Changing National Innovation System of Japan? From Large Firms to Network System

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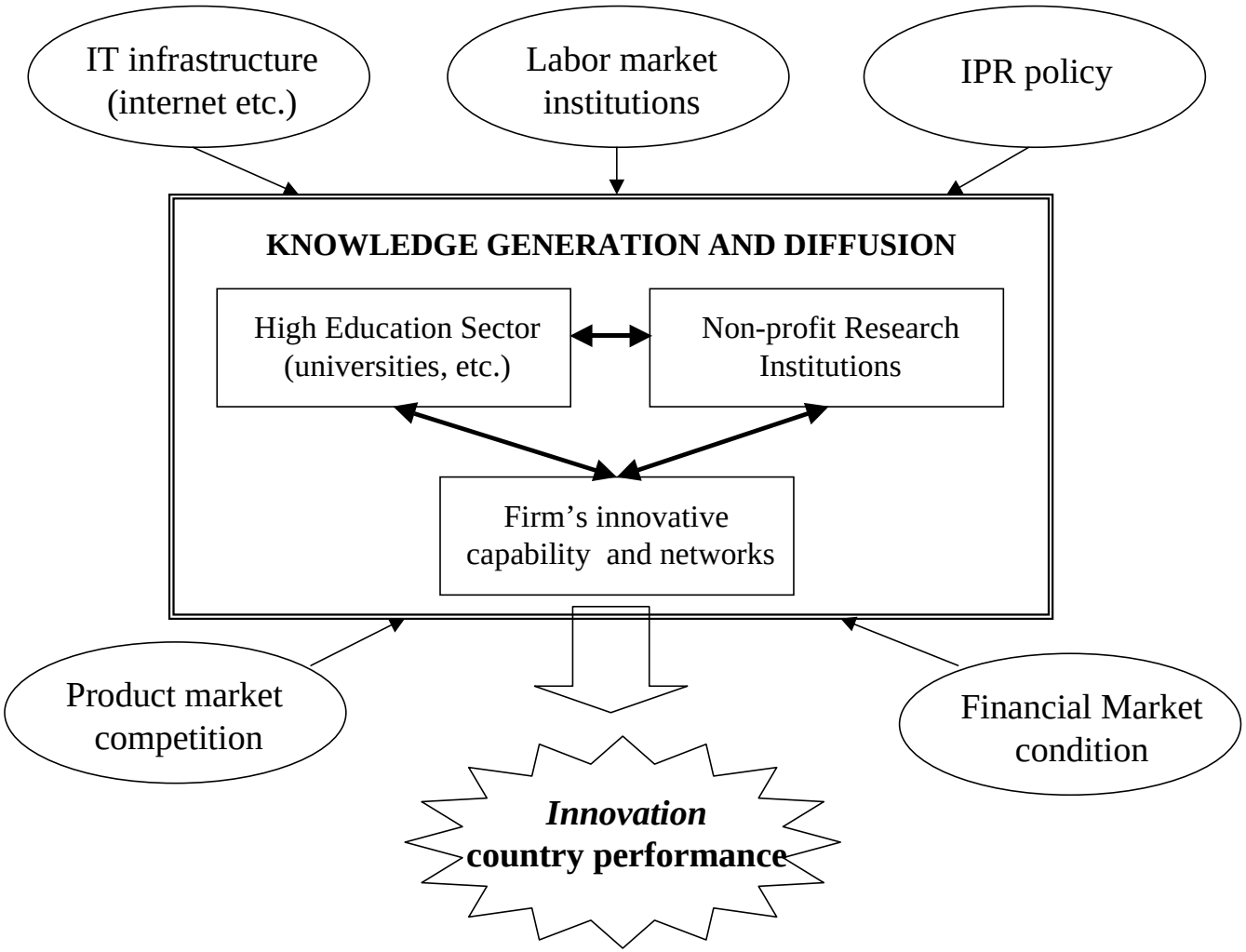
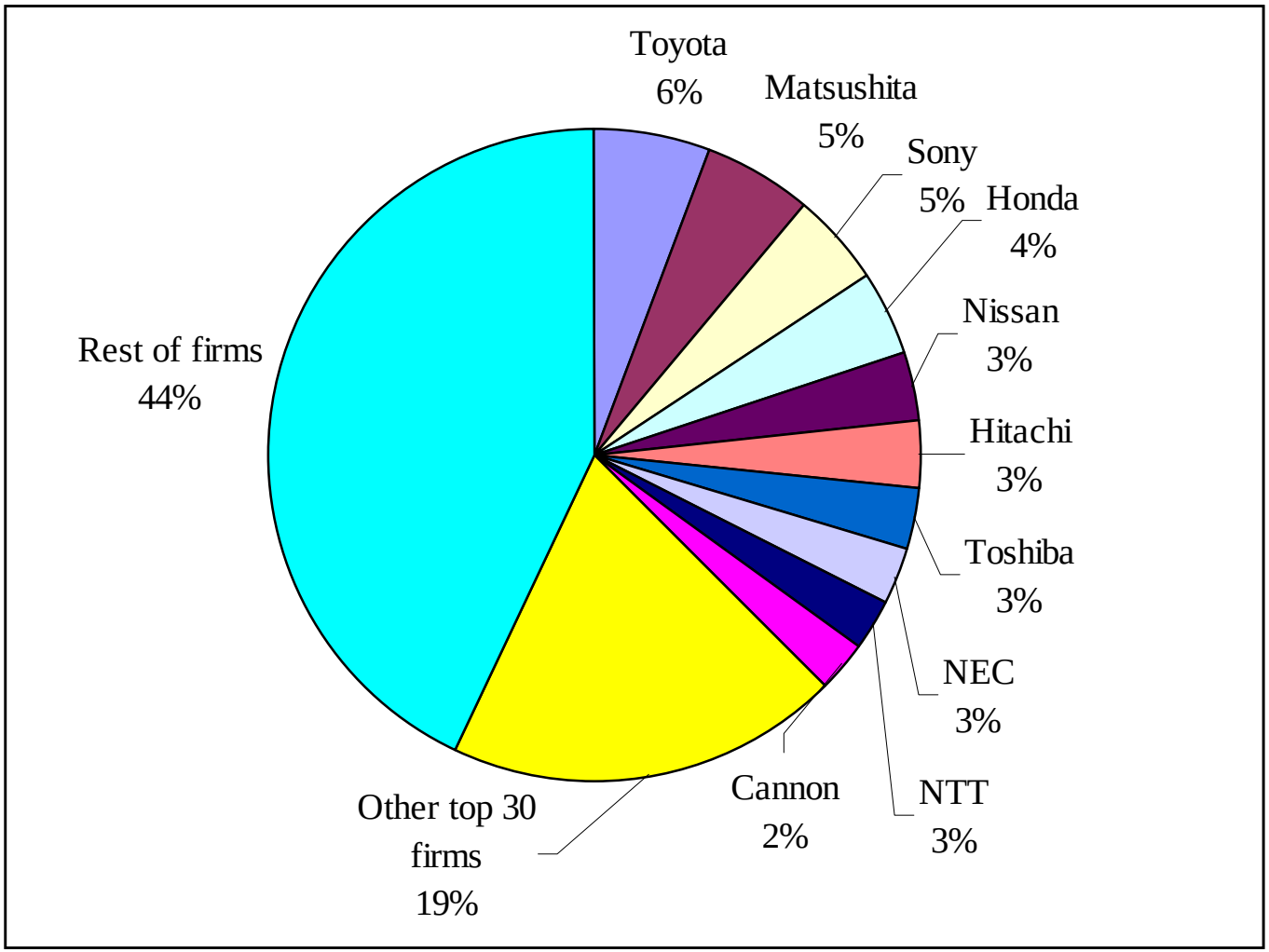
Outline of Presentation

- What is National Innovation System? Characterizing Japanese System
- Growing external collaboration of R&D and econometric analysis
- Policy implications for network innovation model

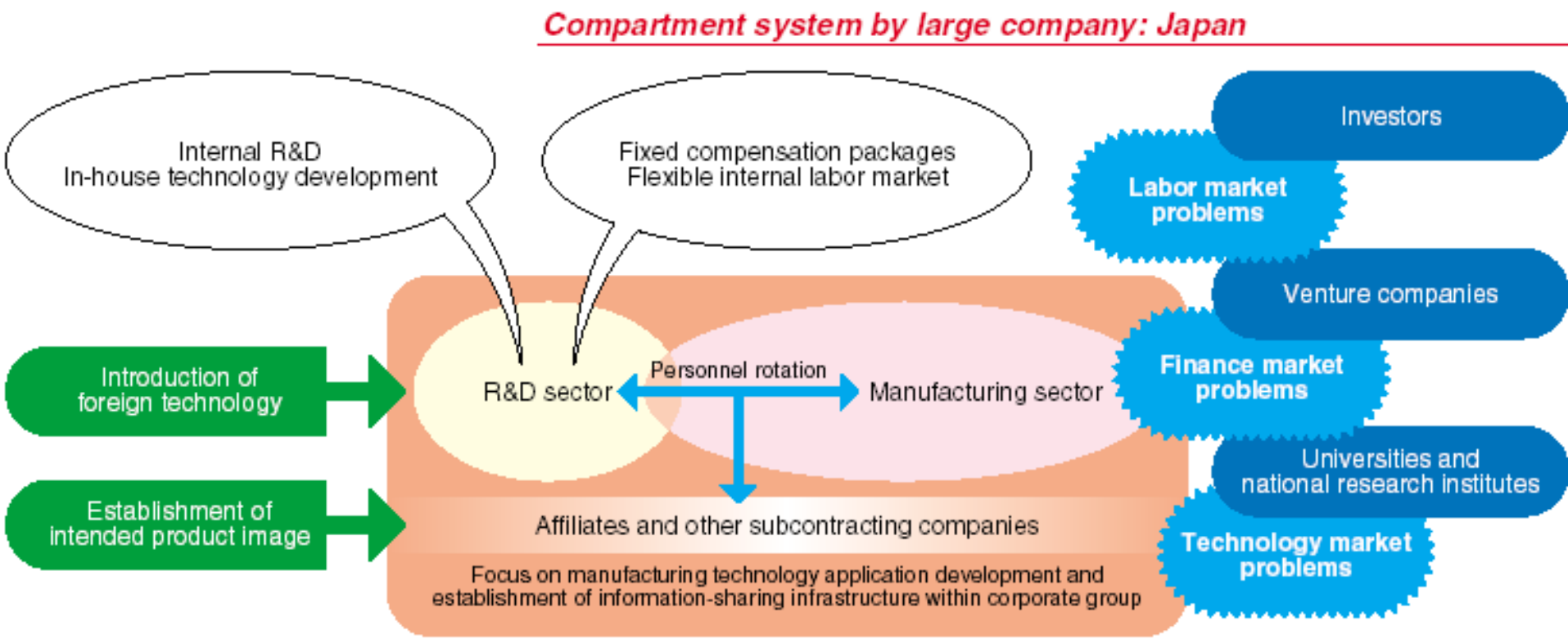
National Innovation System?



Business Expenditure of R&D in Japan



Japan's national innovation system



Changes in Large Firm Dominated System?: Possible Factors

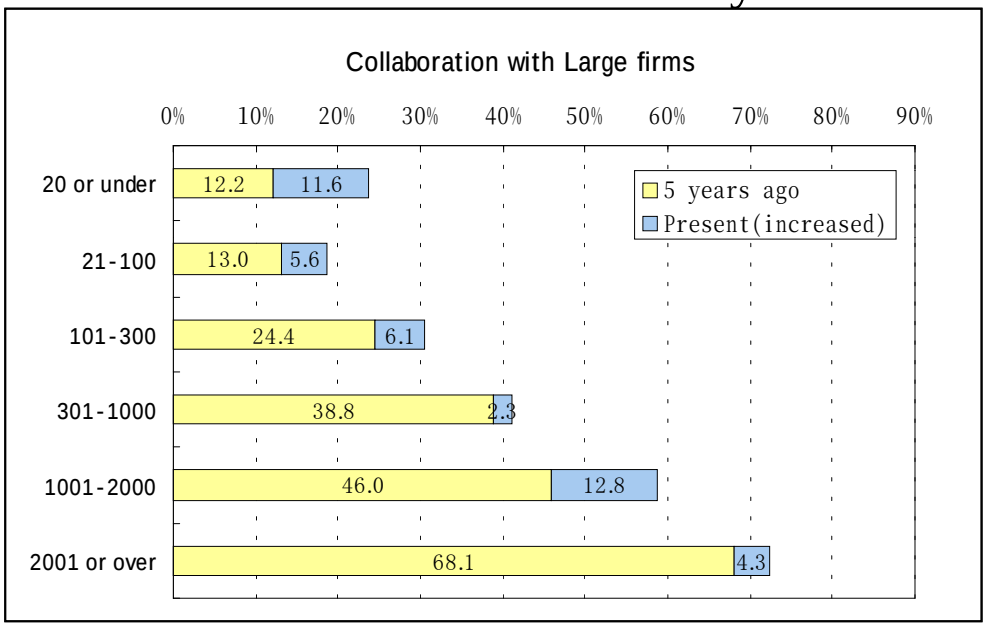
- Intense innovation competition: globalization and catching up of Korea, Taiwan and China
- Necessity of innovation speed in order to appropriate rents from R&D
- Importance of scientific knowledge for industrial innovation: particularly the case for bio-pharmaceuticals
- Institutional changes in science sector: PRIs and national university reforms

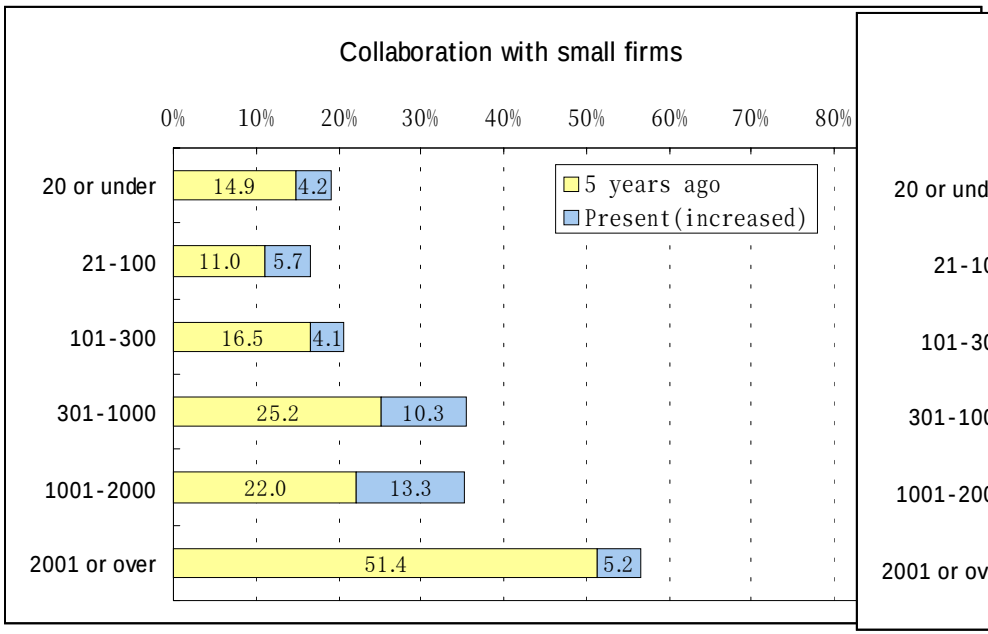
RIETI's Survey on R&D Collaboration

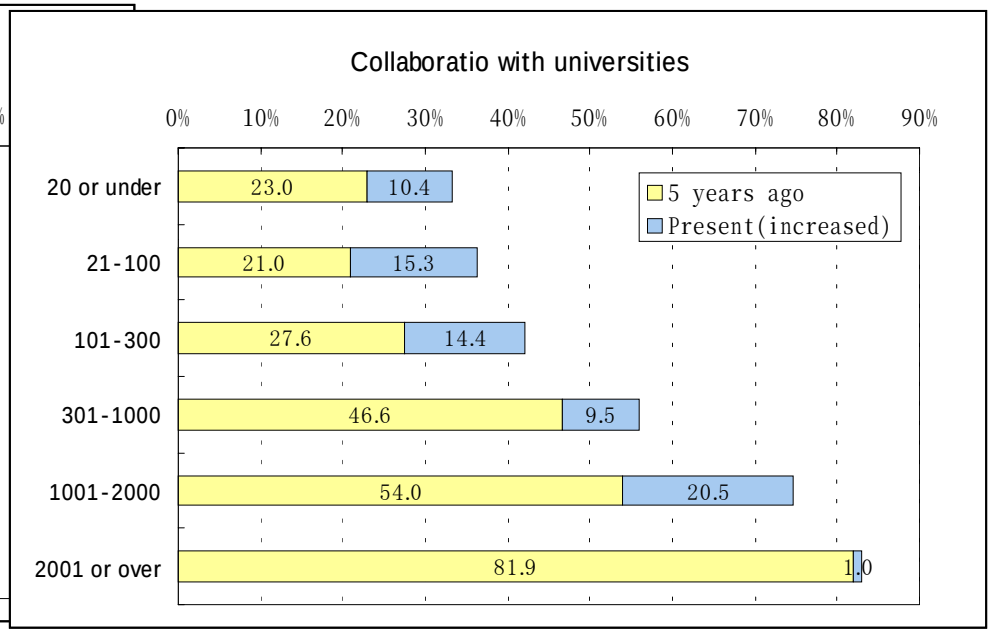
- Firm level survey on external R&D collaboration: business to business networks and university and industry linkages
- Data for 2003, 556 samples
- Survey items
  - Recent trend of external R&D collaboration and IPR licensing
  - Factors behind R&D collaboration decision
  - Managing the boundary of firm in R&D, internal R&D vs outsourcing
- Detail results are found as the following site
  http://www.rieti.go.jp/jp/projects/innovation-system/H15.html

Japanese system is changing?

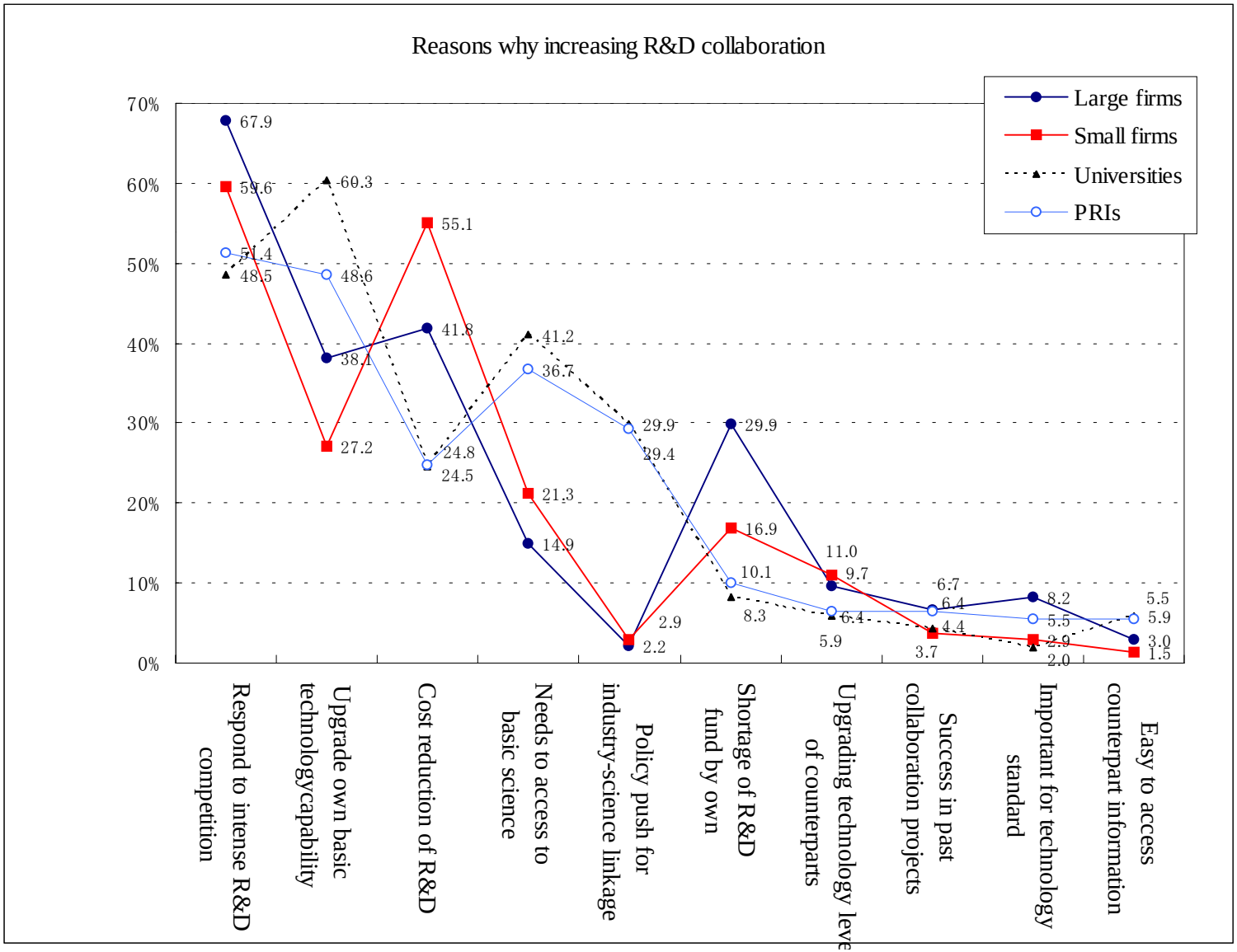
From RIETI survey



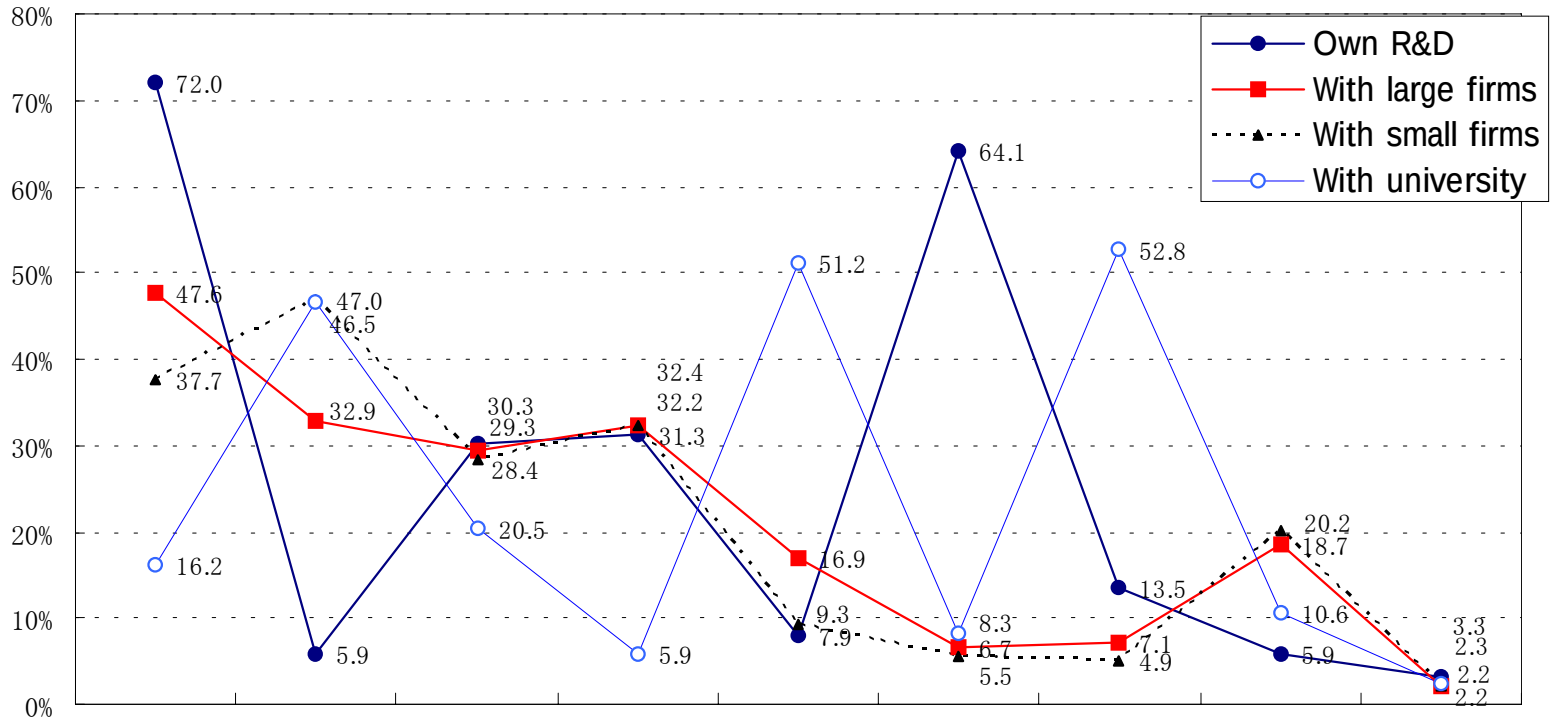




Factors behind R&D outsoucing



Management of firm's boundary in R&D



Motivation and underlining hypotheses for econometric analysis

- Factors behing external R&D collaboration
  - Intense innovation competition?
  - Increasing complexity of innovation and the role of scientific knowledge
  - Selection and concentration of R&D projects, but it needs wider technological scope
- UIC's impacts on research and production productivity: greater impact for small firms
  - Less Not-Invented-Here Syndrome
  - Focusing on more concrete project (short term benefit) and greater pressure for commercialization

Collaboration and R&D strategy

	large firms		SME and startups		Universities	
	SME	LF	SME	LF	SME	LF
Shorter development lead time		++				++
Focusing R&D theme				--		++
Reduce R&D cost					+	
Reduce R&D staffs						
Explore new technology seeds	+++					++
more R&D for application and development project					++	++
Improving basic technology capability			--			
Market needs for R&D						
Commercialization of tech seeds	++				++	+

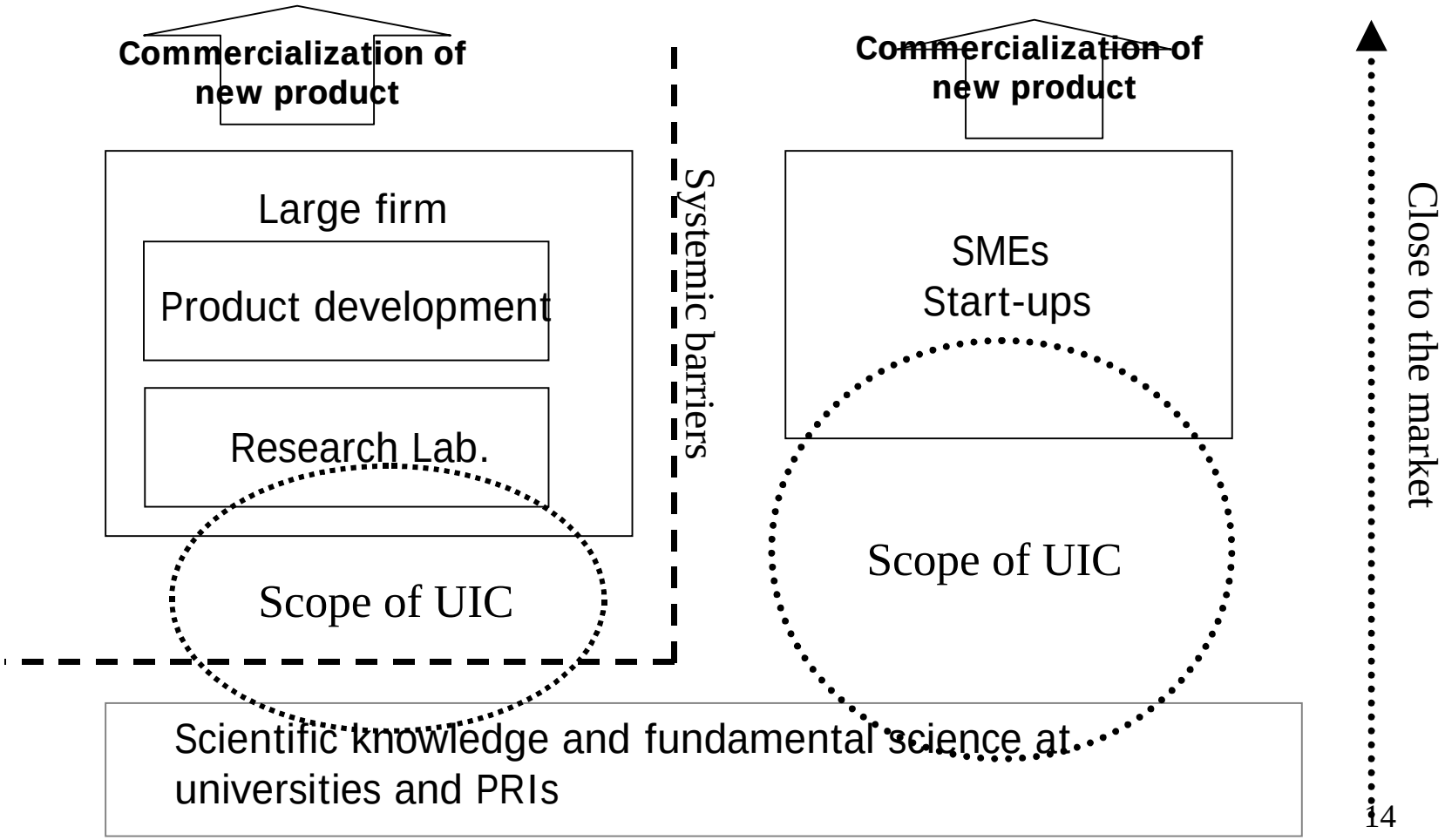
Research Productivity by Firm Age

	all	all	-1950	1951-70	1971-
	(1)	(2)	(4)	(5)	(6)
lrd	0.276	0.260	0.434	0.183	0.109
	(7.81)**	(7.19)**	(5.61)**	(3.05)**	(2.29)*
lemp	0.250	0.246	0.397	0.315	0.131
	(6.08)**	(5.41)**	(3.72)**	(3.30)**	(2.84)**
cord	-0.030	-0.056	-0.131	0.146	-0.169
	(0.23)	(0.45)	(0.53)	(0.67)	(1.06)
univ1	0.377	0.355	0.203	-0.077	0.348
	(3.21)**	(3.05)**	(0.95)	(0.33)	(2.09)*
lage		-2.402			
		(4.81)**			
lage2		0.360			
		(4.86)**			
Constant	-1.683	2.302	-4.257	-1.188	0.439
	(7.10)**	(2.57)*	(8.51)**	(2.83)**	(1.30)
Industry Dummies	yes	yes	yes	yes	yes
Observations	450	438	168	134	136
R-squared	0.62	0.64	0.77	0.55	0.49

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

Implications for J-NIS



Synthesis and policy implications

- Growing trend of R&D external collaboration
- Reflecting firms' R&D strategy for innovation speed and wider technological scope
- Research productivity is higher for young and small firms as compared to old and large firms
- The role of SMEs and start-ups for Japan's NIS reform toward network type system
- SMEs and start-ups: facilitates system's transformation. In addition, it may be beneficial for large firms to have strong high-tech startups
- Policies for facilitating network type NIS system are important, such as IPR, labor mobility, VC finance