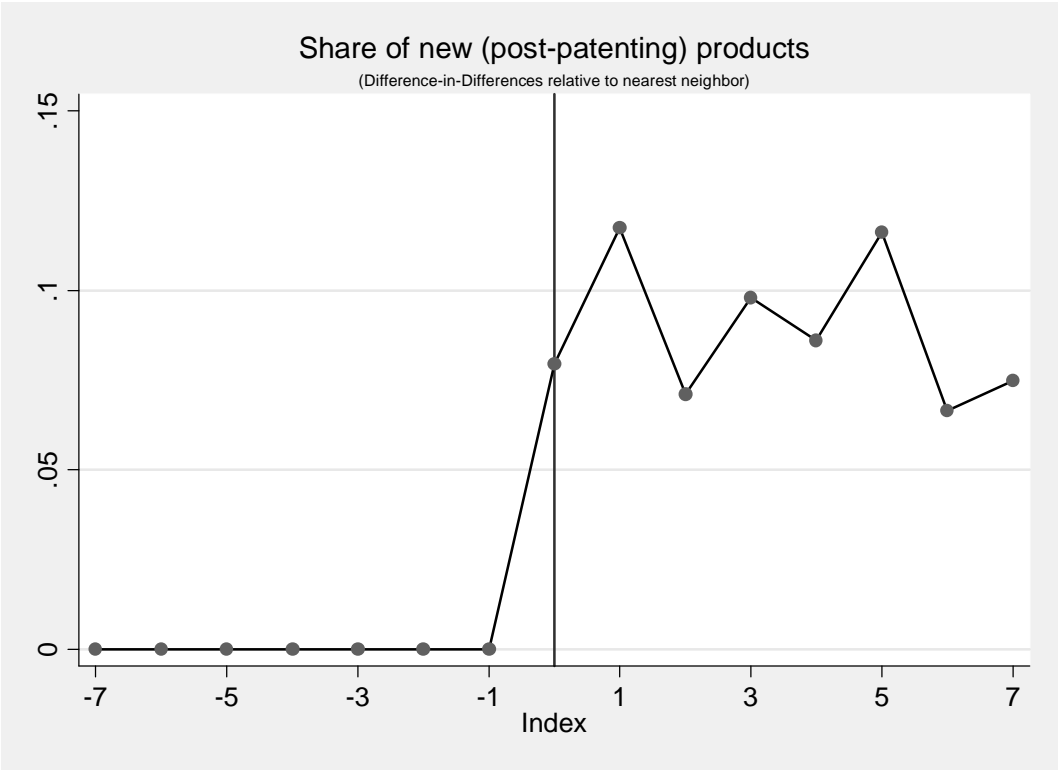
Notes: See notes to Figure A.3a

Table A.1: Scope results: Robustness to other controls

	Elasticity to patent stock (Table 3)		Coefficient on patent dummy (Table 4A)		Coefficient on patent dummy (Table 4B)	
			Switchers overall		Switchers overall	
<b>Gross Number of Products</b>						
(i) Unconditional	0.04366***	(0.00588)	0.78727***	(0.00753)	0.09553***	(0.00676)
<i>Including additional controls for</i>						
(ii) Output	0.01731***	(0.00262)	0.60074***	(0.00826)	0.03912***	(0.00650)
(iii) Output, skill, and capital intensity	0.01774***	(0.00261)	0.57669***	(0.00859)	0.03911***	(0.00648)
(iv) Employment	0.01665***	(0.00259)	0.63483***	(0.00801)	0.04090***	(0.00644)
(v) Employment, skill, and capital intensity	0.01655***	(0.00260)	0.57910***	(0.00876)	0.03951***	(0.00645)
(iv) Capital	0.02442***	(0.00268)	0.60380***	(0.00919)	0.06575***	(0.00664)
(v) Capital, skill, and capital intensity	0.01691***	(0.00260)	0.58141***	(0.00879)	0.04314***	(0.00646)
<b>Net Number of Products</b>						
(i) Unconditional	0.03561***	(0.00354)	0.33172***	(0.01008)	0.01115	(0.00960)
<i>Including additional controls for</i>						
(ii) Output	0.00475	(0.00465)	0.20318***	(0.01112)	-0.03746***	(0.00945)
(iii) Output, skill, and capital intensity	0.00563	(0.00464)	0.20814***	(0.01147)	-0.03761***	(0.00943)
(iv) Employment	0.00317	(0.00456)	0.21551***	(0.01080)	-0.03541***	(0.00943)
(v) Employment, skill, and capital intensity	0.00266	(0.00458)	0.20561***	(0.01149)	-0.03417***	(0.00943)
(iv) Capital	0.01887***	(0.00481)	0.22770***	(0.01184)	-0.00974	(0.00956)
(v) Capital, skill, and capital intensity	0.00294	(0.00458)	0.20775***	(0.01150)	-0.03074***	(0.00944)

**Notes: Columns 1-2.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Columns 3-4** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"). Additionally, the samples in column 2 are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 5-6** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Figure A.4: Event study analysis: Share of new products -- Difference-in-differences relative to nearest neighbor



**Notes:** i) Points on the graph are coefficients on a dummy indicator variable, which equals 1 if the firm applied (successfully) for a patent, interacted with an index indicating the number of years from patenting. (ii) Specifications include cell-year fixed effects, where each cell consists of exactly one “switcher” (i.e., a firm that switches status from non-patentee to patentee), and one control firm which is a non-patentee firm in the same 4-digit industry and same age as the switcher, and nearest in employment size to the switcher firm in the closest data year prior to patenting. (iii) The underlying sample consists of approximately 8,000 switchers and an equal number of non-patentee control firms.

Table A.2: Margins and patenting

Dependent variable:	Markup (Net profits/sales)			Markup (Net profits/value added)		
	(1)	(2)	(3)	(4)	(5)	(6)
	Elasticity estimate (Table 3)	Before-after effect (Table 4A)	Difference-in-Differences effect (Table 4B)	Elasticity estimate (Table 3)	Before-after effect (Table 4A)	Difference-in-Differences effect (Table 4B)
Coefficient on patent stock	-0.00152* (0.00082)			0.00145*** (0.00029)		
Number of observations	60,708			60,708		
Coefficient on patent dummy		0.02266*** (0.00225)	0.00272 (0.00202)		0.02723*** (0.00116)	0.00494*** (0.00111)
Number of observations		31,336	1,333,963		31,336	1,333,963

**Notes:** Net profits are defined as sales less the sum of materials costs, labor costs, and financial costs (calculated as 8.5% of assets, following Aghion et al. (2005)).

**Columns 1 & 4.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Columns 2 & 5** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”). Additionally, the samples in column 2 are restricted to the five years before and the five years after the “switch”. (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 3 & 6** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the “switch”. (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.3: GMM analysis -- All variables

	<b>DIFFERENCE GMM (LAG 2)</b>	<b>DIFFERENCE GMM (LAGS 2, 3)</b>	<b>SYSTEM GMM (LAG 2)</b>	<b>SYSTEM GMM (LAGS 2, 3)</b>
<i>Size</i>				
Output	0.86647** (0.35944)	0.86639** (0.36372)	0.38920*** (0.01331)	0.38905*** (0.01331)
Hansen p-value	NA	0.4670	0.0876	0.1410
m2 p-value	0.0000	0.0000	0.0000	0.0000
Value added	0.81222** (0.36132)	0.81232** (0.36215)	0.38722*** (0.01316)	0.38721*** (0.01316)
Hansen p-value	NA	0.8780	0.1510	0.3480
m2 p-value	0.0001	0.0001	0.0000	0.0000
Capital stock	0.85276** (0.39936)	0.83972** (0.40587)	0.36185*** (0.01505)	0.36195*** (0.01505)
Hansen p-value	NA	0.2920	0.1250	0.1310
m2 p-value	0.0000	0.0000	0.0000	0.0000
Employment	-1.62139** (0.69445)	-1.54659** (0.69557)	0.32487*** (0.01168)	0.32436*** (0.01167)
Hansen p-value	NA	0.4920	0.0000	0.0000
m2 p-value	0.0077	0.0099	0.1060	0.1060
<i>Factor intensity</i>				
Skill intensity	0.01906 (0.03780)	0.01537 (0.03778)	0.00923*** (0.00111)	0.00922*** (0.00111)
Hansen p-value	NA	0.3800	0.7910	0.6610
m2 p-value	0.0153	0.0109	0.0009	0.0009
Capital intensity	2.58166*** (0.97172)	2.42168** (0.98295)	0.04605*** (0.00688)	0.04581*** (0.00689)
Hansen p-value	NA	0.2870	0.0000	0.0000
m2 p-value	0.0005	0.0010	0.0000	0.0000

Table A.3: GMM analysis (continued)

	DIFFERENCE GMM (LAG 2)	DIFFERENCE GMM (LAGS 2, 3)	SYSTEM GMM (LAG 2)	SYSTEM GMM (LAGS 2, 3)
<i>Productivity</i>				
Labor productivity	2.48786*** (0.90240)	2.38693*** (0.91063)	0.05173*** (0.00416)	0.05169*** (0.00416)
Hansen p-value	NA	0.4100	0.0000	0.0000
m2 p-value	0.0009	0.0014	0.0000	0.0000
TFP (Solow residual)	-0.23638 (0.14984)	-0.0673 (0.16002)	0.01931*** (0.00329)	0.02003*** (0.00329)
Hansen p-value	NA	0.0000	0.0296	0.0000
m2 p-value	0.1360	0.4510	0.0808	0.0801
GMM (1-step)	1.06969 (0.70884)	0.19208* (0.09894)	0.07324*** (0.00710)	0.07396*** (0.00705)
Hansen p-value	NA	0.0003	0.0000	0.0000
m2 p-value	0.1870	0.9370	0.6890	0.6850
<i>Scope</i>				
Gross number of products	1.18713*** (0.44143)	1.13419** (0.44683)	-0.02327** (0.01028)	-0.02404** (0.01028)
Hansen p-value	NA	0.3470	0.0000	0.0000
m2 p-value	0.0000	0.0000	0.0000	0.0000
Net number of products	-2.88279*** (1.10424)	-2.82195*** (1.09542)	0.10410*** (0.00866)	0.10413*** (0.00866)
Hansen p-value	NA	0.7490	0.0000	0.0000
m2 p-value	0.0163	0.0163	0.0054	0.0054

**Notes:** (i) This table reports coefficients on log depreciated patent stock. All dependent variables, except the white-collar to blue-collar wage ratio, are logged. (ii) Lagged levels are used as instruments in first differenced equations and lagged differences are used as instruments for equations in levels. System GMM uses equations in both levels and differences as proposed by Blundell and Bond (1998). (iii) m2 is a test for second order serial correlation proposed by Arellano and Bond (1991). (iv) Two-step, Windmeijer-corrected standard errors are reported in parentheses; \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.4: Interactions with patent quality – All variables

Dependent variable	Dummy	Dummy * Q1	Dummy	Dummy * Q2
<i>Size</i>				
Output	0.33467 [0.04292]**	0.12553 [0.02325]**	0.43929 [0.03432]**	0.0193 [0.00501]**
Value added	0.31909 [0.04737]**	0.13661 [0.02538]**	0.43018 [0.03785]**	0.02146 [0.00549]**
Capital stock	0.52744 [0.05073]**	0.10469 [0.02561]**	0.623 [0.03797]**	0.01471 [0.00480]**
Employment	0.2751 [0.03919]**	0.10167 [0.02126]**	0.35815 [0.02982]**	0.01591 [0.00423]**
<i>Factor intensity</i>				
Skill intensity	0.02526 [0.00798]**	0.01027 [0.00398]**	0.03345 [0.00562]**	0.00164 [0.00066]*
Capital intensity	0.29574 [0.04345]**	0.02592 [0.02061]	0.326 [0.03059]**	0.00255 [0.00327]
<i>Productivity</i>				
Labor productivity	0.05957 [0.02400]*	0.02386 [0.01194]*	0.08114 [0.01776]**	0.00339 [0.00214]
TFP (Solow residual)	-0.04114 [0.02057]*	0.02912 [0.00974]**	-0.01933 [0.01452]	0.00489 [0.00168]**
OLS-FE (one-step)	-0.00223 [0.02973]	0.03751 [0.01442]**	0.02556 [0.02260]	0.00632 [0.00261]*
<i>Scope</i>				
Gross number of products	0.45888 [0.02094]**	0.0413 [0.01036]**	0.50029 [0.01573]**	0.00519 [0.00192]**
Net number of products	0.18468 [0.03321]**	0.0308 [0.01602]+	0.22035 [0.02318]**	0.00307 [0.00242]
Number of observations		18,215		18,215

**Notes:** : i) Patent ownership dummy is an indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year. (ii) The dependent variables are all logged. (iii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”). (iv) The number of citations for any given patent is computed as the number of patents that cite the focal patent, and were granted between (and including) the application year of the focal patent and 1999. (v) Q1 is the log total number of forward citations to the patents in the first year of patenting, and Q2 is number of citations per patent for patents in the first year of patenting. (vi) Robust standard errors clustered at the 4-digit industry level are in parentheses; \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.5: Robustness to detailed demand effects

Dependent variable: Log Output	All Patentees	Switchers (overall)	Around the Switch
Coefficient on patent stock (as in Table 3, 5-digit industry code-year fixed effects)	0.05776*** (0.0064)		
Number of observations	310,164		
Coefficient on patent stock (as in Table 3, specialized firms, 4-digit industry-year effects)	0.15159*** (0.00740)		
Number of observations	49,973		
Coefficient on patent dummy (as in Table 4B, specialized firms, 4-digit industry-year effects)		0.49126*** (0.01406)	0.39391*** (0.01334)
Number of observations		1,333,963	1,318,009
Coefficient on patent dummy (as in Table 4B, SMSA-2 digit industry code-year fixed effects)		0.60037*** (0.01815)	0.48684*** (0.01736)
Number of observations		823,549	814,497

**Notes:** Specialized firms are defined as firms for which the share of total output of the predominant 5-digit sector is at least 80%. **Top 2 Panels.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Bottom 2 Panels** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the “switch”. (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.6: Patenting and firm characteristics: Sample of specialized firms

	Elasticity to patent stock (Table 3)		Coefficient on patent dummy (Table 4A)				Coefficient on patent dummy (Table 4B)			
			Switchers overall		Around the Switch		Switchers overall		Around the Switch	
<i>Size</i>										
Output	0.15159***	(0.00740)	0.80730***	(0.01636)	0.56590***	(0.01944)	0.49126***	(0.01406)	0.39391***	(0.01334)
Value added	0.14356***	(0.00803)	0.81934***	(0.01760)	0.57283***	(0.02120)	0.48688***	(0.01503)	0.38925***	(0.01445)
Capital stock	0.16721***	(0.00940)	1.06507***	(0.01881)	0.72532***	(0.02360)	0.47867***	(0.01684)	0.39218***	(0.01637)
Employment	0.13712***	(0.00679)	0.61683***	(0.01459)	0.46606***	(0.01753)	0.43781***	(0.01306)	0.36205***	(0.01236)
<i>Factor intensity</i>										
Skill intensity	0.00537***	(0.00136)	0.05599***	(0.00258)	0.04278***	(0.00365)	0.02423***	(0.00241)	0.02631***	(0.00258)
Capital intensity	0.03905***	(0.00768)	0.55469***	(0.01520)	0.34449***	(0.02018)	0.09121***	(0.01354)	0.08577***	(0.01406)
<i>Productivity</i>										
Labor productivity	0.01447***	(0.00386)	0.19047***	(0.00838)	0.09985***	(0.01141)	0.05345***	(0.00735)	0.03186***	(0.00779)
TFP (Solow residual)	0.00102	(0.00293)	-0.00073	(0.00681)	0.00381	(0.00894)	0.03271***	(0.00516)	0.02560***	(0.00541)
OLS-FE (one-step)	0.00987**	(0.00478)	0.11072***	(0.01199)	0.07324***	(0.01597)	0.07690***	(0.00847)	0.05193***	(0.00891)
<i>Scope</i>										
Gross number of products	0.02739***	(0.00360)	0.78913***	(0.00805)	0.51271***	(0.00950)	0.09872***	(0.00719)	0.13299***	(0.00659)
Net number of products	0.00712	(0.00591)	0.33545***	(0.01045)	0.21231***	(0.01504)	0.0094	(0.01000)	0.03246***	(0.01059)
Number of observations	49,973		27,275		13,558		1,311,830		1,298,113	

**Notes:** The sample includes only specialized firms. Specialized firms are defined as firms for which the share of total output of the predominant 5-digit sector is at least 80%. **Columns 1-2.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Columns 3-6** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”). Additionally, the samples in column 2 are restricted to the five years before and the five years after the “switch”. (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 7-10** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life (“switchers”), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the “switch”. (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.7: Patenting and firm characteristics: Robustness to excluding potential acquirers

	Coefficient on patent dummy (Table 4A)				Coefficient on patent dummy (Table 4B)			
	Switchers overall		Around the Switch		Switchers overall		Around the Switch	
<i>Size</i>								
Output	0.80575***	(0.01671)	0.57359***	(0.02027)	0.49102***	(0.01430)	0.40239***	(0.01379)
Value added	0.81813***	(0.01796)	0.58219***	(0.02201)	0.48812***	(0.01527)	0.40149***	(0.01487)
Capital stock	1.06054***	(0.01919)	0.72837***	(0.02453)	0.47217***	(0.01706)	0.39395***	(0.01684)
Employment	0.61173***	(0.01500)	0.47271***	(0.01835)	0.43605***	(0.01332)	0.37035***	(0.01282)
<i>Factor intensity</i>								
Skill intensity (white- to blue-collar worker ratio)	0.05715***	(0.00263)	0.04428***	(0.00380)	0.02504***	(0.00243)	0.02768***	(0.00266)
Capital intensity (Capital stock per worker)	0.55690***	(0.01540)	0.34425***	(0.02088)	0.08779***	(0.01361)	0.08257***	(0.01441)
<i>Productivity</i>								
Labor productivity	0.19402***	(0.00851)	0.10087***	(0.01185)	0.05497***	(0.00741)	0.03204***	(0.00800)
TFP (Solow residual)	0.00073	(0.00698)	0.00638	(0.00934)	0.03415***	(0.00525)	0.02911***	(0.00559)
OLS-FE (one-step)	0.11411***	(0.01159)	0.07843***	(0.01635)	0.08128***	(0.00851)	0.05876***	(0.00909)
<i>Scope</i>								
Gross number of products	0.78529***	(0.00812)	0.51182***	(0.00982)	0.09136***	(0.00723)	0.13166***	(0.00673)
Net number of products	0.32314***	(0.01074)	0.20239***	(0.01563)	-0.00144	(0.01015)	0.02470**	(0.01084)
Number of observations	27,175		13,104		1,329,802		1,315,731	

**Notes:** The sample excludes firms that appear to acquire another firm in the five-year period prior to and including the year that it switches status from non-patentee to patentee. **Columns 1-4** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"). Additionally, the samples in column 2 are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 5-8** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.8: Patenting and firm characteristics: Robustness to excluding multi-unit firms

	Coefficient on patent dummy (Table 4A)				Coefficient on patent dummy (Table 4B)			
	Switchers overall		Around the Switch		Switchers overall		Around the Switch	
<i>Size</i>								
Output	0.86481***	(0.01749)	0.61283***	(0.02108)	0.53756***	(0.01520)	0.43504***	(0.01452)
Value added	0.88087***	(0.01872)	0.62448***	(0.02284)	0.53849***	(0.01617)	0.43562***	(0.01563)
Capital stock	1.10631***	(0.02015)	0.75419***	(0.02561)	0.50632***	(0.01823)	0.41517***	(0.01772)
Employment	0.67538***	(0.01566)	0.51576***	(0.01913)	0.48649***	(0.01417)	0.40513***	(0.01349)
<i>Factor intensity</i>								
Skill intensity (white- to blue-collar worker ratio)	0.06051***	(0.00278)	0.04603***	(0.00399)	0.02751***	(0.00261)	0.02876***	(0.00283)
Capital intensity (Capital stock per worker)	0.54589***	(0.01633)	0.33063***	(0.02180)	0.07674***	(0.01462)	0.07140***	(0.01515)
<i>Productivity</i>								
Labor productivity	0.18943***	(0.00890)	0.09707***	(0.01228)	0.05107***	(0.00788)	0.02990***	(0.00839)
TFP (Solow residual)	0.00614	(0.00729)	0.01095	(0.00970)	0.03934***	(0.00555)	0.03189***	(0.00584)
OLS-FE (one-step)	0.11540***	(0.01211)	0.08139***	(0.01711)	0.09029***	(0.00893)	0.06508***	(0.00947)
<i>Scope</i>								
Gross number of products	0.80448***	(0.00861)	0.52100***	(0.01030)	0.10420***	(0.00774)	0.13874***	(0.00710)
Net number of products	0.35491***	(0.01094)	0.22813***	(0.01609)	0.01548	(0.01057)	0.04154***	(0.01124)
Number of observations	23,510		11,810		1,257,565		1,245,865	

**Notes:** The sample excludes multi-unit firms. **Columns 1-4** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"). Additionally, the samples in column 2 are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 5-8** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"), plus the sample of non-patentees (i.e, firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.9: Patenting and firm characteristics: Public (listed) firms only

	Elasticity to patent stock (Table 3)		Coefficient on patent dummy (Table 4A)				Coefficient on patent dummy (Table 4B)			
			Switchers overall		Around the Switch		Switchers overall		Around the Switch	
<i>Size</i>										
Output	0.19749***	(0.02272)	0.54771***	(0.11132)	0.43044***	(0.13675)	0.30573*	(0.17282)	0.18691	(0.21028)
Value added	0.19145***	(0.02403)	0.55316***	(0.13016)	0.45754***	(0.16470)	0.30594	(0.18673)	0.11365	(0.23296)
Capital stock	0.20132***	(0.02541)	0.69401***	(0.11229)	0.53791***	(0.14550)	0.39399**	(0.19948)	0.32101	(0.22713)
Employment	0.18379***	(0.02011)	0.27764***	(0.09448)	0.24786*	(0.12722)	0.29919**	(0.14487)	0.2517	(0.17896)
<i>Factor intensity</i>										
Skill intensity	-0.00248	(0.00358)	0.01806	(0.01773)	0.02006	(0.02789)	-0.01045	(0.03088)	0.03154	(0.04536)
Capital intensity	0.00881	(0.01672)	0.47080***	(0.08814)	0.36143***	(0.13343)	0.06839	(0.17108)	0.14044	(0.21519)
<i>Productivity</i>										
Labor productivity	0.0137	(0.01102)	0.27007***	(0.06073)	0.18257**	(0.08625)	0.00655	(0.09185)	-0.06479	(0.10764)
TFP (Solow residual)	0.00438	(0.00864)	-0.03860	(0.04249)	0.00632	(0.06391)	-0.00278	(0.06021)	-0.06014	(0.08293)
OLS-FE (one-step)	0.02041	(0.01438)	0.20144**	(0.08882)	0.16014	(0.11788)	0.00853	(0.10979)	-0.12278	(0.14999)
<i>Scope</i>										
Gross number of products	0.04971***	(0.00866)	0.64904***	(0.05601)	0.52368***	(0.07579)	0.03828	(0.08219)	0.06764	(0.12160)
Net number of products	0.11027***	(0.01822)	0.20917**	(0.08846)	0.22035*	(0.12744)	0.02088	(0.13213)	0.10096	(0.19384)
Number of observations	6,568		1,047		496		3,434		2,883	

**Notes:** The sample includes only public (listed) firms. **Columns 1-2.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Columns 3-6** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"). Additionally, the samples in column 2 are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 7-10** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"), plus the sample of non-patentees (i.e. firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.

Table A.10: Patenting and firm characteristics: Private (unlisted) firms only

	Elasticity to patent stock (Table 3)		Coefficient on patent dummy (Table 4A)				Coefficient on patent dummy (Table 4B)			
			Switchers overall		Around the Switch		Switchers overall		Around the Switch	
<i>Size</i>										
Output	0.14690***	(0.00611)	0.76004***	(0.01516)	0.53283***	(0.01802)	0.45599***	(0.01311)	0.36952***	(0.01240)
Value added	0.14233***	(0.00662)	0.77159***	(0.01628)	0.53923***	(0.01963)	0.44921***	(0.01401)	0.36344***	(0.01344)
Capital stock	0.16484***	(0.00761)	1.03318***	(0.01755)	0.69817***	(0.02198)	0.44902***	(0.01571)	0.36763***	(0.01528)
Employment	0.13285***	(0.00565)	0.57383***	(0.01369)	0.43714***	(0.01633)	0.40195***	(0.01224)	0.33792***	(0.01152)
<i>Factor intensity</i>										
Skill intensity	0.00365***	(0.00107)	0.05064***	(0.00239)	0.03881***	(0.00339)	0.01894***	(0.00223)	0.02216***	(0.00240)
Capital intensity	0.03743***	(0.00601)	0.55371***	(0.01402)	0.33705***	(0.01875)	0.08651***	(0.01253)	0.07649***	(0.01308)
<i>Productivity</i>										
Labor productivity	0.01405***	(0.00312)	0.18621***	(0.00763)	0.09570***	(0.01054)	0.05404***	(0.00681)	0.03160***	(0.00723)
TFP (Solow residual)	0.00275	(0.00243)	-0.00633	(0.00638)	0.00086	(0.00841)	0.02633***	(0.00489)	0.02183***	(0.00515)
OLS-FE (one-step)	0.01178***	(0.00392)	0.10699***	(0.01048)	0.07146***	(0.01474)	0.06993***	(0.00787)	0.04821***	(0.00836)
<i>Scope</i>										
Gross number of products	0.03608***	(0.00322)	0.78750***	(0.00773)	0.51010***	(0.00918)	0.09543***	(0.00690)	0.13187***	(0.00637)
Net number of products	0.03233***	(0.00540)	0.33487***	(0.01023)	0.21857***	(0.01452)	0.01135	(0.00974)	0.04040***	(0.01026)
Number of observations	59,855		30,289		14,886		1,330,529		1,315,126	

**Notes:** The sample includes only private (unlisted) firms. **Columns 1-2.** (i) These columns report coefficients and standard errors on log depreciated patent stock. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iii) Robust standard errors clustered at the 4-digit industry level are reported in parentheses. **Columns 3-6** (i) These columns report coefficients and standard errors on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"). Additionally, the samples in column 2 are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects. (iv) Robust standard errors clustered at the 4-digit industry level are in parentheses. **Columns 7-10** (i) These columns reports coefficients on a dummy indicator variable that equals 1 if the firm has applied for any patents up to and including the observation year (conditional on subsequent approval), and 0 otherwise. All dependent variables, except the white- to blue-collar wage ratio, are logged. (ii) The samples are restricted to those firms that enter without a patent and switch to being a patentee later in their life ("switchers"), plus the sample of non-patentees (i.e. firms that did not apply successfully for a patent any time during the sample period). Additionally, in the samples in column 2, the data for switching firms are restricted to the five years before and the five years after the "switch". (iii) All regressions include firm fixed effects as well as 4-digit industry-year effects. (iv) Robust standard errors clustered at the firm level are in parentheses. \* indicates significance at 10%, \*\* indicates significance at 5%, \*\*\* indicates significance at 1%.