2015 KDI-WB International Workshop

Economic Assessment of Regulatory Reform

Entry Regulation and Industrial Performance in Korea

Sanghoon Ahn
Fellow
Industry and Service Economy

Korea Development Institute

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Part-01

Background

Major Problems in Productivity Dynamics

- ***Creative destruction*** **plays a very important role for productivity growth and innovation by enhancing:**
  - **The expansion or entry of high productivity firms**
  - **The contraction or exit by low productivity firms**
- **Productivity growth driven by *creative destruction* is impeded due to:**
  - **High entry costs**
  - **High levels of taxation**
  - **Labor market rigidity**
  - **…**

Regulatory Costs of Entry are Sizable

Japan-Korea-USA Comparison (1999)

Number of procedures that a start-up has to comply with in order to obtain legal status	**Japan**	**Korea**	**USA**	**Average of 85 countries**
Safety and health	0	0	0	0.34
Environment	0	0	0	0.14
Taxes	2	2	1	2.04
Employment	2	4	1	1.94
Screening	7	7	2	6.04
Time (business days; a week has 5 business days and a month has 22.)	26	27	4	47.4
Cost (share of per capita GDP 1999)	11.6%	16.3%	0.5%	47.1%
Time + Cost (share of per capita GDP 1999)	22.0%	27.1%	1.7%	66.0%
Dollar Amount of Time + Cost	**$ 7,094**	**$ 2,298**	**$ 517**	**$ 5,428**
Per capita GDP 1999	$ 32,230	$ 8,490	$ 30,600	$ 8,226

Source: Djankov, *et al.* (2002), "The Regulation of Entry", *Quarterly Journal of Economics*, 117: 1-37

Barriers to Economic Activity

Japan-Korea-USA Comparison (2005 and 2010)

	Japan		Korea		USA	
	2005	*2010*	*2005*	*2010*	*2005*	*2010*
Ease of doing business index (1=most business-friendly regulations)	-	20	-	15	-	4
Start-up procedures to register a business (number)	11	8	10	8	6	6
Time required to start a business (days)	31	23	17	13	6	6
Time to resolve insolvency (years)	0.6	0.6	1.5	1.5	1.5	1.5
Total tax rate (%)	53.1	48.6	36.4	29.8	46.0	46.8

Source: World Bank, *Doing Business* (2011)

Background

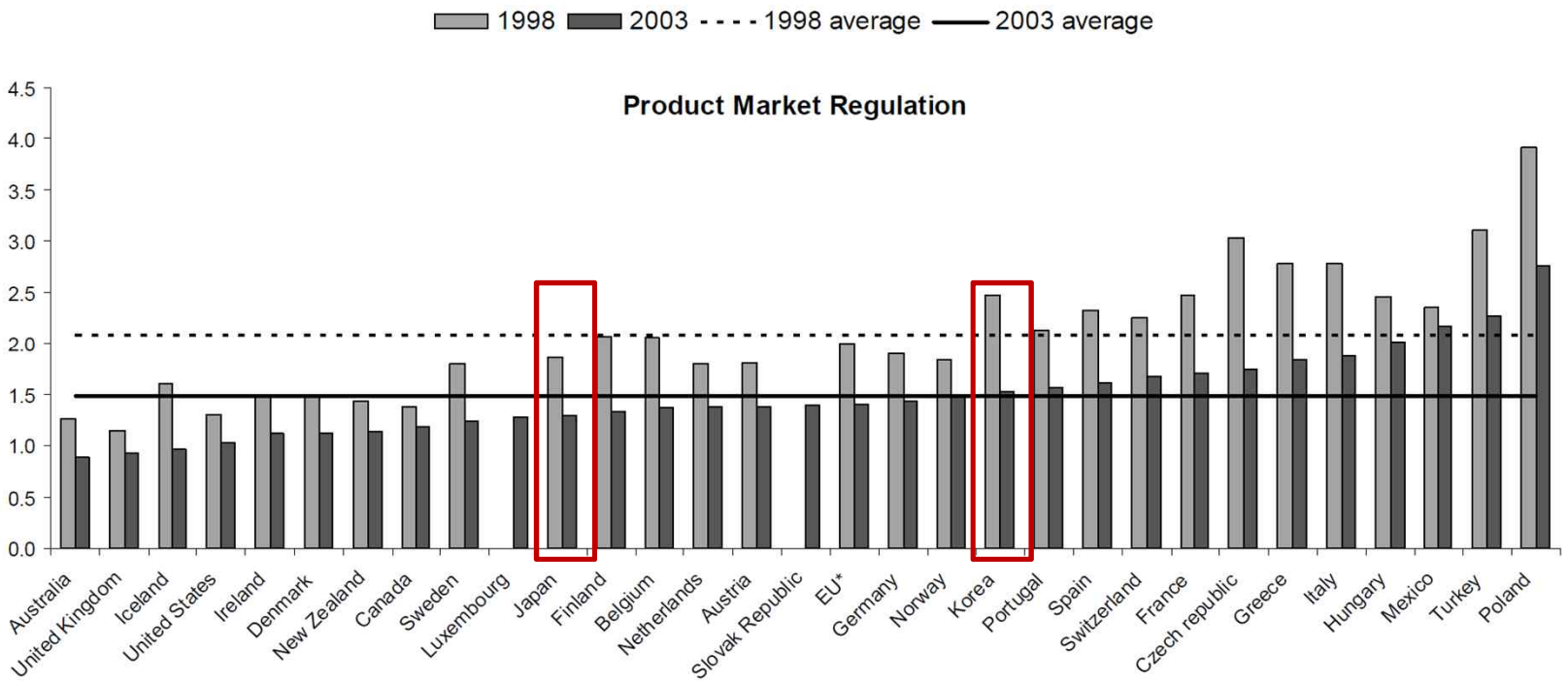
➢ In a sense, the 1997 financial crisis was a blessing in disguise, which made it possible to get a broad support for structural reform.

➢ The *Regulatory Reform Committee* (*RRC*) was established in 1998 and the *RRC* played a leading role in carrying out regulatory reforms in order to overcome the crisis.

- ✓ The *RRC* reviewed and abolished more than half of the nearly 11,000 existing regulations in 1998 and 1999.
- ✓ The *RRC* focused too much on reducing the number of regulations while leaving the compound or complicated regulations untouched. But, there is no doubt that substantial progress in regulatory reform was made.

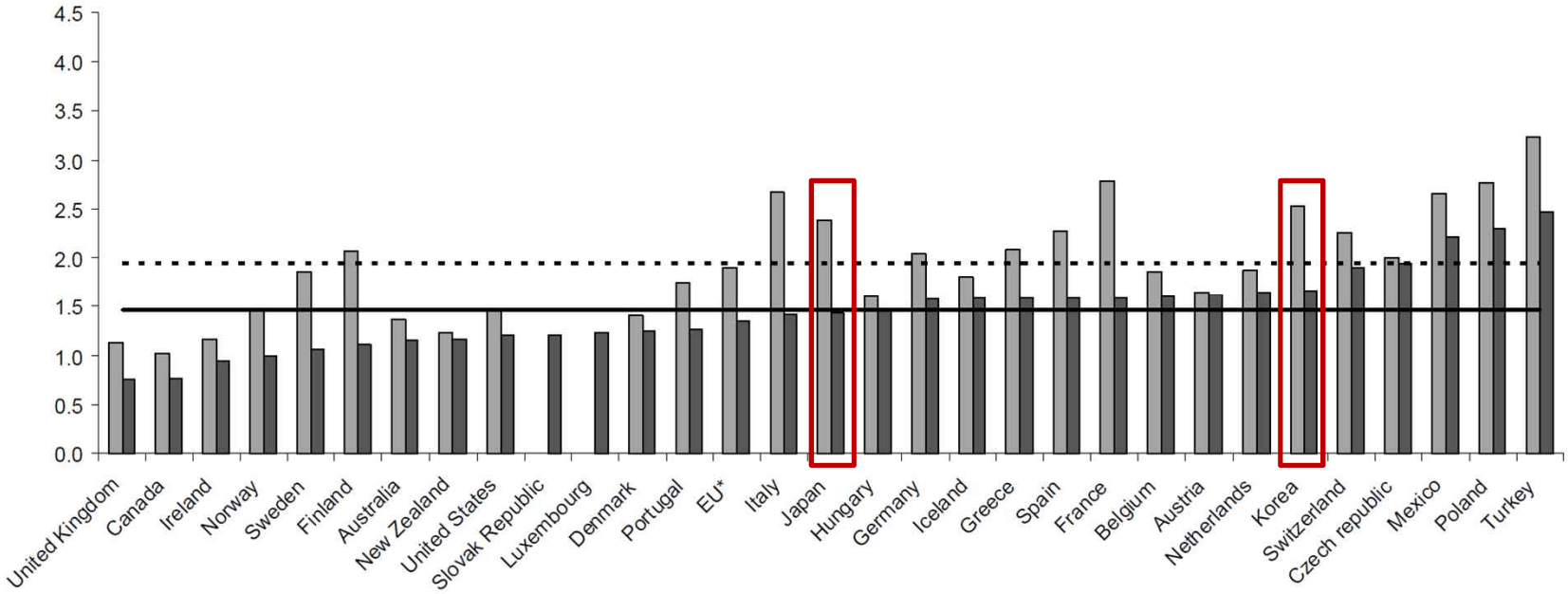
OECD *Product Market Regulation* Indicator

1998 and 2003

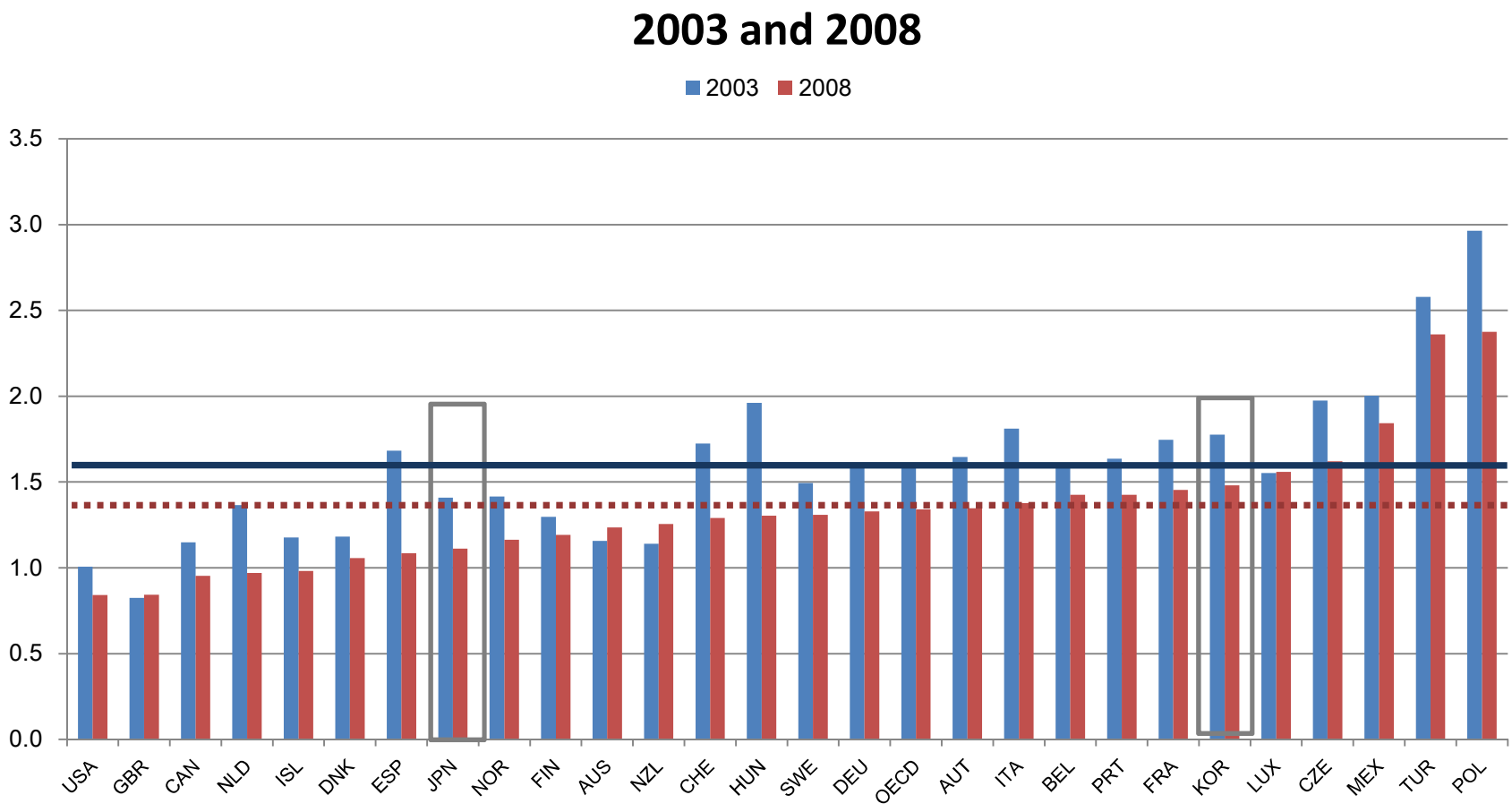


OECD *Product Market Regulation* Indicator

Barriers to Entrepreneurship (1998 and 2003)



OECD *Product Market Regulation* Indicator



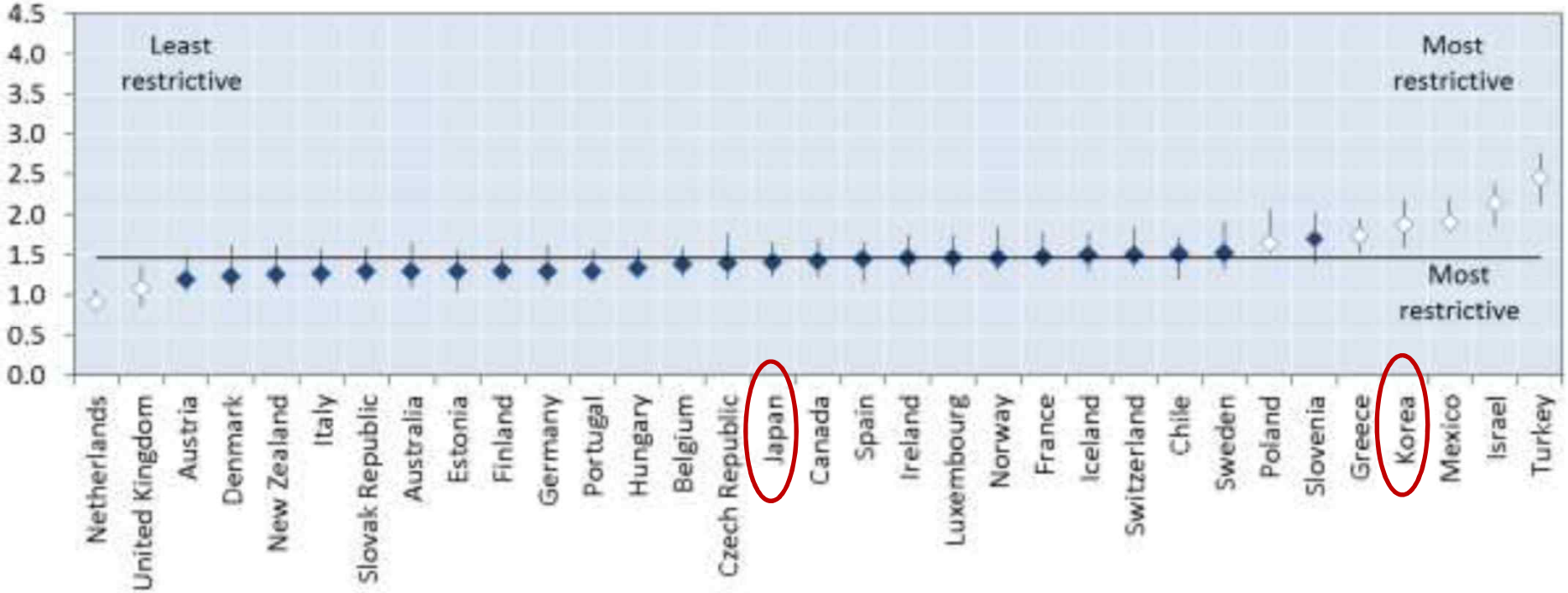
OECD *Product Market Regulation* Indicator

2013 update

Figure 6. Economy-wide PMR score in 2013

Index scale 0 to 6 from least to most restrictive

Panel A. OECD countries



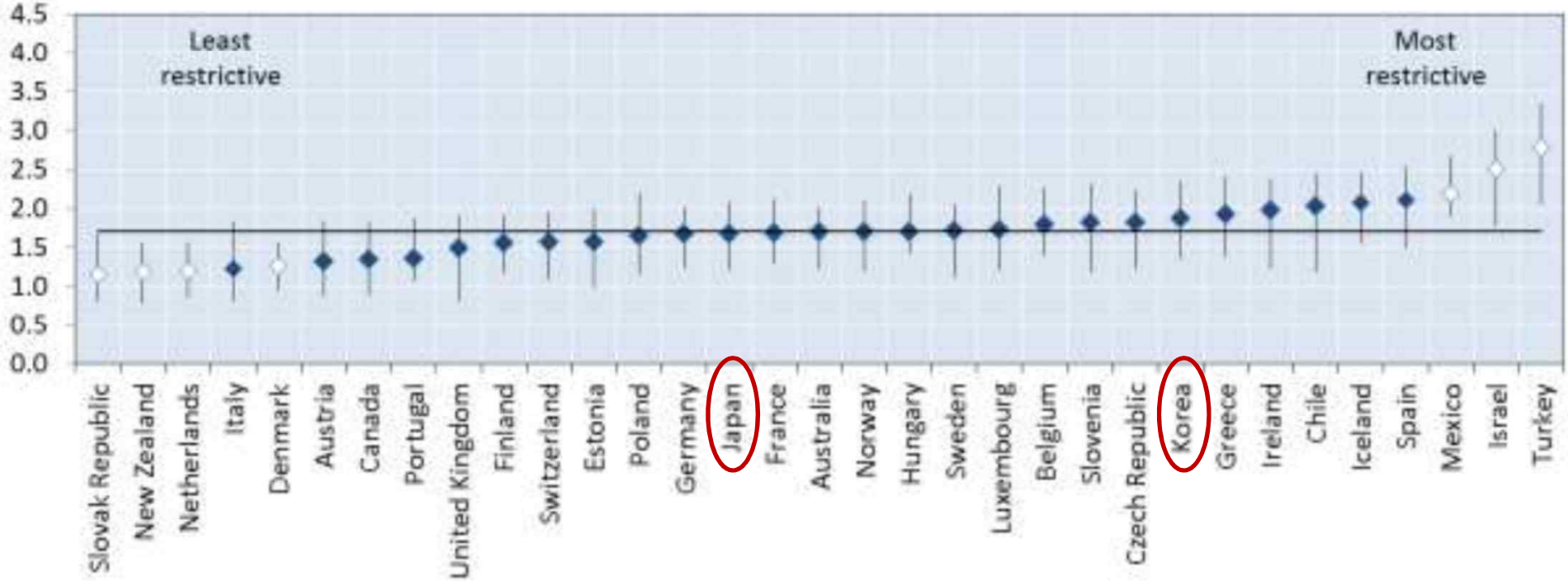
OECD *Product Market Regulation* Indicator

2013 update

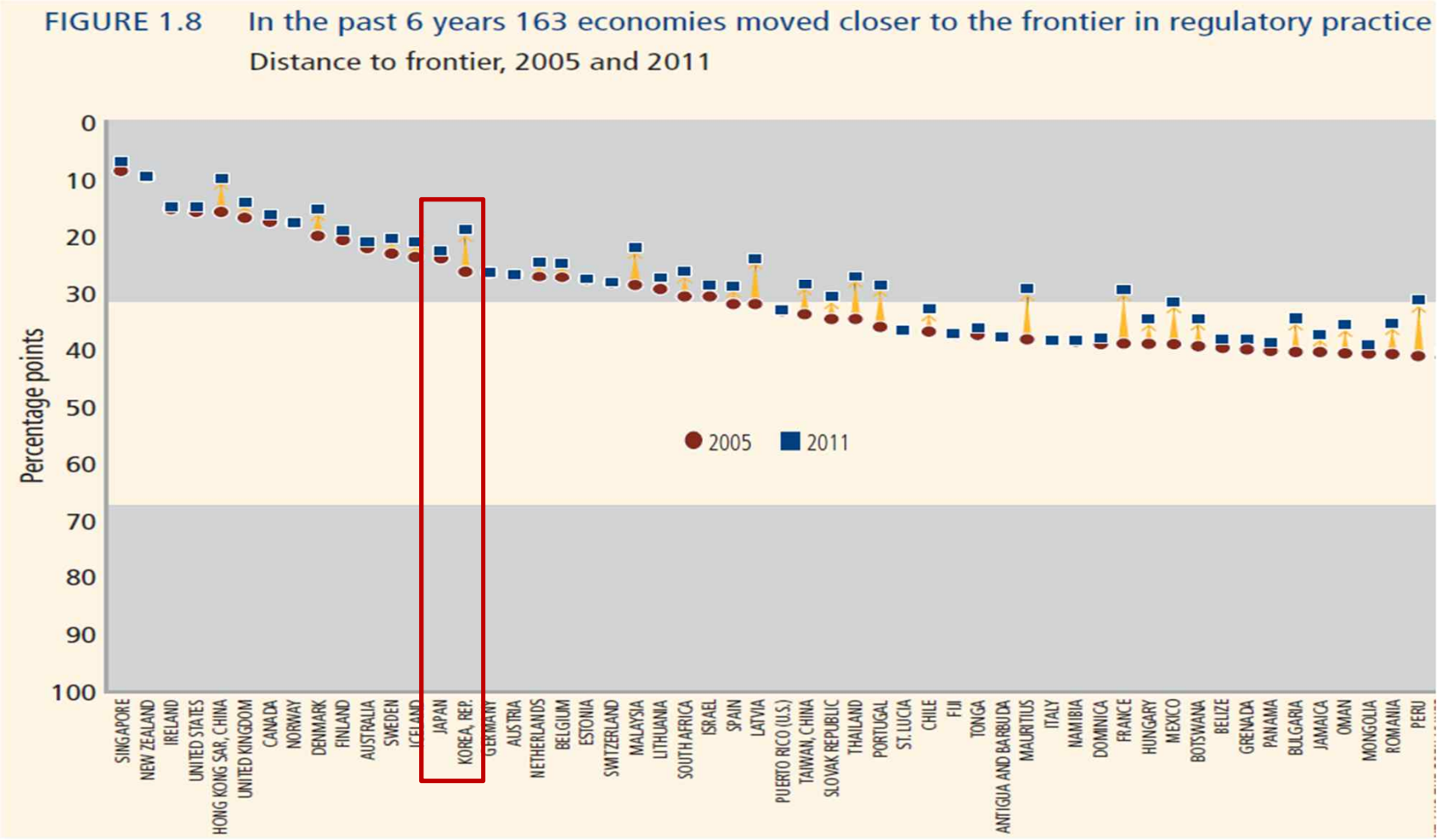
Figure 8. Barriers to entrepreneurship in 2013

Index scale 0 to 6 from least to most restrictive

Panel A. OECD countries

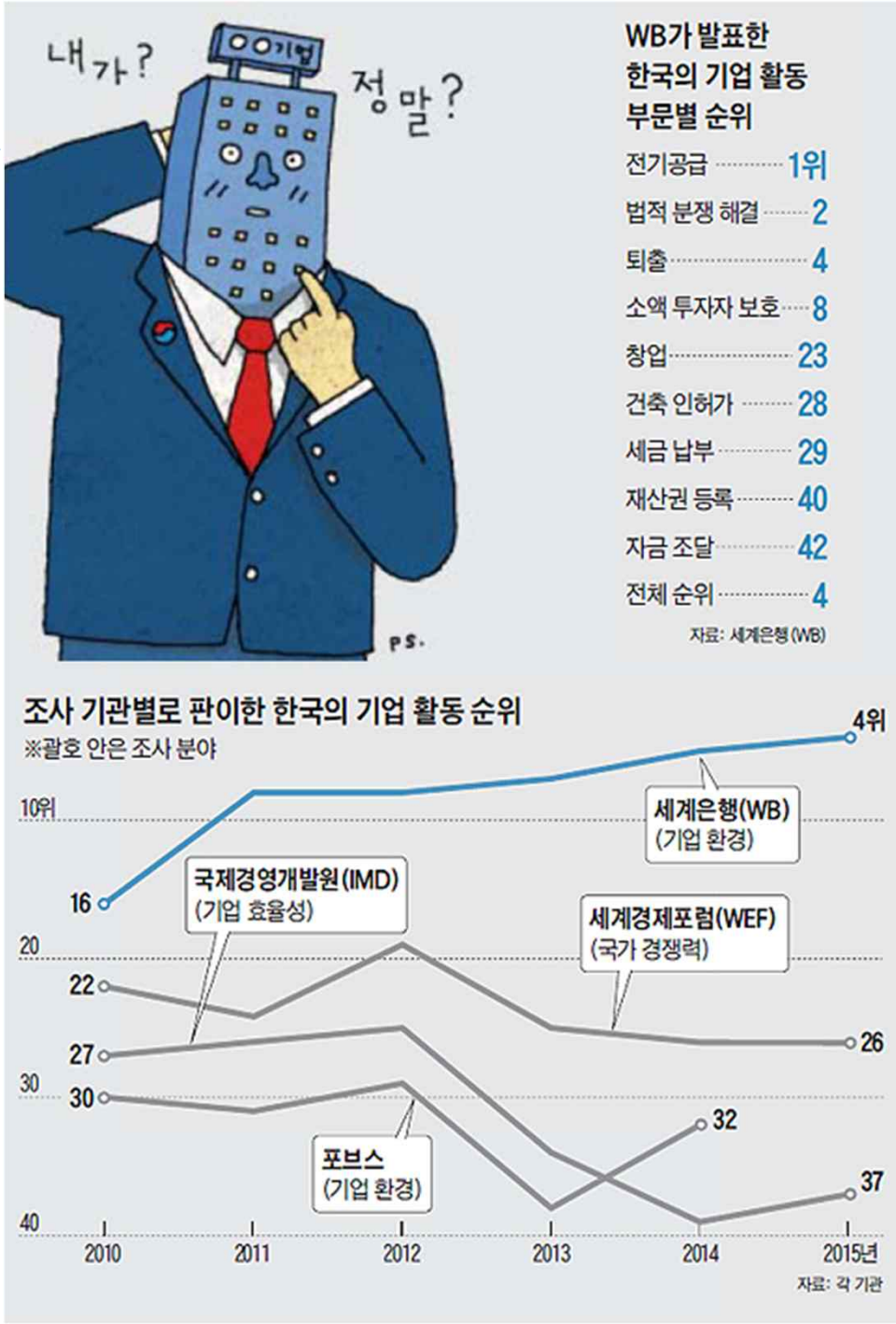


World Bank *Doing Business* Indicator



Daily Chosun (28 October 2015)

세계銀, 제도·인프라만 따져 파업·규제 등은 반영 안해… 업계 "그대로 믿기 어려워"
포브스 등 다른 평가기관들 기준으론 '한국은 중위권'



Part-02

Entry Regulations in Korea

Changes in Entry Regulations by Type (1992 - 2001)

2001 / 1992	State Monopoly	Designa-tion	Permit	License	Approval	Authori-zation	Registr-ation	Report	abolished	TOTAL
State monopoly	**20**		1							21
Designa-tion		**5**	1		1		1		2	10
Permit			**101**				34	55	30	220
Licence				**33**			37		1	71
Approval			1		**16**		1	1	7	26
Authori-zation								2	2	4
Registra-tion			2				**73**	9	65	149
Report							2	**21**	17	40
not existing in 1992			6		2		1	1		10
TOTAL	20	5	112	33	19	0	149	89	124	**551**

Source: Kim (2002)

Entry Regulations in the Whole Industry (By Number of Sectors)

CODE	INDUSTRY	Number of KSIC 5-digit industries (A)	1992		2001		Changes	
			# of industries with entry regulation (B)	% (C=B/A)	# of industries with entry regulation (D)	% (E=D/A)	# of industries with entry regulation (D-B)	% (E-C)
A	AGRICULTURE AND FORESTRY	32	13	*40.6*	6	*18.8*	-7	*-21.9*
B	FISHING	9	7	*77.8*	7	*77.8*	0	*0.0*
C	MINING AND QUARRYING	27	26	*96.3*	26	*96.3*	0	*0.0*
D	MANUFACTURING	585	188	*32.1*	115	*19.7*	-73	*-12.5*
E	ELECTRICITY, GAS AND WATER SUPPLY	6	4	*66.7*	4	*66.7*	0	*0.0*
F	CONSTRUCTION	40	39	*97.5*	39	*97.5*	0	*0.0*
G	WHOLESALE AND RETAIL TRADE	168	57	*33.9*	40	*23.8*	-17	*-10.1*
H	HOTELS AND RESTAURANTS	22	20	*90.9*	19	*86.4*	-1	*-4.5*
I	TRANSPORT, POST AND TELECOMMUNICATIONS	61	45	*73.8*	40	*65.6*	-5	*-8.2*
J	FINANCIAL INSTITUTIONS AND INSURANCE	30	21	*70.0*	23	*76.7*	2	*6.7*
K	REAL ESTATE, RENTING AND BUSINESS SERVICE	83	41	*49.4*	32	*38.6*	-9	*-10.8*
L	PUBLIC ADMINISTRATION AND DEFENCE	15	15	*100.0*	15	*100.0*	0	*0.0*
M	EDUCATION	14	11	*78.6*	12	*85.7*	1	*7.1*
N	HEALTH AND SOCIAL WORK	20	15	*75.0*	16	*80.0*	1	*5.0*
O	OTHER COMMUNITY AND PERSONAL SERVICES	80	37	*46.3*	31	*38.8*	-6	*-7.5*
P	PRIVATE HOUSEHOLDS WITH EMPLOYED PERSO	1	0	*0.0*	0	*0.0*	0	*0.0*
Q	EXTRA-TERRITORIAL ORGANIZATIONS AND BOD	2	2	*100.0*	2	*100.0*	0	*0.0*
	TOTAL	**1,195**	**541**	***45.3***	**427**	***35.7***	**-114**	***-9.5***

Source: Kim (2002)

Entry Regulations in Manufacturing (By Number of Sectors)

	Industry (KSIC 2-digit)	Number of KSIC 5-digit industries (A)	1992		2001		Changes	
			# of industries with entry regulation (B)	% (C=B/A)	# of industries with entry regulation (D)	% (E=D/A)	# of industries with entry regulation (D-B)	% (E-C)
15	Food Products and Beverages	72	62	*86.1*	62	*86.1*	0	*0.0*
16	Tabacco Products	2	1	*50.0*	1	*50.0*	0	*0.0*
17	Textiles	38	1	*2.6*	0	*0.0*	-1	*-2.6*
18	Sewn Wearing Apparel and Fur Articles	16	0	*0.0*	0	*0.0*	0	*0.0*
19	Leather, Luggage and Footwear	16	1	*6.3*	0	*0.0*	-1	*-6.3*
20	Wood and Products of Wood and Cork	21	5	*23.8*	0	*0.0*	-5	*-23.8*
21	Pulp, Paper and Paper Products	21	2	*9.5*	1	*4.8*	-1	*-4.8*
22	Publishing and Printing	16	10	*62.5*	10	*62.5*	0	*0.0*
23	Coke, Refined Petroleum Products and Fuel	5	5	*100.0*	5	*100.0*	0	*0.0*
24	Chemicals and Chemical Products	49	18	*36.7*	16	*32.7*	-2	*-4.1*
25	Rubber and Plastic Products	25	1	*4.0*	0	*0.0*	-1	*-4.0*
26	Other Non-metallic Mineral Products	43	10	*23.3*	3	*7.0*	-7	*-16.3*
27	Basic Metals	32	0	*0.0*	0	*0.0*	0	*0.0*
28	Fabricated Metal Products	36	6	*16.7*	2	*5.6*	-4	*-11.1*
29	Other Machinery and Equipment	56	29	*51.8*	3	*5.4*	-26	*-46.4*
30	Computers and Office Machinery	8	3	*37.5*	0	*0.0*	-3	*-37.5*
31	Electrical Machinery and Apparatuses	22	13	*59.1*	0	*0.0*	-13	*-59.1*
32	Electronic Components and Telecom. Equipme	10	3	*30.0*	0	*0.0*	-3	*-30.0*
33	Medical, Precision and Optical Instrument	24	13	*54.2*	11	*45.8*	-2	*-8.3*
34	Motor Vehicles, Trailers and Semitrailers	7	0	*0.0*	0	*0.0*	0	*0.0*
35	Other Transport Equipment	18	3	*16.7*	0	*0.0*	-3	*-16.7*
36	Furniture and Articles n.e.c.	43	2	*4.7*	1	*2.3*	-1	*-2.3*
37	Recycling	5	0	*0.0*	0	*0.0*	0	*0.0*
	TOTAL	**585**	**188**	***32.1***	**115**	***19.7***	**-73**	***-12.5***

Source: Kim (2002)

Entry Regulations in Manufacturing (By Production of Sectors)

	Industry	1991			2000			Changes
		Production of industries (A)	Production of industries with entry regulation (B)	% (C=B/A)	Production of industries (D)	Production of industries with entry regulation (E)	% (F=E/D)	% (G=F-C)
15	Food Products and Beverages	17,165,127	16,538,625	*96.4*	35,093,720	30,200,392	*86.1*	*-10.3*
16	Tabacco Products	2,974,982	2,731,629	*91.8*	3,695,553	3,186,547	*86.2*	*-5.6*
17	Textiles	14,312,117	48,912	*0.3*	26,033,439	0	*0.0*	*-0.3*
18	Sewn Wearing Apparel and Fur Articles	5,921,649	0	*0.0*	9,457,700	0	*0.0*	*0.0*
19	Leather, Luggage and Footwear	6,642,851	1,714,986	*25.8*	5,507,506	0	*0.0*	*-25.8*
20	Wood and Products of Wood and Cork	2,150,883	1,863,921	*86.7*	3,171,060	0	*0.0*	*-86.7*
21	Pulp, Paper and Paper Products	5,193,334	1,142,630	*22.0*	13,410,379	281,933	*2.1*	*-19.9*
22	Publishing and Printing	3,190,461	2,915,241	*91.4*	9,803,929	8,719,676	*88.9*	*-2.4*
23	Coke, Refined Petroleum Products and Fuel	9,521,810	9,521,810	*100.0*	40,038,973	40,038,973	*100.0*	*0.0*
24	Chemicals and Chemical Products	19,522,861	5,550,923	*28.4*	56,014,909	12,426,363	*22.2*	*-6.2*
25	Rubber and Plastic Products	8,893,617	218,123	*2.5*	21,464,626	0	*0.0*	*-2.5*
26	Other Non-metallic Mineral Products	11,147,334	1,531,079	*13.7*	16,974,163	763,161	*4.5*	*-9.2*
27	Basic Metals	18,168,098	0	*0.0*	44,527,747	0	*0.0*	*0.0*
28	Fabricated Metal Products	8,574,139	2,116,420	*24.7*	20,306,140	516,507	*2.5*	*-22.1*
29	Other Machinery and Equipment	16,354,154	11,473,913	*70.2*	42,413,933	3,242,338	*7.6*	*-62.5*
30	Computers and Office Machinery	1,485,854	215,228	*14.5*	26,348,597	0	*0.0*	*-14.5*
31	Electrical Machinery and Apparatuses	6,587,394	4,685,685	*71.1*	21,594,787	0	*0.0*	*-71.1*
32	Electronic Components and Telecom. Equipme	19,640,609	12,865,090	*65.5*	79,414,018	0	*0.0*	*-65.5*
33	Medical, Precision and Optical Instrument	2,054,848	880,793	*42.9*	5,132,385	2,465,542	*48.0*	*5.2*
34	Motor Vehicles, Trailers and Semitrailers	17,745,997	0	*0.0*	53,578,437	0	*0.0*	*0.0*
35	Other Transport Equipment	5,630,912	440,669	*7.8*	18,383,561	0	*0.0*	*-7.8*
36	Furniture and Articles n.e.c.	5,065,943	48,195	*1.0*	8,378,225	35,614	*0.4*	*-0.5*
37	Recycling	32,600	0	*0.0*	891,355	0	*0.0*	*0.0*
	TOTAL	**207,977,574**	**76,503,872**	***36.8***	**561,635,142**	**101,877,046**	***18.1***	***-18.6***

Source: Kim (2002)

Entry Regulations by Strength (By Number of Sectors)

KSIC	industry	1992			2001			change		
		Strong Form	Weak Form	Total	Strong Form	Weak Form	Total	Strong Form	Weak Form	Total
15	Food Products and Beverages	62	0	62	21	41	62	−41	41	0
16	Tabacco Products	1	0	1	1	0	1	0	0	0
17	Textiles	1	0	1	0	0	0	−1	0	−1
18	Sewn Wearing Apparel and Fur Articles	0	0	0	0	0	0	0	0	0
19	Leather, Luggage and Footwear	0	1	1	0	0	0	0	−1	−1
20	Wood and Products of Wood and Cork	0	5	5	0	0	0	0	−5	−5
21	Pulp, Paper and Paper Products	0	2	2	0	1	1	0	−1	−1
22	Publishing and Printing	0	10	10	0	10	10	0	0	0
23	Coke, Refined Petroleum Products and Fuel	3	2	5	0	5	5	−3	3	0
24	Chemicals and Chemical Products	16	2	18	8	8	16	−8	6	−2
25	Rubber and Plastic Products	0	1	1	0	0	0	0	−1	−1
26	Other Non-metallic Mineral Products	2	8	10	1	2	3	−1	−6	−7
27	Basic Metals	0	0	0	0	0	0	0	0	0
28	Fabricated Metal Products	5	1	6	2	0	2	−3	−1	−4
29	Other Machinery and Equipment	5	24	29	3	0	3	−2	−24	−26
30	Computers and Office Machinery	0	3	3	0	0	0	0	−3	−3
31	Electrical Machinery and Apparatuses	0	13	13	0	0	0	0	−13	−13
32	Electronic Components and Telecom. Equipment	2	1	3	0	0	0	−2	−1	−3
33	Medical, Precision and Optical Instrument	5	8	13	5	6	11	0	−2	−2
34	Motor Vehicles, Trailers and Semitrailers	0	0	0	0	0	0	0	0	0
35	Other Transport Equipment	0	3	3	0	0	0	0	−3	−3
36	Furniture and Articles n.e.c.	1	1	2	1	0	1	0	−1	−1
37	Recycling	0	0	0	0	0	0	0	0	0
Total		103	85	**188**	42	73	**115**	−61	−12	**−73**

Source: Kim (2002)

Part-03

Firm Dynamics in Korea

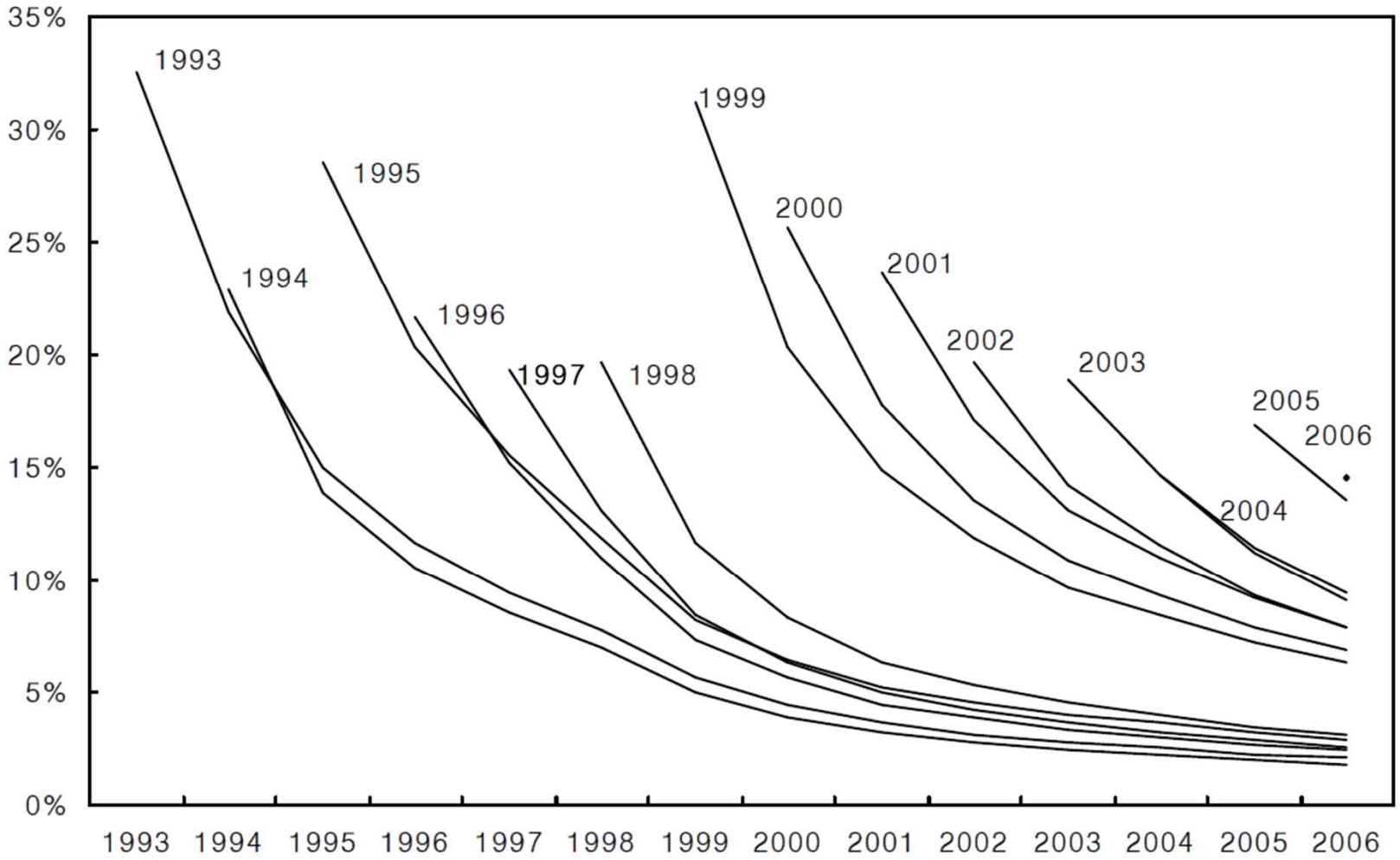
Entry and Exit Rates (By Number of Plants)

(%)

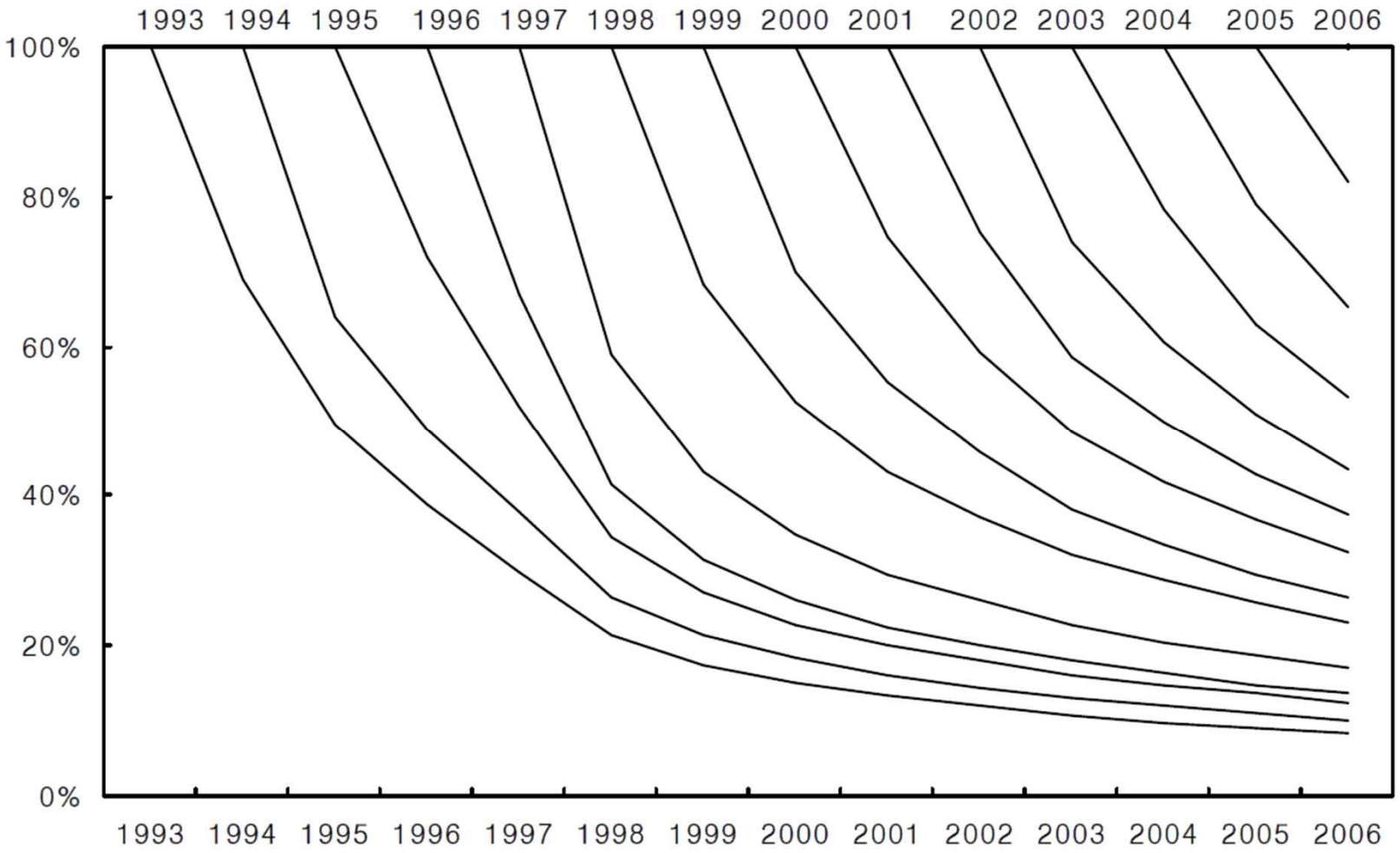
KSIC	industry	1992		2001	
		Entry Rate	Exit Rate	Entry Rate	Exit Rate
15	Food Products and Beverages	14.05	10.97	17.94	9.06
16	Tabacco Products	0.00	20.00	8.33	0.00
17	Textiles	15.21	15.73	18.40	12.62
18	Sewn Wearing Apparel and Fur Articles	18.96	19.31	20.20	15.70
19	Leather, Luggage and Footwear	18.45	22.45	17.47	18.87
20	Wood and Products of Wood and Cork	14.39	14.83	19.11	12.60
21	Pulp, Paper and Paper Products	14.32	15.42	16.82	10.16
22	Publishing and Printing	17.61	18.99	22.77	10.51
23	Coke, Refined Petroleum Products and Fuel	5.48	8.22	10.64	2.13
24	Chemicals and Chemical Products	14.93	10.39	15.13	7.76
25	Rubber and Plastic Products	15.07	14.72	16.55	10.02
26	Other Non-metallic Mineral Products	14.11	15.75	15.33	8.33
27	Basic Metals	15.55	15.03	15.16	5.91
28	Fabricated Metal Products	19.73	15.03	20.17	10.87
29	Other Machinery and Equipment	19.56	14.58	18.77	10.17
30	Computers and Office Machinery	21.21	17.93	19.89	12.43
31	Electrical Machinery and Apparatuses	20.23	15.31	17.37	9.73
32	Electronic Components and Telecom. Equipment	15.61	14.27	21.33	10.95
33	Medical, Precision and Optical Instrument	16.44	15.11	21.36	10.38
34	Motor Vehicles, Trailers and Semitrailers	18.17	12.83	18.72	7.75
35	Other Transport Equipment	17.24	12.32	23.29	9.67
36	Furniture and Articles n.e.c.	16.35	18.31	22.86	14.47
37	Recycling	31.65	15.19	29.43	15.31
	Average	16.27	15.33	18.57	10.23

Source: Author's calculation based on micro-data from the *Statistics Korea*

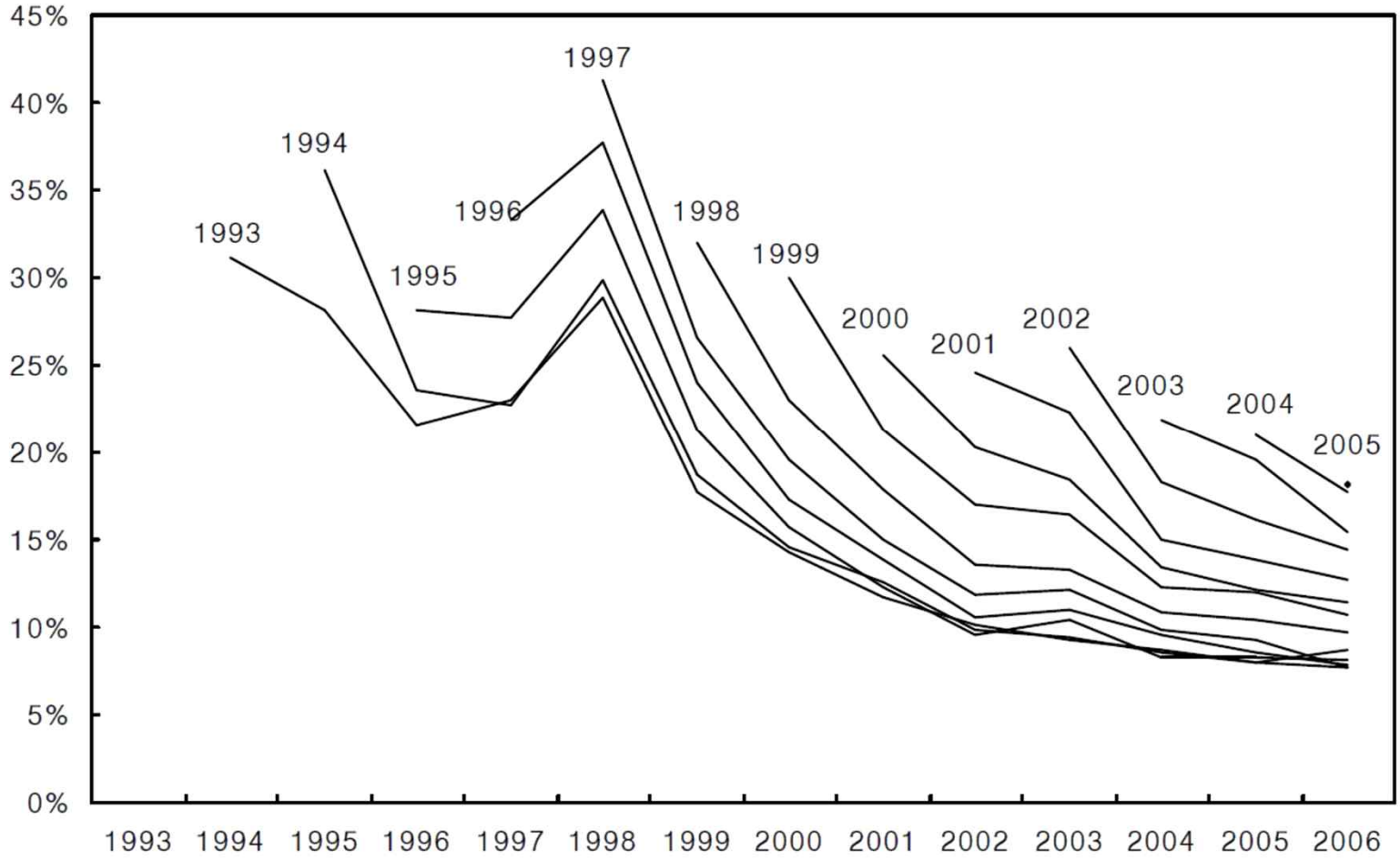
Evolution of Each Entry Cohort's Share: Korea



Evolution of Each Entry Cohort's Survival Rate



Evolution of Each Entry Cohort's Hazard Rate



Part-04

Firm Dynamics and Economic Performance

Summary of preliminary findings

- Entry Regulations and Firm Dynamics
  - ✓ Entry regulations reduce entry rate
  - ✓ Entry regulations reduce exit rate
- Firm Dynamics and Economic Performance
  - ✓ Entry raises employment and TFP growth
  - ✓ Exit raises (output and) TFP growth

Table 7. Correlation of Entry Regulation and Firm Dynamics (I)

	Entry Rate (# of plants)	Entry Rate (production)	Entry Rate (employment)	Entry Regulation Indicator (# of industry)	Entry Regulation Indicator (strong form)	Entry Regulation Indicator (weak form)	Entry Regulation Indicator (production)
Entry Rate (# of plants)	1.0000						
Entry Rate (production)	0.7310 **	1.0000					
Entry Rate (employment)	0.8167 **	0.9453 **	1.0000				
Entry Regulation Indicator (# of industry)	-0.2944 **	-0.1953 *	-0.2434 **	1.0000			
Entry Regulation Indicator (strong form)	-0.4232 **	-0.2314 **	-0.2752 **	0.6382 **	1.0000		
Entry Regulation Indicator (weak form)	-0.0387	-0.0658	-0.0927	0.7806 **	0.0170	1.0000	
Entry Regulation Indicator (production)	-0.3128 **	-0.1380	-0.1816 *	0.9122 **	0.6112 **	0.6885 **	1.0000

**: Significant at the 1% level.
* : Significant at the 5% level.

Table 8. Correlation of Entry Regulation and Firm Dynamics (II)

	Entry Rate (# of plants)	Exit Rate (# of plants)	Entry Regulation Indicator (# of industry)	Entry Regulation Indicator (strong form)	Entry Regulation Indicator (weak form)	Entry Regulation Indicator (production)	Non-Production to Production Worker Ratio (by industry)	Capital to Labor Ratio (by industry)
Entry Rate (# of plants)	1.0000							
Exit Rate (# of plants)	0.0582	1.0000						
Entry Regulation Indicator (# of industry)	-0.2944 **	-0.2509 **	1.0000					
Entry Regulation Indicator (strong form)	-0.4232 **	-0.1749 *	0.6382 **	1.0000				
Entry Regulation Indicator (weak form)	-0.0387	-0.1839 *	0.7806 **	0.0170	1.0000			
Entry Regulation Indicator (production)	-0.3128 **	-0.2096 *	0.9122 **	0.6112 **	0.6885 **	1.0000		
Non-Production to Production Worker Ratio (by industry)	0.0919	-0.1451	0.3616 **	-0.0563	0.5152 **	0.2920 **	1.0000	
Capital to Labor Ratio (by industry)	-0.3527 **	-0.1957 *	0.4353 **	0.0802	0.5002 **	0.3149 **	0.2298 **	1.0000

**: Significant at the 1% level.
* : Significant at the 5% level.

Table 9. Regressions for Entry Rate

Entry Rates (# of plants)	I	II	III	IV
Average Employment	-0.00048 ***	-0.00039 ***	-0.00052 ***	-0.00046 ***
	(-7.43)	(-5.69)	(-7.96)	(-6.79)
Non-Production to Production Worker Ratio (by industry)	0.05367 ***	0.03451 *	0.03053	0.05105 **
	(2.65)	(1.92)	(1.38)	(2.56)
Capital to Labor Ratio (by industry)	-0.00010 **	-0.00015 ***	-0.00015 ***	-0.00012 ***
	(-2.22)	(-3.81)	(-3.01)	(-2.85)
Entry Regulation Indicator (# of Industry)	-0.03956 **			
	(-2.60)			
Entry Regulation Indicator (strong form)		-0.08473 ***		
		(-4.03)		
Entry Regulation Indicator (weak form)			0.00409	
			(0.19)	
Entry Regulation Indicator (production)				-0.03007 **
				(-2.52)
Intercept	0.18962 ***	0.19119 ***	0.18914 ***	0.18913 ***
	(16.21)	(16.89)	(15.76)	(16.15)
Year Dummy	Yes	Yes	Yes	Yes
Number of Obs.	138	138	138	138
R^2	0.61396	0.63945	0.59372	0.61286

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 10. Regressions for Exit Rate

Exit Rates (# of plants)	I	II	III	IV
Average Employment	0.00007	0.00012 *	0.00001	0.00009
	(1.08)	(1.72)	(0.13)	(1.33)
Non-Production to Production Worker Ratio (by industry)	0.00477	-0.01750	-0.00520	0.00056
	(0.24)	(-0.96)	(-0.24)	(0.03)
Capital to Labor Ratio (by industry)	-0.00002	-0.00007 *	-0.00003	-0.00004
	(-0.39)	(-1.82)	(-0.73)	(-1.02)
Entry Regulation Indicator (# of Industry)	-0.04449 ***			
	(-2.99)			
Entry Regulation Indicator (strong form)		-0.06317 ***		
		(-2.97)		
Entry Regulation Indicator (weak form)			-0.02690	
			(-1.24)	
Entry Regulation Indicator (production)				-0.03176 ***
				(-2.72)
Intercept	0.08550 ***	0.08647 ***	0.08461 ***	0.08496 ***
	(7.48)	(7.56)	(7.20)	(7.39)
Year Dummy	Yes	Yes	Yes	Yes
Number of Obs.	138	138	138	138
R^2	0.18169	0.18111	0.13501	0.17222

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 11. Entry and Employment Growth (I)

Annual Employment Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.05293	0.07670 **	0.07175 *
	(1.40)	(2.03)	(1.93)
Capital to Labor Ratio (by industry)	0.00005	-0.00001	0.00004
	(0.55)	(-0.09)	(0.44)
Entry Rates (# of plants)	0.45424 ***		
	(3.21)		
Entry Rate (production)		0.32118 **	
		(2.25)	
Entry Rate (employment)			0.44861 ***
			(3.05)
Intercept	-0.13736 ***	-0.08848 ***	-0.10801 ***
	(-4.57)	(-3.78)	(-4.33)
Year Dummy	Yes	Yes	Yes
Number of Obs.	138	138	138
R^2	0.29538	0.26772	0.29040

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 12. Entry and Employment Growth (II)

3-year Average Annual Emplyment Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.09601 **	0.13034 ***	0.12021 ***
	(2.15)	(3.07)	(2.83)
Capital to Labor Ratio (by industry)	0.00006	-0.00001	0.00003
	(0.50)	(-0.10)	(0.27)
Entry Rates (# of plants)	0.34822 ***		
	(2.89)		
Entry Rate (production)		0.34750 ***	
		(2.97)	
Entry Rate (employment)			0.38343 ***
			(3.08)
Intercept	-0.08102 ***	-0.05459 ***	-0.06508 ***
	(-3.21)	(-2.65)	(-2.99)
Year Dummy	Yes	Yes	Yes
Number of Obs.	92	92	92
R^2	0.24511	0.24879	0.25404

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 13. Entry and Output Growth (I)

Annual Production Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	-0.06398	0.02365	0.00513
	(-0.79)	(0.29)	(0.06)
Capital to Labor Ratio (by industry)	0.00030	0.00016	0.00029
	(1.65)	(0.90)	(1.64)
Entry Rates (# of plants)	1.71892 ***		
	(5.66)		
Entry Rate (production)		1.53595 ***	
		(4.98)	
Entry Rate (employment)			1.82675 ***
			(5.85)
Intercept	-0.16176 **	0.00464	-0.06168
	(-2.51)	(0.09)	(-1.16)
Year Dummy	Yes	Yes	Yes
Number of Obs.	138	138	138
R^2	0.33096	0.29977	0.34017

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 14. Entry and Output Growth (II)

3-year Average Annual Production Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	-0.08426	0.07325	0.02130
	(-0.78)	(0.74)	(0.22)
Capital to Labor Ratio (by industry)	0.00054 *	0.00025	0.00047 *
	(1.95)	(1.01)	(1.89)
Entry Rates (# of plants)	1.61063 ***		
	(5.56)		
Entry Rate (production)		1.68278 ***	
		(6.13)	
Entry Rate (employment)			1.92767 ***
			(6.80)
Intercept	-0.07723	0.04073	-0.01560
	(-1.27)	(0.84)	(-0.31)
Year Dummy	Yes	Yes	Yes
Number of Obs.	92	92	92
R^2	0.37831	0.41229	0.45130

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 15. Exit and Employment Growth (I)

Annual Employment Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.07357 *	0.07156 *	0.05759
	(1.92)	(1.82)	(1.49)
Capital to Labor Ratio (by industry)	-0.00009	-0.00008	-0.00011
	(-1.12)	(-1.05)	(-1.44)
Exit Rates (# of plants)	-0.27393		
	(-1.51)		
Exit Rates (production)		-0.18722	
		(-0.84)	
Exit Rates (employment)			-0.52119 **
			(-2.41)
Intercept	-0.04614 *	-0.05959 **	-0.03619
	(-1.70)	(-2.35)	(-1.40)
Year Dummy	Yes	Yes	Yes
Number of Obs.	138	138	138
R^2	0.25224	0.24326	0.27191

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 16. Exit and Employment Growth (II)

3-year Average Annual Emplyment Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.13857 ***	0.13579 ***	0.11809 **
	(3.07)	(2.97)	(2.57)
Capital to Labor Ratio (by industry)	-0.00011	-0.00011	-0.00013
	(-1.04)	(-1.06)	(-1.27)
Exit Rates (# of plants)	0.05501		
	(0.32)		
Exit Rates (production)		-0.00447	
		(-0.02)	
Exit Rates (employment)			-0.26345
			(-1.36)
Intercept	-0.04026	-0.03471	-0.01542
	(-1.53)	(-1.48)	(-0.62)
Year Dummy	Yes	Yes	Yes
Number of Obs.	92	92	92
R^2	0.17176	0.17078	0.18845

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 17. Exit and Output Growth (I)

Annual Production Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.03763	0.07430	0.04360
	(0.42)	(0.83)	(0.48)
Capital to Labor Ratio (by industry)	-0.00014	-0.00008	-0.00013
	(-0.75)	(-0.43)	(-0.69)
Exit Rates (# of plants)	0.14024		
	(0.33)		
Exit Rates (production)		0.98798 *	
		(1.95)	
Exit Rates (employment)			0.21294
			(0.42)
Intercept	0.08152	0.03946	0.07990
	(1.29)	(0.68)	(1.31)
Year Dummy	Yes	Yes	Yes
Number of Obs.	138	138	138
R^2	0.16575	0.18887	0.16617

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Table 18. Exit and Output Growth (II)

3-year Average Annual Production Growth Rates	I	II	III
Non-Production to Production Worker Ratio (by industry)	0.12900	0.15649	0.12908
	(1.07)	(1.30)	(1.04)
Capital to Labor Ratio (by industry)	-0.00021	-0.00017	-0.00021
	(-0.75)	(-0.60)	(-0.74)
Exit Rates (# of plants)	0.61214		
	(1.33)		
Exit Rates (production)		0.95522 *	
		(1.97)	
Exit Rates (employment)			0.41313
			(0.79)
Intercept	0.07702	0.07682	0.10497
	(1.10)	(1.25)	(1.56)
Year Dummy	Yes	Yes	Yes
Number of Obs.	92	92	92
R^2	0.16993	0.18972	0.15875

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Plant-level Regression Analysis Using Plant- and Industry-level Variables

$$\sqrt[3]{\frac{L_{i,t+3}}{L_{i,t}}} - 1 = \alpha_0 + \alpha_{Plant} \cdot X_{i,t} + \alpha_{Industry} \cdot Y_{j,t} + \alpha_{Dt} \cdot D_t + \alpha_{Dj} \cdot D_j + \varepsilon_{i,t}$$

Table 19. Firm Dynamics and Employment Growth

3-year Average(overlapped) Annual Employment Growth Rates $(L_{i,t+3}/L_{i,t})^{(1/3)}-1$	I (Total)	II (Total)	III (Employment < 300)	IV (Employment < 300)	V (Employment ≥ 300)	VI (Employment ≥ 300)
(Sales growth)$_{i,t}$	0.23472 ***	0.23438 ***	0.22665 ***	0.22631 ***	0.39134 ***	0.39133 ***
	(64.35)	(64.25)	(66.07)	(65.96)	(15.64)	(15.64)
(Non-production worker share)$_{i,t}$	0.00263 ***	0.00259 ***	0.00328 ***	0.00322 ***	-0.00277 *	-0.00277 *
	(6.12)	(6.03)	(6.85)	(6.77)	(-1.68)	(-1.67)
(Capital-labor ratio)$_{i,t}$	0.00016 ***	0.00016 ***	0.00017 ***	0.00017 ***	0.00003 ***	0.00003 ***
	(4.18)	(4.19)	(3.51)	(3.52)	(2.91)	(2.90)
(R&D intensity)$_{i,t}$	-0.00150	-0.00153	-0.00135	-0.00138	0.01158	0.01134
	(-0.40)	(-0.40)	(-0.37)	(-0.38)	(0.15)	(0.15)
(Export intensity$_{)i,t}$	0.01238	0.01242	0.01187	0.01190	0.01418	0.01417
	(1.61)	(1.61)	(1.57)	(1.57)	(1.33)	(1.33)
ln(Number of workders)$_{i,t}$	-0.03110 ***	-0.03123 ***	-0.03680 ***	-0.03692 ***	-0.09529 ***	-0.09531 ***
	(-48.97)	(-49.32)	(-61.23)	(-61.61)	(-16.15)	(-16.15)
(Non-production worker share)$_{j,t}$	0.01312 ***	0.01116 ***	0.01102 ***	0.00907 ***	-0.01182	-0.01220
	(6.27)	(5.32)	(5.32)	(4.36)	(-0.38)	(-0.39)
(Capital-labor ratio)$_{i,t}$	-0.00002 **	-0.00003 ***	-0.00002 *	-0.00003 **	-0.00004	-0.00004
	(-2.15)	(-2.78)	(-1.88)	(-2.53)	(-0.81)	(-0.82)
(R&D intensity)$_{j,t}$	0.22787 ***	0.22223 ***	0.22411 ***	0.21843 ***	0.91296 ***	0.91287 ***
	(5.00)	(4.88)	(4.95)	(4.83)	(2.63)	(2.63)
(Export intensity)$_{j,t}$	-0.00988 ***	-0.01313 ***	-0.00996 ***	-0.01321 ***	-0.03379	-0.03428
	(-2.87)	(-3.78)	(-2.96)	(-3.89)	(-1.26)	(-1.27)
(Import penetration ratio)$_{j,t}$	-0.00190	-0.00292	0.00075	-0.00032	-0.10852 ***	-0.10841 ***
	(-0.51)	(-0.79)	(0.20)	(-0.09)	(-3.40)	(-3.39)
(Entry rate)$_{j,t}$	0.04532 ***	0.03919 ***	0.04268 ***	0.03657 ***	-0.01628	-0.01711
	(3.77)	(3.25)	(3.54)	(3.02)	(-0.21)	(-0.22)
(Exit rate)$_{j,t}$		-0.15851 ***		-0.15929 ***		-0.01938
		(-12.40)		(-12.54)		(-0.18)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	266,525	266,524	262,700	262,699	3,825	3,825
R^2	0.31261	0.31305	0.31027	0.31072	0.72748	0.72749

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

Plant-level Regression Analysis Using Plant- and Industry-level Variables

$$\frac{\ln TFP_{i,t+3} - \ln TFP_{i,t}}{3} = \beta_0 + \beta_{Plant} \cdot X_{i,t} + \beta_{Industry} \cdot Y_{j,t} + \beta_{Dt} \cdot D_t + \beta_{Dj} \cdot D_j + \varepsilon_{i,t}$$

Table 20. Firm Dynamics and TFP Growth

3-year Average(overlapped) Annual TFP Growth Rates $\{\ln(TFP)_{i,t+3}-\ln(TFP)_{i,t}\}/3$	I (Total)	II (Total)	III (Employment < 300)	IV (Employment < 300)	V (Employment ≥ 300)	VI (Employment ≥ 300)
$\ln(TFP)_{i,t}$	-0.24383 ***	-0.24376 ***	-0.24466 ***	-0.24459 ***	-0.20992 ***	-0.21001 ***
	(-275.69)	(-275.61)	(-272.87)	(-272.81)	(-26.43)	(-26.46)
$(\text{Non-production worker share})_{i,t}$	0.00558 ***	0.00562 ***	0.00632 ***	0.00636 ***	0.00004	0.00005
	(10.34)	(10.34)	(11.23)	(11.21)	(0.07)	(0.09)
$(\text{Capital-labor ratio})_{i,t}$	-0.00005 ***	-0.00005 ***	-0.00005 ***	-0.00005 ***	-0.00004 ***	-0.00004 ***
	(-8.99)	(-8.98)	(-7.43)	(-7.41)	(-5.22)	(-5.20)
$(\text{R&D intensity})_{i,t}$	0.00016	0.00018	0.00016	0.00018	-0.03331	-0.03434
	(0.35)	(0.39)	(0.36)	(0.40)	(-0.96)	(-0.98)
$(\text{Export intensity}_{)i,t}$	0.00042	0.00036	0.00167	0.00161	-0.01054	-0.01055
	(0.34)	(0.29)	(1.31)	(1.26)	(-1.46)	(-1.46)
$\ln(\text{Number of workders})_{i,t}$	0.00764 ***	0.00771 ***	0.00706 ***	0.00713 ***	0.00726 ***	0.00725 ***
	(32.29)	(32.59)	(27.11)	(27.37)	(4.25)	(4.24)
$(\text{Non-production worker share})_{j,t}$	0.01921 ***	0.02033 ***	0.01845 ***	0.01959 ***	0.00092	-0.00012
	(10.48)	(11.07)	(9.72)	(10.30)	(0.07)	(-0.01)
$(\text{Capital-labor ratio})_{i,t}$	0.00002 ***	0.00002 ***	0.00002 ***	0.00002 ***	0.00001	0.00001
	(3.72)	(4.34)	(3.78)	(4.43)	(0.26)	(0.25)
$(\text{R&D intensity})_{j,t}$	0.31034 ***	0.31419 ***	0.30630 ***	0.31025 ***	0.64897 ***	0.64758 ***
	(9.34)	(9.45)	(9.05)	(9.17)	(3.80)	(3.79)
$(\text{Export intensity})_{j,t}$	-0.00894 ***	-0.00713 ***	-0.00756 ***	-0.00571 **	-0.06415 ***	-0.06547 ***
	(-3.81)	(-3.03)	(-3.18)	(-2.40)	(-4.10)	(-4.15)
$(\text{Import penetration ratio})_{j,t}$	0.01964 ***	0.02019 ***	0.01938 ***	0.01999 ***	0.05134 **	0.05193 **
	(6.99)	(7.18)	(6.84)	(7.05)	(2.15)	(2.17)
$(\text{Entry rate})_{j,t}$	0.07149 ***	0.07405 ***	0.07179 ***	0.07439 ***	0.09267 *	0.09138 *
	(7.50)	(7.76)	(7.39)	(7.66)	(1.88)	(1.85)
$(\text{Exit rate})_{j,t}$		0.09192 ***		0.09489 ***		-0.04577
		(8.52)		(8.67)		(-0.70)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	203,936	203,935	200,878	200,877	3,058	3,058
R^2	0.43413	0.43436	0.43536	0.43561	0.38465	0.38476

The values in parentheses are heteroskedasticity-robust t-statistics
***: Significant at the 1% level.
**: Significant at the 5% level.
*: Significant at the 10% level.

TFP growth rate for subsequent three years	I	II	III
$\ln(TFP)_{i,t}$	-0.24542 ***	-0.24604 ***	-0.24708 ***
	(-110.31)	(-110.39)	(-110.56)
Non-production to production worker ratio (plant-level)	0.00465 ***	0.00482 ***	0.00486 ***
	(5.11)	(4.96)	(4.97)
Capital Labor Ratio (plant-level)	-0.00004 ***	-0.00004 ***	-0.00004 ***
	(-5.46)	(-5.36)	(-5.24)
R&D Intensity (plant-level)	-0.00184	-0.00197	-0.00179
	(-0.86)	(-0.87)	(-0.81)
Export Intensity (plant-level)	0.00871	0.00647	0.00654
	(1.19)	(0.89)	(0.90)
ln(Number of workers)	0.00938 ***	0.01014 ***	0.01017 ***
	(16.96)	(18.30)	(18.30)
Non-production to production worker ratio (industry-level)	0.01248 ***	0.00679 **	0.01527 ***
	(4.08)	(2.30)	(4.89)
Capital Labor Ratio (industry-level)	0.00002 **	0.00010 ***	0.00011 ***
	(2.05)	(8.92)	(9.69)
R&D Intensity (industry-level)	0.75621 ***	0.79440 ***	0.75078 ***
	(9.70)	(8.74)	(8.27)
Export intensity (industry-level)	0.05482 ***	0.03776 ***	0.02668 ***
	(7.50)	(4.83)	(3.40)
Import penetration rate (industry-level)	0.04214 ***	0.04995 ***	0.04833 ***
	(8.76)	(10.07)	(9.80)
Entry rate (industry-level)		0.15204 ***	0.13458 ***
		(7.92)	(7.03)
Exit rate (industry-level)		0.25960 ***	0.24569 ***
		(6.79)	(6.41)
Entry regulation rate (industry-level)	-0.03249 ***		-0.02799 ***
	(-11.20)		(-9.65)
Number of observations	33402	33402	33402
Adjusted R^2	0.43095	0.4322	0.43390
R^2	0.43115	0.4324	0.43414

Summary of preliminary findings

- Entry Regulations and Firm Dynamics
  - ✓ Entry regulations reduce entry rate
  - ✓ Entry regulations reduce exit rate

- Firm Dynamics and Economic Performance
  - ✓ Entry raises employment and productivity growth
  - ✓ Exit raises (output and) productivity growth

Part-05

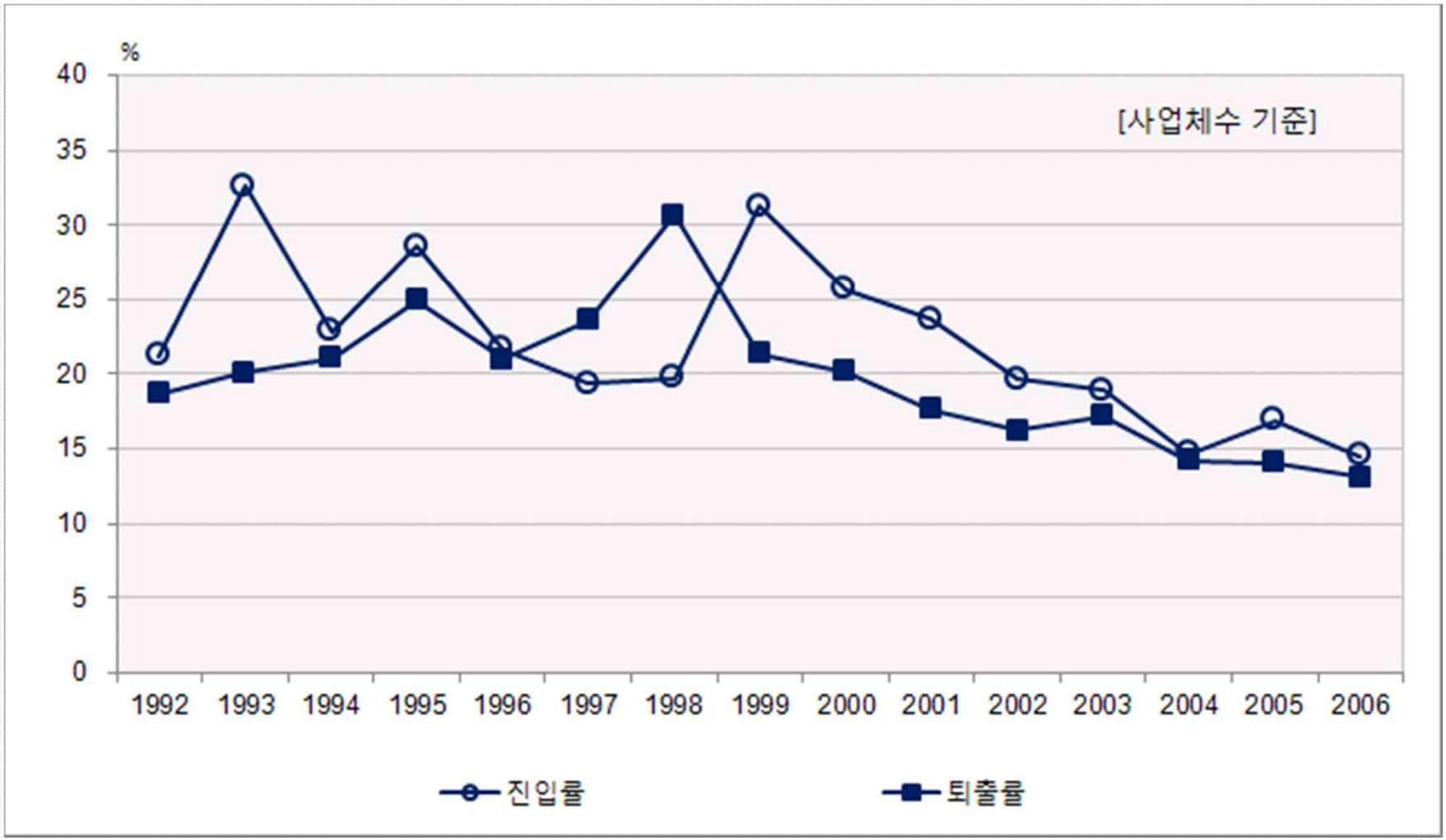
Remaining Questions and Extensions

Major Problems in Productivity Dynamics

- ***Creative destruction*** **plays a very important role for productivity growth and innovation by enhancing:**
  - **The expansion or entry of high productivity firms**
  - **The contraction or exit by low productivity firms**
- **Productivity growth driven by *creative destruction* is impeded due to:**
  - **High entry costs**
  - **High levels of taxation**
  - **Labor market rigidity**
  - **…**

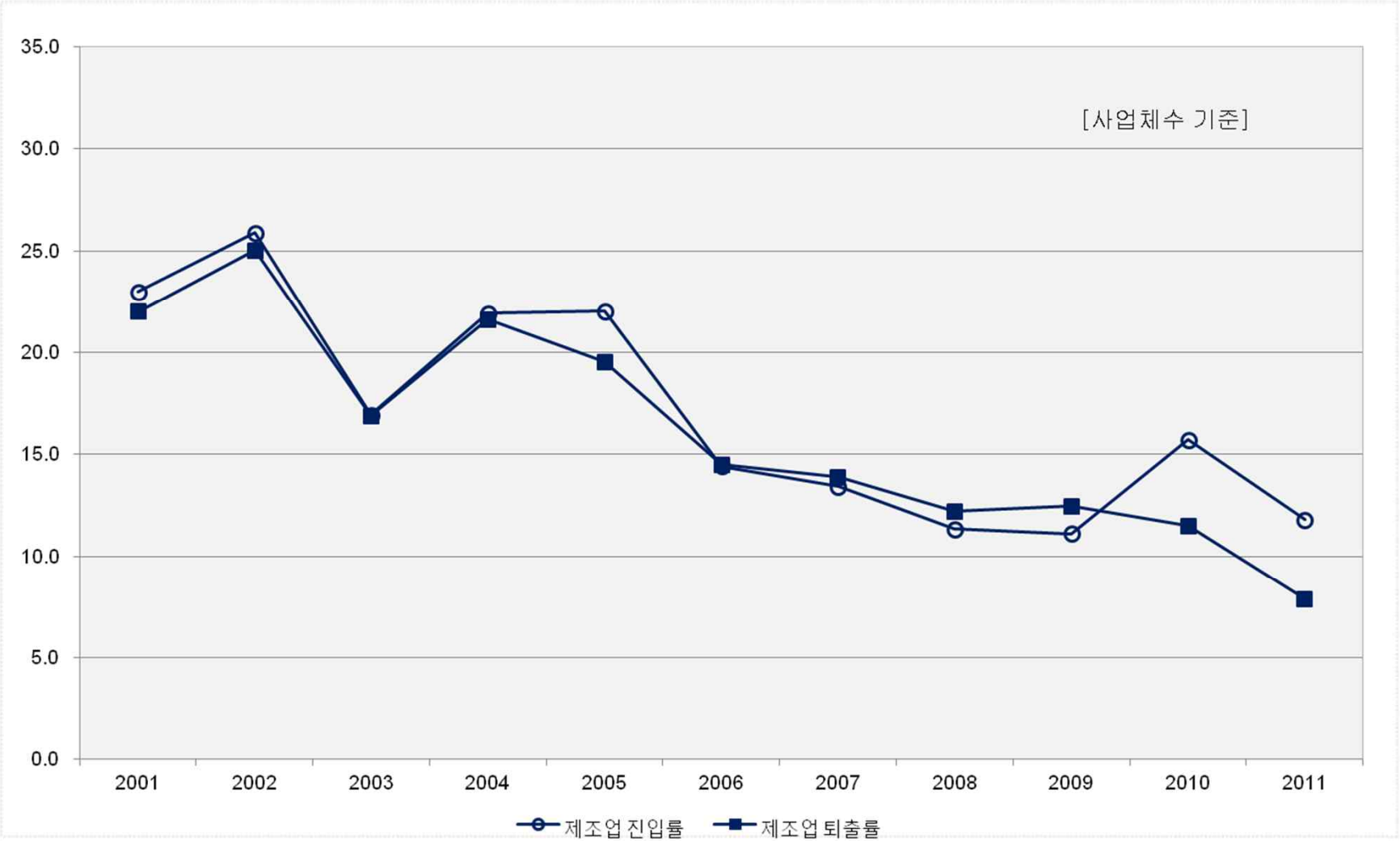
Entry and Exit in Korean Manufacturing (1992-2006)

광업제조업통계조사 (5인 이상 사업체 대상)



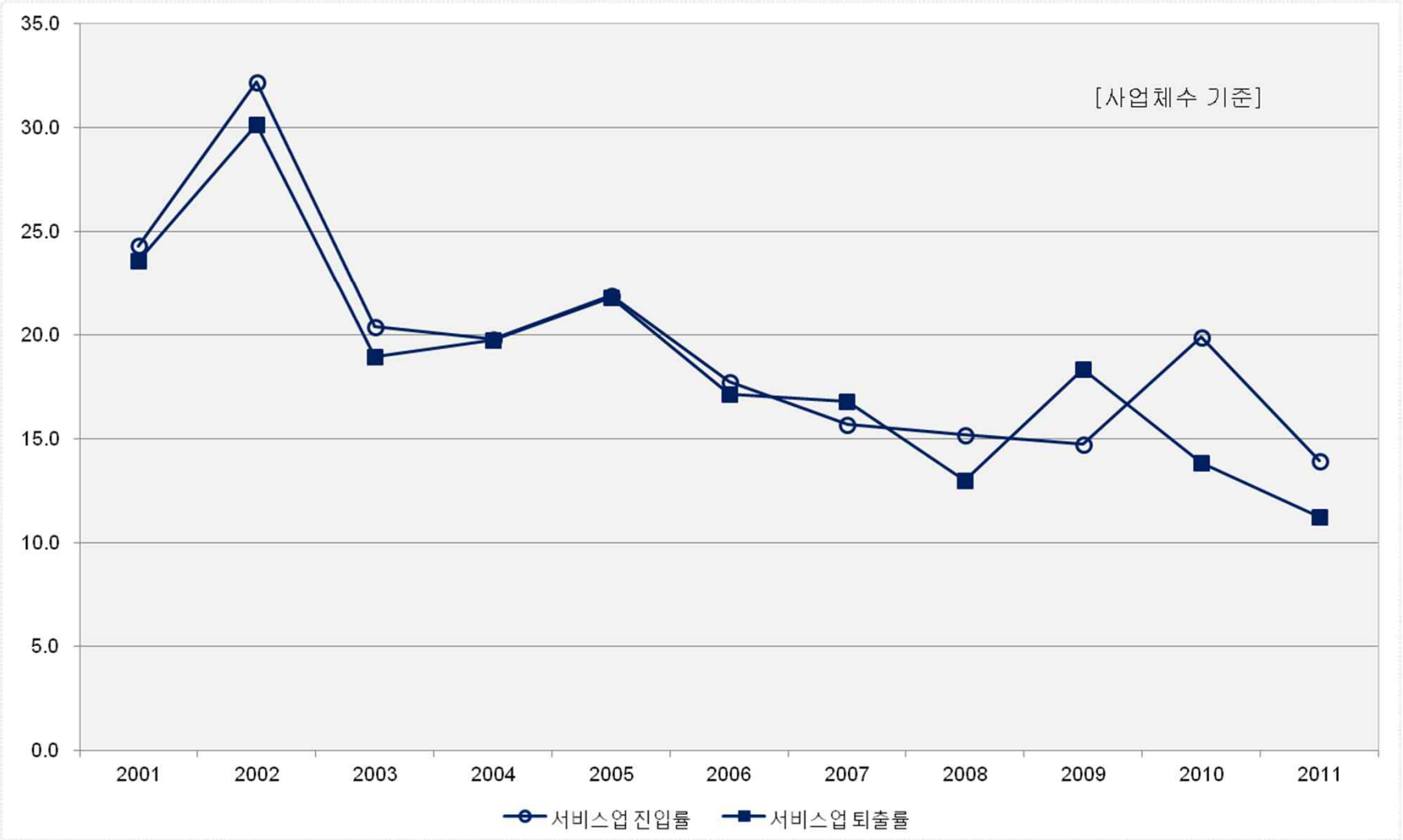
Entry and Exit in Korea: Manufacturing (2001-2011)

전국사업체통계조사 (전체 사업체 대상)



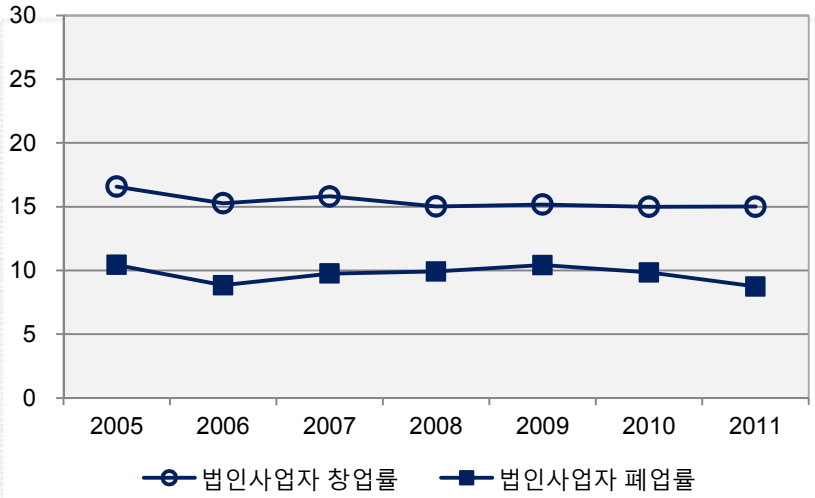
Entry and Exit in Korea: Services (2001-2011)

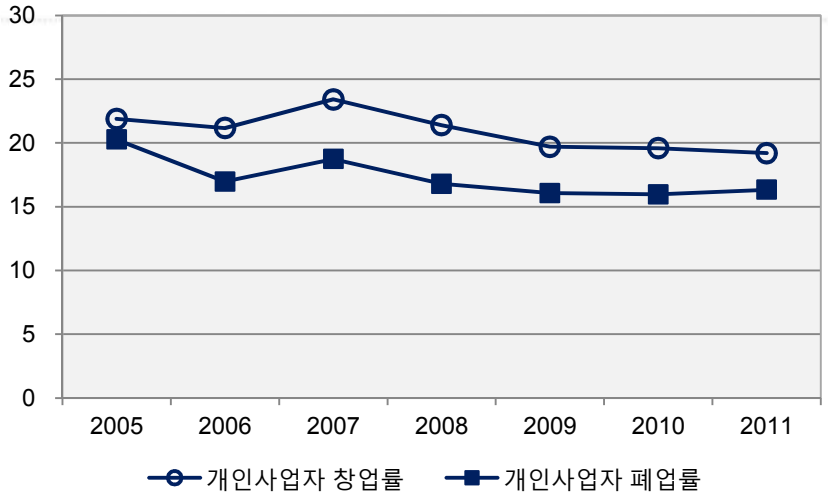
전국사업체통계조사 (전체 사업체 대상)

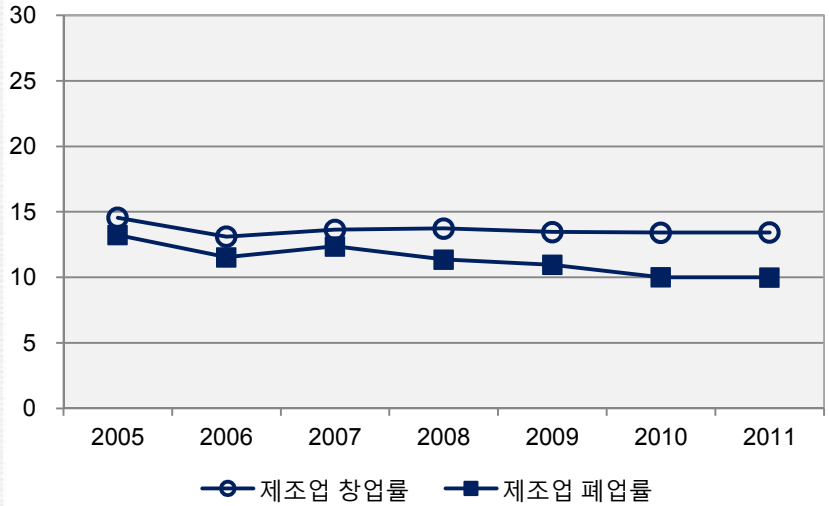


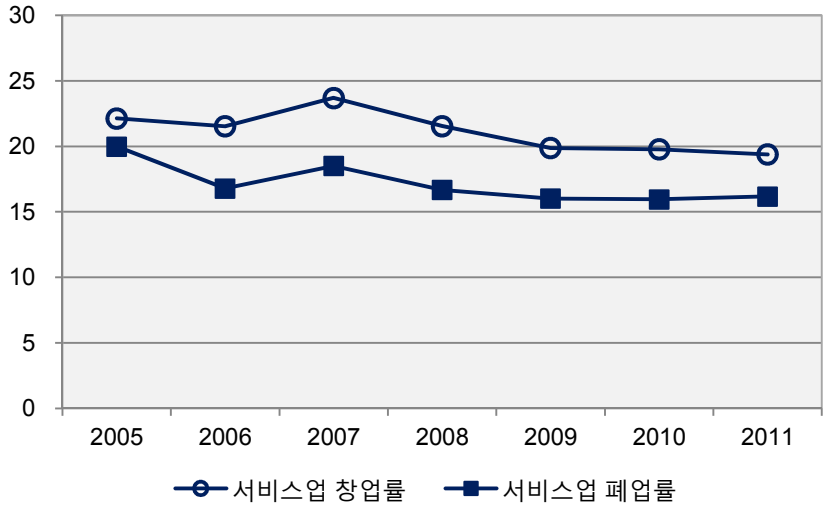
Entry and Exit in Korea (2005-2011)

국세청 국세통계연보



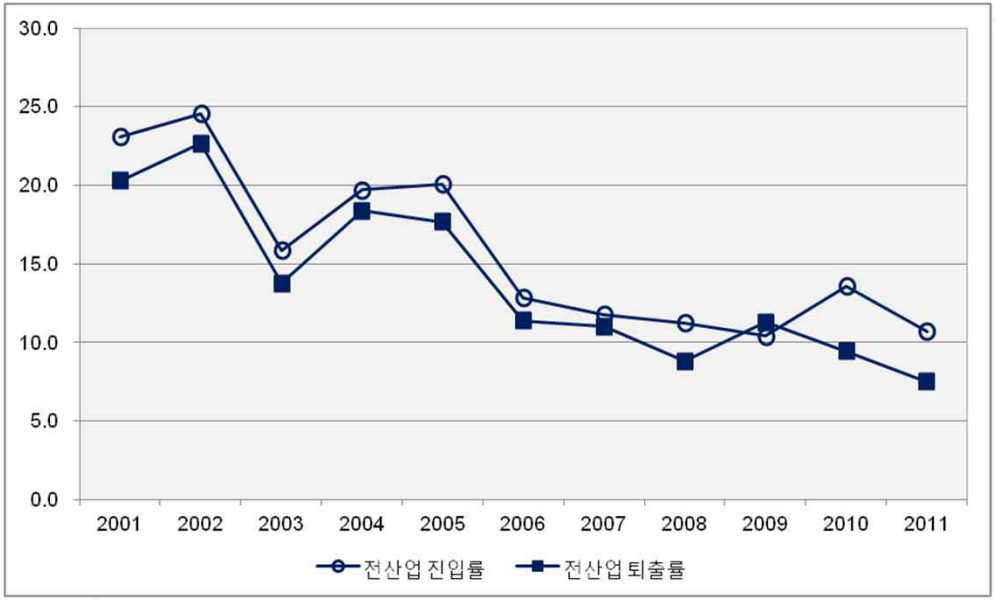


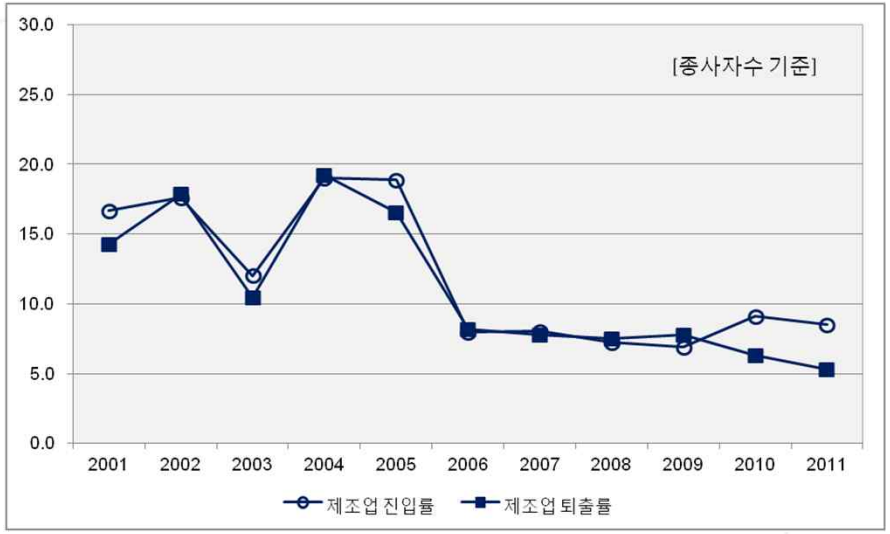


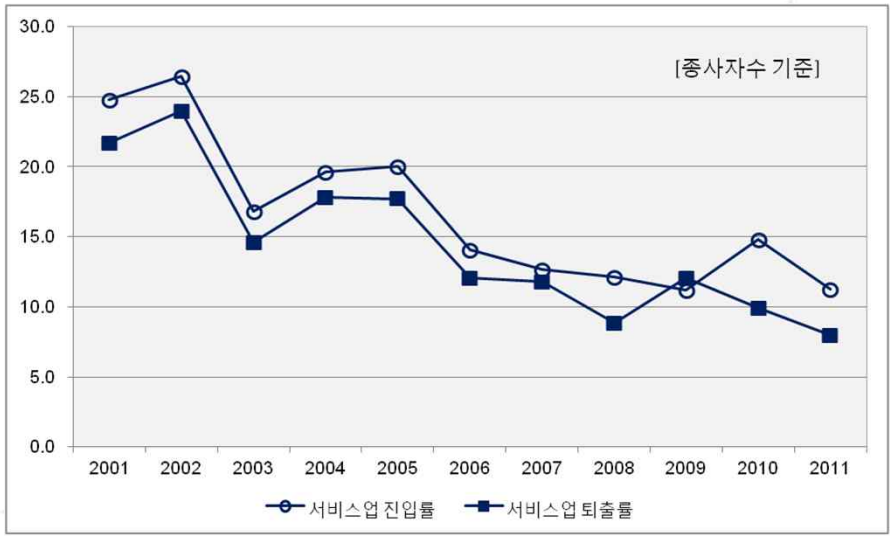


Entry and Exit in Korea (2001-2011)

전국사업체통계조사 (전체 사업체 대상), 종사자수 기준







OECD Committee on Industry, Innovation and Entrepreneurship

Transportation Infrastructure Investment and the Location of New Manufacturing: A Korean Case Study

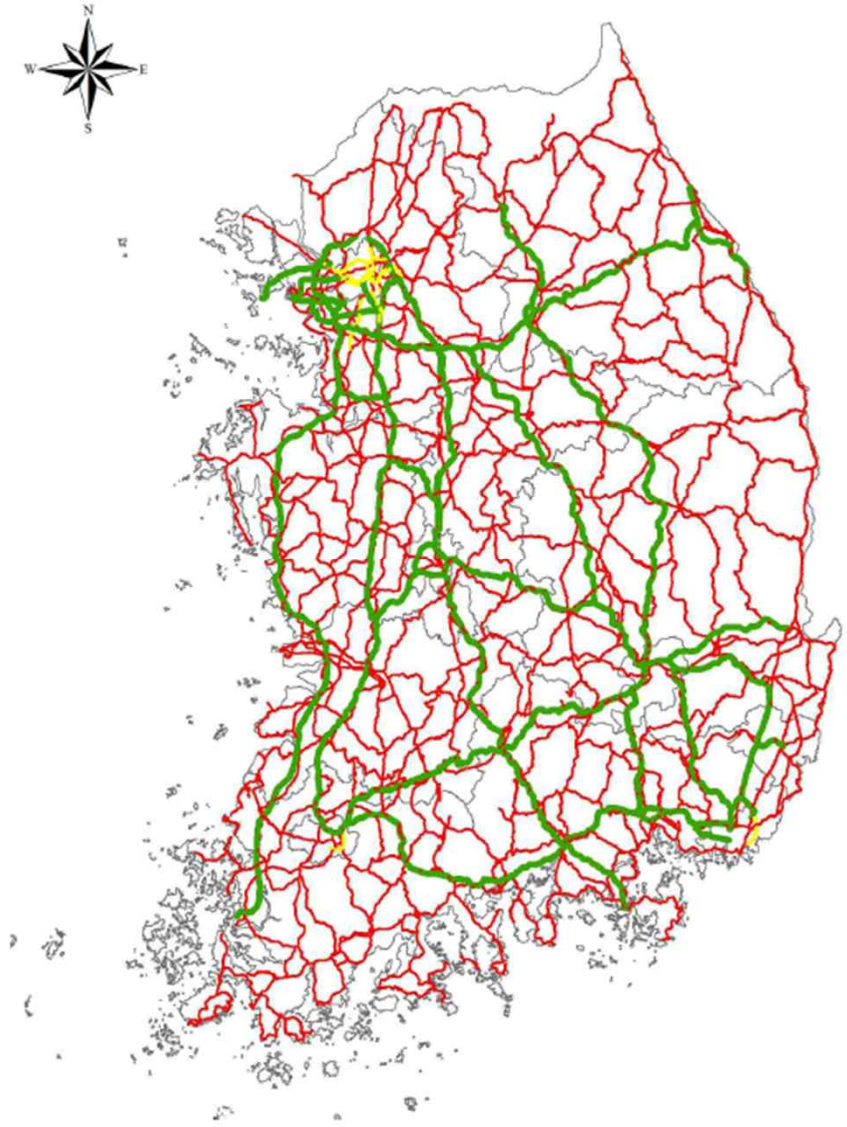
Sanghoon Ahn (OECD and KDI)
Hyungtai Kim (Georgetown University and KDI)
Gudmundur F. Ulfarsson (University of Iceland)

15 October, 2015

Overview

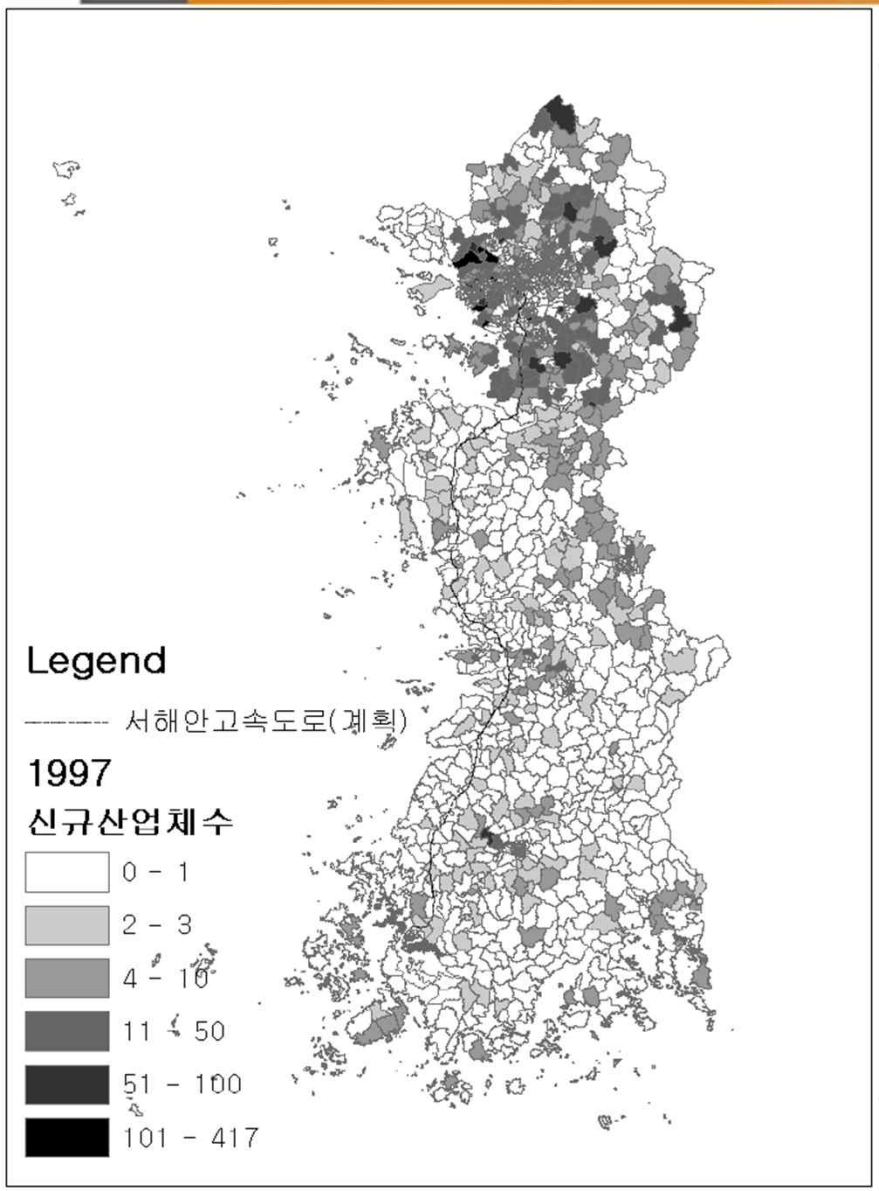
- This study confirms a significant positive impact of transport infrastructure investment on the location of new manufacturing establishments in the region.
  - ✓ West Coast Expressway (completed in December 2001 connecting the Seoul Metropolitan area with Jeolla province) was aimed to stimulate industrial development of the region
  - ✓ We focus on new manufacturing establishments due to their significant spillover effect on local economies
- The analysis uses regional data with fine spatial resolution based on small spatial administrative units
  - ✓ 2,029 spatial units per year
  - ✓ 20,290 observations in the 10 year panel (1997 to 2006)

Road Network in South Korea (2006)



West Coast Expressway and New Plants (1997-2006)

KDI



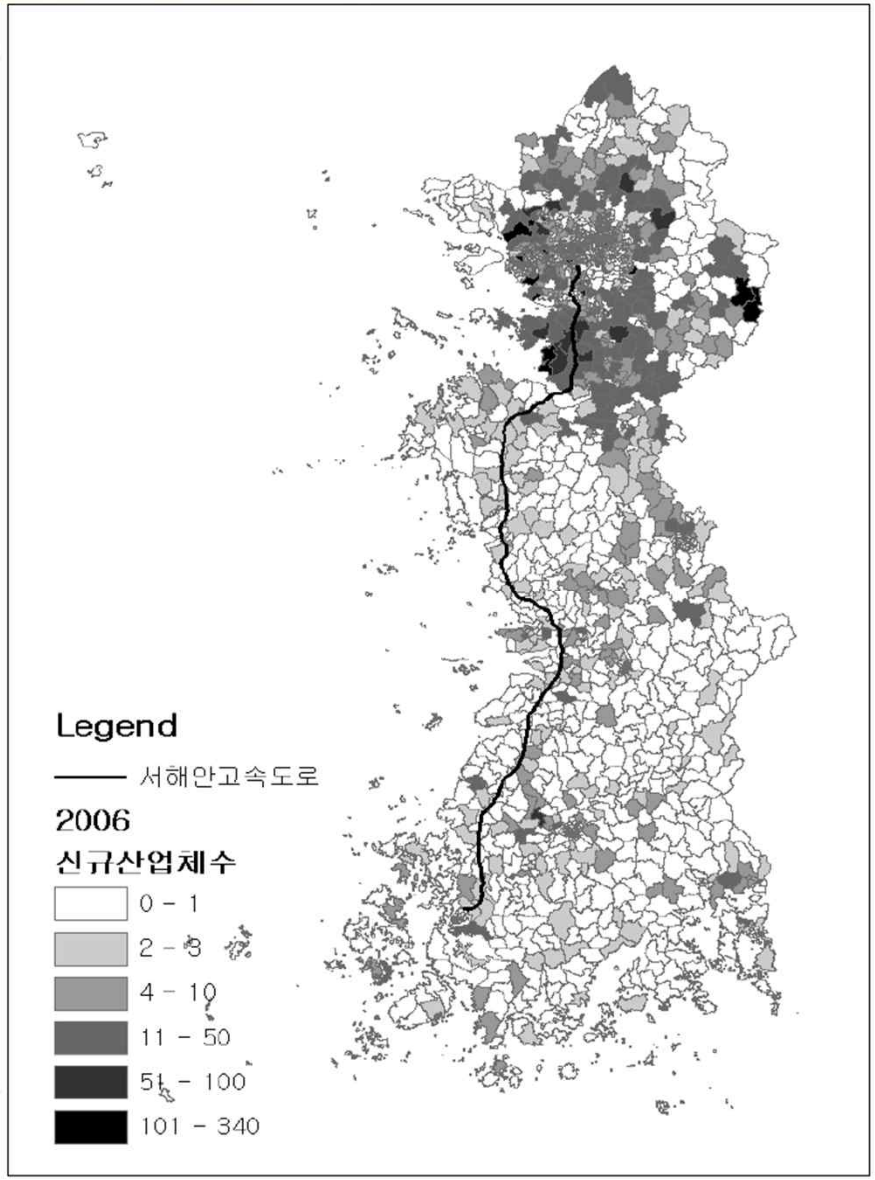


Table 1. Descriptive Statistics of Variables and Data Sources

Variable		1997		2006	
		Mean	St. Dev.	Mean	St. Dev.
Number of all new manufacturing establishments	M	6.26	22.30	6.12	19.56
Number of new high-tech manufacturing establishments	M	0.45	1.91	0.76	3.88
Number of new medium-high-tech manufacturing establishments	M	1.38	6.79	1.51	6.62
Number of new medium-low-tech manufacturing establishments	M	1.35	6.42	1.33	5.56
Number of new low-tech manufacturing establishments	M	3.06	11.51	2.49	7.28
Number of new small manufacturing establishments	M	4.12	15.30	4.09	12.73
Number of new medium manufacturing establishments	M	1.75	6.58	1.69	6.24
Number of new large manufacturing establishments	M	0.39	2.15	0.34	1.47
The shortest distance from the West Coast Expressway IC	G	81.51	83.76	28.52	24.09
The shortest distance from the existing expressway IC as of 1997	G	14.90	19.68	14.91	19.68
Road ratio (road area / administrative district area)	P	0.06	0.05	0.07	0.05
The distance from the CBD of neighboring large cities	G	32.90	25.90	32.90	25.90
Average wage of employed workers in manufacturing (unit: 1 million KRW)	M	13.24	3.34	21.65	7.75
Average land price (unit: 10 000 KRW)	L	50.43	71.13	83.08	117.48
Population density (1 000 people/km^2)	S	6.78	8.20	6.85	8.08
Number of employees in existing manufacturing (unit: 1 000 people)	M	12.76	15.53	13.71	19.52
Number of employees in existing high-tech (unit: 1 000 people)	M	1.97	4.17	2.74	5.86
Number of employees in existing medium-high tech (unit: 1 000 people)	M	3.51	6.13	3.94	7.54
Number of employees in existing medium-low tech (unit: 1 000 people)	M	2.33	3.83	2.82	5.26
Number of employees in existing low-tech (unit: 1 000 people)	M	4.88	4.98	4.17	4.55
Area of current district ('eup,' 'myeon,' or 'dong') (unit: km^2)	G	20.29	26.90	20.29	26.90
Congestion restriction zone	G	0.44	0.50	0.44	0.50
Growth management zone	G	0.08	0.28	0.08	0.28
Nature conservation zone	G	0.02	0.15	0.02	0.15

Data originates from: (M) Mining and Manufacturing Survey; (G) Geographical Information System calculation; (P) Korea Ministry of Public Administration and Security; (L) Korea Ministry of Land, Transport and Maritime Affairs; (S) Statistics Korea. Expressway interchange is denoted IC.

Table 2. Negative binomial model of the number of new manufacturing industry establishments

Variables	Coefficient (Standard Error)
Constant	1.7729 (0.1029)***
The shortest distance from the West Coast Expressway IC	-0.0026 (0.0003)***
The shortest distance from the existing expressway IC as of 1997	-0.0092 (0.0021)***
Road ratio (road area / administrative district area)	0.2598 (0.8243)
The distance from the CBD of neighboring large cities	-0.0047 (0.0018)***
Average wage of employed workers in manufacturing industry (unit: 1 million KRW)	-0.0134 (0.0020)***
Average land price (unit: 10 000 KRW)	-0.0024 (0.0002)***
Population density (1 000 people/km^2)	0.0205 (0.0050)***
Number of employees in existing manufacturing (unit: 1 000 people)	0.0166 (0.0011)***
Area of current district ('eup,' 'myeon,' or 'dong') (unit: km^2)	0.0004 (0.0016)
Congestion restriction zone	-0.6461 (0.0906)***
Growth management zone	-0.4491 (0.1035)***
Nature conservation zone	-0.2306 (0.1970)
Observations	18 450
Log-likelihood at zero	-34 503.76
Log-likelihood at convergence	-31 389.73

* Denotes a p-value of 0.1 or smaller; ** denotes a p-value of 0.05 or smaller; *** denotes a p-value of 0.01 or smaller. Standard errors are in parentheses.

Main Findings

- The increased accessibility by the opening of the West Coast Expressway turns out to have a significant impact on the location decision of new manufacturing establishments regardless of technology level or size.

- New manufacturing establishments tend to choose a location near an interchange (IC) of the West Coast Expressway.

Main Findings

➢ The accessibility to the prior existing expressway as of 1997 is found to have a statistically significant impact on the location of new manufacturing establishments.

✓ The overall results imply that when a manufacturing establishment decides on location, the accessibility to the existing expressway is as important as the accessibility to the new West Coast Expressway.

Main Findings

➢ The average wage of employed workers in local manufacturing establishments is also important.

- ✓ Establishments with lower technology level tend to be more responsive to the average wage when deciding on location.
- ✓ The average wage does not have a statistically significant impact on high-tech manufacturing establishments

Main Findings

➢ Land price is found to produce a negative effect regardless of technology level or size.

Main Findings

➢ The number of employed workers in existing manufacturing establishments in the local area, a variable to control for the effect of agglomeration economies, is significant.

- ✓ This is consistent with preceding studies.
- ✓ Clustering by technology level is an important location determinant for a new manufacturing establishment.

For Further Studies

- Impacts of infrastructure investments on:
  - ✓ New entrants
  - ✓ Employment
  - ✓ Investment
  - ✓ Productivity
- Interactions with:
  - ✓ Innovative activities
  - ✓ GVCs

Thank you !

Korea's Leading Think Tank KDI