Innovation and government intervention: A comparison of Singapore and Hong Kong

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ABSTRACT

Government is one of the determinants for innovation capacity although its role and degree of involvement in innovation is debatable. Government intervention can be vital in supporting R&D and innovation as market alone cannot provide adequate incentives for knowledge production. Degrees of government intervention, however, vary in different economies and range from directive intervention by actively advising industrial policy and investing in selected areas, to facilitative intervention by creating positive environment and providing public goods for industry. This study uses Singapore and Hong Kong as two cases to explore the influence of government intervention on innovation performance. Singapore is known for strong government intervention while Hong Kong is famous for its positive non-intervention policy that minimizes the power of government in influencing the market. The comparison shows that innovation activities in Singapore are largely policy driven and dominated by big players, while in Hong Kong industry innovation is less active but the local industry has a dynamic innovation base contributed by small firms. Using a difference-in-differences analysis of USPTO patents filed by Singapore and Hong Kong, we find evidence for the effectiveness of government intervention on enhancing the technological significance and scope of innovation. The findings could shed light on the implication of government involvement in innovation.

1. Introduction

Government is one of the determinants for innovation capacity according to the National Innovation System theory (Nelson, 1993) and the Triple Helix theory (Etzkowitz and Leydesdorff, 2000). While it is generally agreed that a capable government is important, how government should function is still debatable, especially the role it should play and the way it could get involved in innovation. The debate has been going on for decades with no consensus in sight, partly due to the difficulties in assessing the impact of government intervention on innovation performance given the presence of various confounding factors. The study intends to move the discussion forward by using Singapore and Hong Kong as two cases for comparison and probe the relationship between government intervention and innovation performance. Singapore is known for high level of government intervention in various aspects of society (Mok, 2005). By contrast, Hong Kong adopts a "positive non-intervention" policy that favors free economy and minimizes the power of government in influencing the market. They represent two streams of the views on the role of the government and are perfect examples for illustration. The comparison of innovation activities and performance could shed light on the implication of government involvement in innovation.

2. Role of the government

The debate over the ideal role of government in economy seems to be polarized between neoliberalism favoring market-led development and statism favoring government intervention (Yeung, 2000). The free market neo-classical theory argues that the state should refrain from intervening in the market and let Adam Smith's invisible hand solve economic problems. Government interventions will distort the market and lead to deadweight loss because of inefficient resource allocation and possible corruption. By contrast, state-centered theory argues that the state should play a more strategic role in "taming market forces and harnessing them to a national economic interest" (White and Wade, 1988). The economic success in Asian Newly Industrialized Countries (NICs) is often cited as evidence of the contribution of direct state intervention (Appelbaum et al., 1992; Wade, 1990). In the arena of innovation policy, the market failure concept is also applied to justify government support for science and technology (Arrow, 1962; Nelson, 1959). It is argued that the market alone fails to provide enough incentives for knowledge production. The knowledge inappropriability and uncertainty in obtaining returns for long-term commitment often lead to firms' under-investment in R&D, which calls for impetus from the public sector (Martin and Scott, 2000). In addition, the

Table 1

R&D activities in the business sector in 2012.

Source: Data are compiled by the author (ASTAR, 2013; C&SD, 2014, 2015a,2015b; DOS 2015).

Industry	HK			SG		
	GDP (in USD)	R&D expenditure (in USD)	R&D exp/GDP	GDP (in USD)	R&D expenditure (in USD)	R&D exp/GDP
Manufacturing	$3.9B (1.5%)	$43.5 M (5.1%)	1.1%	$55.2B (19.4%)	$2,214.8 M (60.2%)	4.0%
Import/export, wholesale and retail trades, accommodation and food services	$7.6B (29%)	$321.2 M (37.7%)	0.4%	$60.3B (21.2%)	$448.8 M (12.2%)	0.7%
Information and communications service	$9.1B (3.5%)	$265.0 M (31.1%)	2.9%	$11.1B (3.9%)	$125.1 M (3.4%)	1.1%
Financing, insurance, real estate, professional services	$7.2B (27.4%)	$170.0 M (19.9%)	0.2%	$74.5B (26.2%)	$853.5 M (23.2%)	1.1%
Others	$100.8B (38.6%)	$52.8 M (6.2%)	0.1%	$83.3B (29.3%)	$36.8 M (1.0%)	0.0%
Total	$261.2 B (100%)	$852 M (100.0%)	0.3%	$284.4 B (100%)	$3679 M (100%)	1.3%

development of some technology involves high cost that is beyond the financial and technical capability of most private firms and requires government assistance (Link and Siegel, 2007). By contrast, critics of market failure theory argue that there is no clear cut standard to identify market failure and assess when the government should intervene (Demsetz, 1969). The cost of corrective government action may be higher than the potential gains. In addition, it is warned that bureaucrats are less capable to identify opportunities and pick the winners if they are not familiar with the industry. Government allocating resources to selectively support some industries and enterprises is likely to put other industries and enterprises at a disadvantage (Joseph and Johnston 1985).

Along with the debate, other suggestions were made to lay aside the dichotomy of markets and states. Instead, there should be multiple forms and organizations of economy, where state intervention is only a matter of degree (Yeung, 2000). Most government intervention takes on two types: directive intervention – which aims to achieve predetermined results by making changes in investment and production patterns in selected industries; and facilitative intervention – which aims at creating positive environments for private enterprises by providing public goods such as infrastructure and education (Luedde-Neurath, 1988). The directive government participates in picking winners as they believe some industries and products are more important than others and therefore strategically concentrate capital in these industries. For example, in promoting high tech economy, government provides R&D funding, sets up public research facilities, and assists transfer of the result to private sectors. The facilitative government attempts to promote innovation by constructing institutions conducive to fostering a healthy culture and by aiming policies at overcoming obstacles to private investment in innovation instead of directly influencing the innovation behavior through highly interventionist measures (Sharif and Baark, 2009).

Despite the ample discussions on the role of government, empirical studies testing the relationship between the level of government intervention and innovation are still scarce. Existing studies are generally focused on particular policy instruments ranging from fiscal interventions such as R&D subsidies, R&D contracts, tax incentives and public procurement, to non-fiscal intervention such as infrastructure, professional service, and regulations. The most studied instrument is direct R&D subsidy and tax credit (Aerts et al., 2004; Almus and Czarnitzki, 2003; David et al., 2000; Hall and van Reenen, 2000; Martin and Scott, 2000) as it is easily quantifiable and is expected to have the most straightforward contribution to the output. Scholars have also looked into other innovative outputs such as patents, new products or process, and sales of new products, or long term outcomes on firm performance, such as sales, employment, productivity and profitability (Chudnovsky et al., 2006). However, very few studies have taken government intervention as a whole and assessed its overall impact on innovation, which is difficult because of the complexity of national innovation system, the variance across regions in the country, and the mixed roles of government at different levels. Singapore and Hong Kong, both being

city economies with a single government and no regional disparity, make them ideal cases for the purpose to examine the overarching impact of government intervention. Therefore, this study intends to fill in the gap in the literature by exploring the relationship between the level of government intervention and innovation performance.

3. Methodology and data

The study uses Singapore and Hong Kong as two cases to compare the role of government and innovation. Singapore and Hong Kong are often compared with each other due to their similarities in history, size, population, the lack of natural resources, as well as their economic performance and competitiveness (Young, 1992). However, the differences in these two city-states are also noticeable, one of which is the role of the government. Singapore is well known for its strong government and long history of government intervention in economy. The government has directed the economic upgrade from labor intensive industry to technology intensive industry. In the recent decade, the government is actively promoting R&D and innovation activities and tries to transform Singapore into an innovation-led economy. By contrast, Hong Kong is known for the laissez-faire capitalism with the characteristics of non-interventionism and later positive non-interventionism. The government keeps a low public budget and has a limited role in the market. While Hong Kong also intends to stimulate innovation by setting up innovation fund, the effort is rather small in both scope and scale. For example, the Singapore government provided US$2.3 billion (S$2.7 billion) for R&D in 2012, accounting for 0.8% of GDP (Table 1.6 in ASTAR, 2013).[1] In the same year, the Hong Kong government financed US$0.9 billion (HK$ 6.8 billion) for R&D, which was only 0.3% of GDP (C&SD 2013; Chart 1.1). Given the similarities and differences, Singapore and Hong Kong are interesting cases for comparison.

The two cases are compared using two approaches. The first approach is to profile the innovation activities in these two regions, including innovation output, research areas, and innovation performers. The second approach uses a natural experiment design and takes the local industry in Singapore as a focal point to analyze the impact of government intervention, with foreign companies and Hong Kong as counterfactuals. The pre- and post-intervention comparison of the local industry performance in Singapore is only valid when compared with the foreign industry (less influenced by the intervention) and the industry in Hong Kong (with minimal government intervention). As elaborated below, the national strategy of development moves from relying on MNCs in the 1980s, to encouraging R&D activities starting

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[1] The currency Singapore Dollar was converted to US Dollar based on the Foreign Exchange Rates in the respective years published by the Monetary Authority of Singapore (http://www.federalreserve.gov/releases/h10/hist/). The currency Hong Kong Dollar was converted to US Dollar based on the fixed exchange rate of US$1 = HK$7.8 as published by the Hong Kong Monetary Authority (http://www.hkma.gov.hk/eng/key-functions/monetary-stability/history-hong-kongs-exchange-rate-system.shtml).