How to Effectively Finance Innovations ?: A Comparative Study of Government Policies in Taiwan, Singapore, Malaysia and Thailand

Patarapong Intarakumnerd

GRIPS

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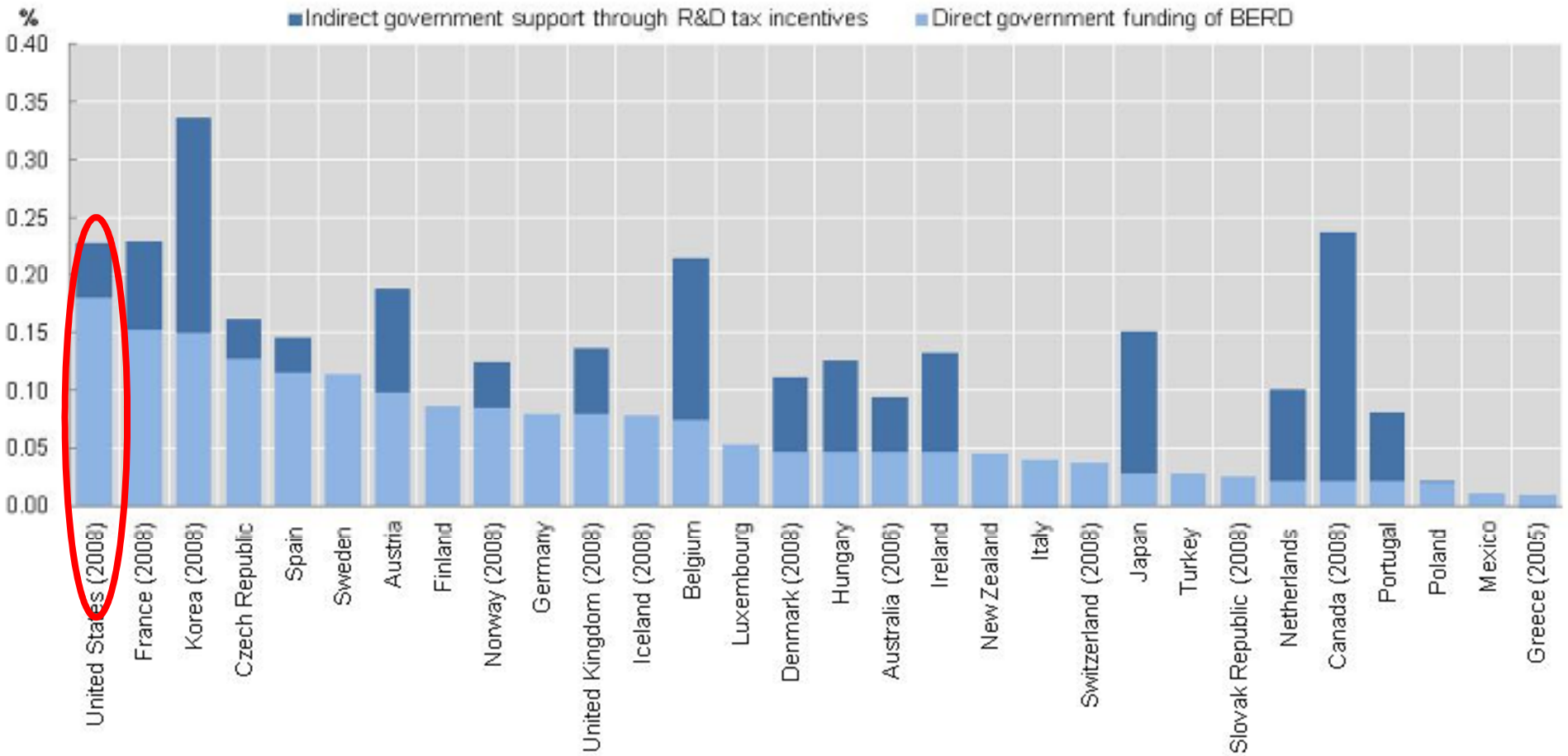
Types of Financing Innovation Measures

Measure	*Benefits*	*Possible constraints*
Tax concession	Non-discriminatory: open to all 'Arm's length' instrument: activities chosen by industry. Maintenance of firm confidentiality. Speedy processing (where approval 'automatic').	Of no benefit to unprofitable/start-up firms. Subsidise 'existing' activity that would have occurred anyway (unless based on incremental performance, which is hard to police).
Repayable loans	Can be targeted widely or for focused activities. Priorities or scope (type, timing, size) set by govt., specific proposals made by firms.	Less likely to subsidise activity that would have occurred any way Requirements against SMEs/startups (e.g. collateral) cumbersome & lengthy procedure.
Grants	For focused activities, sectors, clusters, type of firms. Priorities or scope set by govt Firms get investment money upfront: reducing risks & uncertainty	Criticism on fairness Government ability to 'select'
Equity participation	Similar to grants Increasing creditability of recipients	Criticism on fairness Government ability to 'select'

Direct and indirect government funding of business R&D and tax incentives for R&D

As percentage of GDP



Source: OECD (2010), *Measuring Innovation: A New Perspective*, OECD, Paris based on NESTI 2009 R&D tax incentives. questionnaire

An IDRC-sponsored Study on Comparing Financing Innovation in Thailand, Malaysia, Taiwan and Singapore

Objectives

- Assess the effectiveness of existing schemes and programs: direct equity financing, tax incentives, loans, grants, and capital market financing across four countries.
- Evaluate the institutional context underlying the successes and failures of these schemes.
- Develop policy recommendations for Thailand and Malaysia.

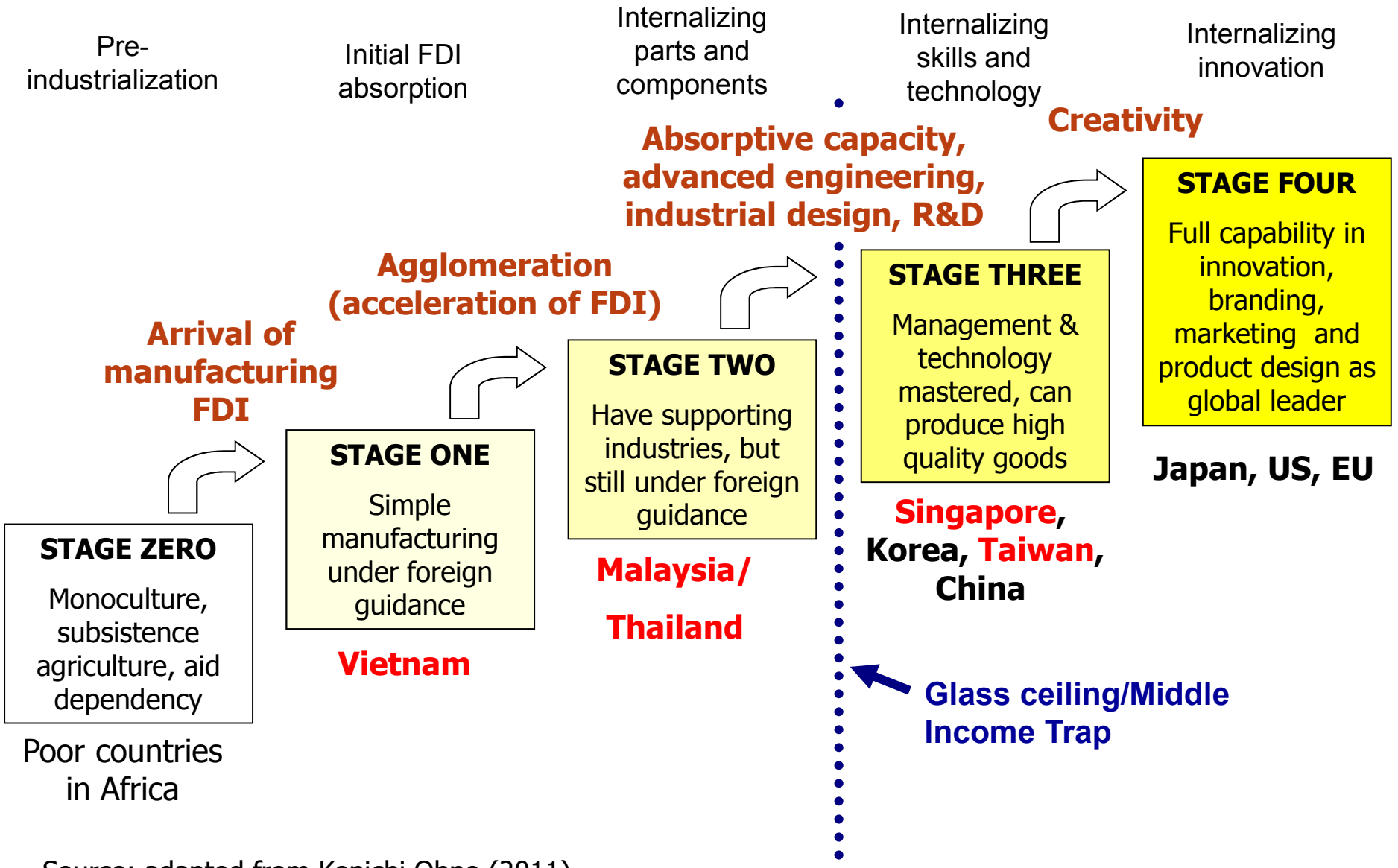
Methodology

- Four country studies of East Asian NIEs
- Two level of analysis
  - Macro level: Analysis of NIS and overview of financing innovation policies
  - Operating level: content, efficiency, effectiveness of schemes
- Coverage: taxes, grants, loans, direct equity financing, capital market financing
- Research methods: interviews+ secondary data

Team Members

- Dr. Patarapong Intarakumnerd (TU)
- Dr. Jarunee Wonglimpiyarat (TU)
- Prof. Morris Teubal, (International Advisor), Hebrew University of Jerusalem, Israel
- Prof. Poh-kam Wong (NUS)
- Dr. Annette Singh (NUS)
- Associate Prof. Dr. K. Thiruchelvam (UM)
- Dr. VGR Chandran (UM)
- Dr. Ng Boon Kwee (UM)
- Dr. Wong Chan Yuan (UM)
- Dr. Chee Kin Sam (UM)
- Dr. Meng-Chun Liu(CIER), Taiwan
- Dr. Fang-I Wen(CIER), Taiwan
- Dr. Tippawan Pinvanichkul (KMITT)
- Dr. Wuttigrai Ngamsirijit (NIDA)
- Dr. Poomporn Thamsatitdej (TU)

Stages of Catching-up Industrialization



Source: adapted from Kenichi Ohno (2011)

Key Economics and S&T Indicators

Country	GDP Per capita ($000s)	Researchers per million	GERD as % of GDP	% GERD by business sector	Scientific Papers/ year	US Patents/ year
Singapore	49.5	6,088	2.61	66.8	58,731	481
Taiwan	32.2	5,200	2.94	70.1	100,232	6,128
Malaysia	13.6	372	0.64	84.9	17,980	212
Thailand	8	311	0.25	40.9	26,896	28

National Innovation System: Four Countries

- Two groups of countries
  - High income, first-tier East Asian NIEs (Taiwan, Singapore)
  - Middle income, second-tier East Asian NIEs (Malaysia, Thailand)
- Strong & learning intensive NIS vs. weak & fragmented NIS
  - Taiwan: Learning Intensive SMEs & intermediary roles of RTOs, e.g. ITRI
  - Singapore: Leveraging TNCs with recent push on indigenous innovations
  - Malaysia & Thailand: stuck in middle income trap

Tax Incentives

	Thailand	Malaysia	Singapore	Taiwan
Year of Operation	**1996**	**1982**	**1960s**	**1991**
Type	on Expenditures	on Expenditures	on Expenditures	Tax credits
Coverage	R&D (strict definition), training, collaboration with universities	R&D, commercialization of R&D	pioneer activities, R&D, R&D hub (covering R&D *outside* Singapore), design, acquisition of IP and automation equipment	R&D, training, implementing certain technologies
Focus (sector, cluster, technology, type of firms)	General	General, specific (biotech, ICT, East Coast Development Region), and *firm-specific* (pre-package incentives)	- Pioneer Status (strategic activities/sectors) - Convertible to grants for startups	General and Specific (automation, energy saving, and pollution control, digital technologies)
Project-by-project approval	Yes	No	No	No

Tax Incentives (2)

	Thailand	Malaysia	Singapore	Taiwan
Effectiveness	Number of approved projects increased but still from limited number of firms.	Increase in number of projects but decline in number of apply firms	Increase in number of firms doing R&D in Singapore, especially TNCs	Number of approved tax deductions in NT$ has increased but no significant changes in number of applying firms. Increase in employment, GDP and net tax revenues

Grants

	Thailand	Malaysia	Singapore	Taiwan
Year of Operation	1990s	2000s (becoming holistic)	1970s	1980s
Significance Level	Not	Very	very	very
Coverage	R&D, prototyping, pilot scale	The whole spectrum (pre-R&D, R&D, commercialization, acquisition of other firms' IP)	Wide-ranging and evolving according to needs and capabilities of firms	Wide-ranging and evolving according to needs and capabilities of firms
Focus (sector, cluster, technology, type of firms)	General	both general and specific technologies, sectors, clusters, products	both general and specific (sectors, technologies, and types of firms)	Both general and specific (sectors, technologies, products)

Grants (2)

	Thailand	Malaysia	Singapore	Taiwan
Effectiveness	Too small to have critical success	Criticism of lengthy approval processes and duplication of schemes	Effective older policies e.g. LIUP project enhancing linkages between TNCs & local firms, but only moderate success with recent policy on promoting high-tech startups	Inducing substantial R&D investment from recipient firms, supporting creation of new industries/product. SMEs significantly benefited

Examples of Evolving Singapore's Grant Schemes

Phase 1: Industrial Take-off Phase (1965 to mid-1970s)

- Laying of foundation for subsequent NIS development through:
  - FDI promotion, establishing Singapore as a labor-intensive offshore manufacturing base
  - Development of HR capabilities
    - offering incentives to MNCs to send Singaporean engineers to headquarters to acquire new technical skills

Phase 2: Local Technological Deepening (mid-1970s to late-1980s)

- Inter-firm linkages between local suppliers and MNC buyers stimulated by **Local Industry Upgrading Programme** (LIUP)
- *Target group*: Local businesses providing products or services to MNCs

- *Aim for assistance*: Encouraging MNCs to transfer their technology know-how and HR expertise to local businesses

Assistance provided:

•EDB subsidizes a percentage of the salary of an MNC manager to work in the local business

•Amount of assistance determined on case-by-case basis.

•MNC employee generally works with the local supplier for 2 years

Phase 3: Applied R&D expansion (late-1980s to late-1990s)
Research Incentive Scheme for Companies (RISC)

Target group: Singapore-registered companies.

Use of assistance: Encouraging businesses to set up R&D centers in Singapore and to develop in-house R&D capabilities in strategic areas of technology. Project should:

- be a fairly long-term commitment by the company and result in measurable benefits to the Singapore economy
- result in significantly increased R&D spending, with intermediate milestones for verification

Assistance provided: 30%-50% of qualifying costs of the project. Grant is disbursed on a reimbursement basis

Phase 4: Shift Towards High-tech Entrepreneurship and Basic R&D (late-1990s onwards)

- Largely aimed at SMEs,
- Target different aspects needed to assist companies undertake innovation:
  - **Technology Innovation Programme (TIP) – Projects**: subsidizes 50-70% cost of innovation projects of companies and consortium
  - **TIP – Experts** and **Innovation Voucher Scheme** (IVS), increase SME access to expertise in universities and PRIs
  - **Technology Enterprise Commercialisation Scheme**, subsidize up to 100% of qualifying costs for the POC phase (maximum of $250,000); up to 85% of qualifying costs for POV phase (maximum of $500,000)

Impact of Selected Public Innovation Financing Programs in Singapore, as of 2010

Name of scheme	No. of projects/companies	Year program started
LIUP	>200 MNCs to procure from >1,000 local suppliers	1986
SIIRD	Supported 102 projects	1997
TIP – Projects	666 projects[1]	2006
TIP – Experts	92 scientists and researchers seconded to SMEs[1]	2006
TECS	70 companies	2008
POC (NRF)	51 projects awarded	
SEEDS	185 start-ups	2001
YES (Start-ups)	83 start-ups	2008
ESVF	4 investments	2008
TIS	11 investments	2009
TRD	9 inventions	2009

[1] As of 2009

Source: SPRING Annual Report 2009/10; SIIRD website; Budget Speech 2010; Tan 2010; Huang Limin (2011)

Loans

	Thailand	Malaysia	Singapore	Taiwan
Year of Operation	1990s	1970s	1970s	1980s
Level of Significance	significant	significant	not significant	significant
Coverage	Increasingly focused on R&D	The whole spectrum	evolving according to needs and capabilities of firms	Wide-ranging and evolving according to needs and capabilities of firms
Focus (sector, cluster, technology, type of firms)	Rather General	both general and specific technologies, sectors and activities	both general and specific activities	Both general and specific (sectors, technologies, activities)
Facilities supporting access to loans	SME credit guarantee	SME credit guarantee /SME credit rating agency	SME credit guarantee	SME credit guarantee

Loans (2)

	Thailand	Malaysia	Singapore	Taiwan
Effectiveness	Number of applications in some programs has dropped significantly	Applications increased significantly, especially from SMEs but 90% of recipient firms are Bumiputera	Not so significant compared to other types	Number of approved projects increased

Equity Financing (1)

	Thailand	Malaysia	Singapore	Taiwan
Year of equity financing operation	**1987**	**1984**	**1983**	**1983**
Stages of VC investment	Expansion /mezzanine	Growth /expansion	Early/growth/ expansion	Early/growth/ expansion
Specialized funds to support innovative firms through VCs	SME VC Fund, MAI Matching Fund	MTDC, MAVCAP	TRIDENT Platform	Development Fund and SME Development Fund
Sector of VC investment	Food and drinks, machinery and equipment, household furnishings, wood products, costumes	Manufacturing, information and communications technology, biotechnology	ICT, Biotechnology, medicine, genetic engineering, software and technology enabled business services	Optoelectronics, biotechnology, electronics

Equity Financing (2)

	Thailand	Malaysia	Singapore	Taiwan
Business angel financing	No formal network	Infancy stage	Has formal network (SPRING)	Has formal network (TWBAN)
Government's Direct Equity Financing	None	None	Several schemes both by government alone and co-invest with private VC	Very large government funds (Development Fund and SME Development Fund)
Formal VC Association	Thai Venture Capital Association (TVCA) 1994	Malaysia Venture Capital Association (MVCA) 1995	Singapore Venture Capital and Private Equity Association (SVCA) 1992	Taiwan Private Equity and Venture Capital Association (TVCA) 1999

Equity Financing (3)

	Thailand	Malaysia	Singapore	Taiwan
Effectiveness	Low uptake in government VCs; private VCs are risk averse; fund of funds initiative failed because of not enough demand. Lack of mentoring services	Helped to sustain private-sector R&D but not yet effective in creating new startups	Surveys show moderate success of new programs but the overall number of high-tech startups increased significantly, especially in the past few years	Helped to increase high-tech startups but not so significantly as only 28% of VC funds went to early stages

Capital Market

	Thailand	Malaysia	Singapore	Taiwan
Main stock markets	SET	Bursa Malaysia (MYX) and OTC market	Singapore Stock Exchange (SGX), Catalist	TWSE and GTSM
Stock market for technology-based firms	No MAI is for *all* SMEs	Yes (MESDAQ or ACE)	Yes (SESDAQ or Catalist)	Yes (TWSE and OTC)
Major sector of listing securities	Production, consulting, trading, services	Finance, plantation, properties, consumer, mining, construction	Electronics, financial, ICT training	Electronic parts, components, semiconductor, optoelectronics, computer and peripheral equipment
Listing platform to support technology-based firms	No particular rules for technology-based firms	flexible listing rules to support firms in all sectors	particular listing rules for fast growing local and international companies	flexible listing rules for technology-based firms

Capital Market (2)

	Thailand	Malaysia	Singapore	Taiwan
Effectiveness	No significant impact in terms of increasing number of 'innovative' SMEs	No significant increase in listing of innovative firms	Number of listed companies has increased rather significantly in recent years.	Number of listed companies has increased rather significantly in recent years.

Institutions underlying Policy Process

	Thailand	Malaysia	Singapore	Taiwan
Unity and Capability of Government Bureaucracy	Fragmented, MOST not an economic ministry, MOI has little role in technology development	Fragmented & overlapping (MOST vs. METI)	Several capable agencies (ASTAR, EDB, SPRING), using cabinet effectively	Under one strong agency (MOEA)
Perception of Roles of Government in Strengthening Private Firms	Limited to HR & infrastructure (neoclassical economics and linear model of innovation)	To solve both market and systemic failures; strong 'selective' intervention	To solve both market and systemic failures; strong 'selective' intervention	To solve both market and systemic failures; strong 'selective' intervention
Corruption and Attitudes on Corruption	Strong concerns preventing grants/public equity participation, and 'selective' policies	Some concerns but grants/public equity participation, and 'selective' policies were implemented	Not a significant factor as grants/public equity participation, and 'selective' policies were normal practices	Not a significant factor as grants/public equity participation, and 'selective' policies were normal practices

Institutions underlying Policy Process (2)

	Thailand	Malaysia	Singapore	Taiwan
Laws, Regulations and Norms	'Public money must be recovered' attitude preventing grants/public equity participation in risky 'innovation'	No similar concept on public money, but Bhumiputra policies have adverse impacts	No similar concept on public money	No similar concept on public money
Entrepreneurship	Many 'necessity-based' entrepreneurs but few 'opportunity-based' or Schumpeterian ones. Positive changes for younger generation	Similar situation to Thailand	Initially low but increased substantially by recent government policies	Many high-tech startups especially in ICT
Trust	Limited inter-firm collaboration & university-industry links	Limited inter-firm collaboration & university-industry links	Strengthened by government initiatives (LIUP, entrepreneurial universities)	Strengthened by intermediaries like RTOs (e.g. ITRI)

General Conclusion

- Singapore and Taiwan, the first-tier East Asian NIEs, have been more successful in formulating and implementing government financing innovation schemes as compared to Malaysia and Thailand, the second-tier East Asian NIEs.

- Between Malaysia and Thailand, Malaysia performed better.

- in the more successful countries, Singapore and Taiwan, there are co-evolutions of innovation financing policy instruments and levels of technological and innovative capabilities of firms.
- Key success factors:
  - higher level of flexibility and policy coordination and learning,
  - greater variety of policy instruments and
  - Higher level of 'selectivity' to the particular needs of industrial sectors, clusters, technologies, types of firms or even individual firm demands

- Developing technological and innovative capabilities of firms takes a long. The amount, duration and continuity of government supporting schemes are quite crucial.
- Policy makers must have a deep understanding of what constitute innovations and innovation systems, and how they evolve overtime

- Innovation financing policies require other corresponding policy initiatives to make them work successfully e.g. producing qualified human resources, attracting foreign talent, and helping organizations to work together

- Institutional factors do shape the choices and effective implementation of these policies. Vice versa, policy initiatives can change institutions

Thank you very much