

## Growth Slowdown Analysis for Greater China Economies

Tan Khee Giap<sup>1</sup>, Lian Xiao,<sup>2</sup> & Xie Teleixi<sup>3</sup>

### Abstract

The purpose of this paper to investigate empirically the determinants of growth slowdown in Greater China provinces at different levels of development. Much of the existing literature dealing with the question of whether China is or will be stuck in a middle-income trap has largely focused on the country as a whole. Given China's regional diversity and variation in terms of Gross Regional Domestic Product (GRDP) per capita, it is more appropriate to understand the dynamics of growth slowdown in the Greater China region at the sub-national and provincial level, which is what we do in this paper. We use income group-specific logistic regression models as well as Bayesian Model Averaging (BMA) techniques to examine the impact of various determinants on the probability of a sub-national economy in the Greater China region experiencing a growth slowdown.

**Key words:** China; Middle-Income Trap; Growth Slowdown; Bayesian Model Averaging; Logistic Regression.

**JEL Codes:** C11, O11, O43

### 1. Background and Motivation

Since the reform and opening up of China in the late 1970s, China has experienced stable and rapid economic growth, with the country experiencing an annual average Gross Domestic Product (GDP) growth rate of 9.8% between 1978 and 2014.<sup>4</sup> During the corresponding period, China's GDP per capita increased from US\$195 to US\$3,863 in constant 2005 US dollars.<sup>5</sup> In 2014, China ranked second (out of 175 countries) in terms of nominal GDP and 73<sup>rd</sup> (out of 178 countries) in terms of nominal GDP per capita.<sup>6</sup> This spectacular growth performance has enabled China to transition to the upper-middle-income status in 2011 (Zhuang *et al.*, 2012).

Notwithstanding the fact that China has witnessed an impressive economic growth phase in the past three decades or so, policy-makers, and scholars alike have expressed their concerns about the sustainability of such growth in the long-term. The growth momentum of China appears to have tapered off in the years following the 2008 Global Financial Crisis (GFC). In the five-year period between from 2010 to 2014, China's annual growth in GDP has slowed down, from 10.6% in 2010 to under 8.0% in 2012 and eventually slipping down to 7.3% in 2014, the slowest since the 1990s.<sup>7</sup> It is quite likely that this declining trend in GDP growth will persist in the near future.

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<sup>4</sup> The average annual growth rate of GDP for China for the period 1978 to 2014 is calculated based on data from the World Bank.

<sup>5</sup> GDP per capita denoted in 2005 US\$ for the period, 1978 to 2014 is obtained from the World Bank.

<sup>6</sup> Based on GDP and GDP per capita data in current US\$ obtained from the World Bank.

<sup>7</sup> Based on data from the World Bank.

In fact, the Chinese leaders have accepted that China has now entered into the “New Normal Era”, which will be characterized by slower but sustainable, quality growth for several decades to come, according to President Xi Jinping and Premier Li Keqiang (Associated Press, 2014 and Li, 2015). After the fifth plenary session of the 18<sup>th</sup> Communist Party of China Central Committee which outlined the 13<sup>th</sup> Five-Year Plan (2016-2020) for China’s national development, President Xi Jinping explained that China needed to grow at 6.5% annually in order to “build a moderately prosperous society” by 2020 (J. Zhang 2015). However, if the deceleration in GDP growth continues in the next five to 10 years, to under 5% or even lower, China will face a tangible risk of falling into the middle-income trap where the “New Normal” can become “abnormal” and stagnation in per capita income may derail further economic development (Zheng 2015).

With a rapidly ageing population and an urbanizing economy that is in many ways still underdeveloped, there are serious challenges China has to overcome if it wants to maintain a steadfast pace of development in order to avoid falling into the middle-income trap. Some of the pressing challenges confronting the country include the troika of investment, consumption, and exports, the main drivers of economic growth for China. In terms of investment, China has been witnessing significant declines in foreign direct investment as well as government-led infrastructure development. In addition, domestic demand contributed to less than 40% of GDP in China during the last decade.<sup>8</sup> Meanwhile, household consumption is still not a leading driver of growth and it may not be able to assume that role in the near future either.

In terms of export-oriented external demand, the appreciation of the Renminbi against the US dollar by about 32% in the past decade (2005-2015)<sup>9</sup> has put pressure on the growth of foreign demand for goods made in China, while rising labor costs may further erode the competitiveness of Chinese goods in the international market. Another potential challenge to the stable development of China’s economy is the real estate sector. Residential housing prices have been appreciating too rapidly in speculative attempt to reflect the rapid rate of growth of the whole economy. This may engender financial bubbles in such assets, which, if left unchecked, could burst in a manner that is able to derail national economic development.

The issue of whether China can successfully avoid the middle-income trap and continue its development has serious ramifications. If the trap is successfully avoided, it will raise the standard of living for close to 1.4 billion people. Furthermore, as China is a major driver of regional and global growth, a slowdown in China will likely have impact on economic activities elsewhere in the world, especially in the rest of Asia which China has close economic ties with. It is thus timely for us to assess the growth prospects of the Greater China economies.

Much of the current literature focusing on whether or not China is in a middle-income trap and if it would be able to successfully transition into a high-income economy has largely focused on China as a whole. For instance, Eichengreen *et al.*, (2012) predict that China as a whole has over a 70% chance of undergoing a slowdown. However, given China’s regional diversity and variation in terms of Gross Regional Domestic Product (GRDP) per capita, it is more appropriate if one analyses the possibility of growth slowdown in the country at the sub-national level.

In this context, our paper studies growth slowdown for the Greater China economies at the provincial level against the backdrop of other Asian developing economies including the Association of South East Asian Nations (ASEAN) economies and the sub-national economies of India and Indonesia.<sup>10</sup> We are interested in episodes of growth reversals after the economy has experienced relatively fast growth and investigate factors which make these episodes more likely to occur at different levels of development. The findings from this analysis allow us to compute predictive probabilities of experiencing growth slowdown in the near future for each Greater China economy. The rest of this paper is organized as follows. Section 2 reviews the existing literature on middle-income traps and growth slowdown in general and those specific to Greater China economies. Section 3 presents some stylized facts about the economic growth landscape of Greater China economies over the period 1990-2014.

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<sup>8</sup> The data for household final consumption expenditure as a percentage of GDP for China are available from the World Bank, which shows a declining trend in the household consumption to GDP ratio from about 47% in 2000 to about 34% in 2013.

<sup>9</sup> The appreciation of the Renminbi against the US dollar over the last 10 years from 2005 to 2015 is calculated to be around 32.4% by the authors using data from Google Finance.

<sup>10</sup> The sub-national economies of India refer to the Indian states and union territories while the Indonesia sub-national economies refer to the provinces of Indonesia.

Section 4 describes our methodological approach employed in this paper while Section 5 details the data sources used. Section 6 documents the main empirical findings of this paper and Section 7 concludes.

## 2. Literature Review: Middle-Income Trap and Growth Slowdown

The concept of middle-income trap is relatively new. The term was introduced by Gill and Kharas in 2006 and has become increasingly popular over the past decade (Gill and Kharas, 2015). It draws attention to the phenomenon that certain economies which have attained middle-income status for an extended period of time have not caught up with the high-income economies. However, there is no consensus in the literature on whether such a trap exists. Some authors argue that they do (Aiyar *et al.*, 2013) while others dispute their existence (Im and Rosenblatt, 2013; Bulman *et al.*, 2014). More recently, Ye and Robertson (2016) conclude that if middle-income traps exist, they are not very common. In fact, much remains to be clarified about the concept. As Gill and Kharas (2015) have noted, different authors define “middle-income traps” differently.

Despite the lack of consensus about the definition and existence of middle-income traps, policy-makers are concerned about them nonetheless. Thus, a rich body of research about the causes of the traps and factors which help an economy overcome or avoid such traps has emerged. In particular, Cai (2016) highlights the “comparative advantage vacuum” of middle-income economies: middle-income economies are short of capital and technology as compared to high-income economies while at the same time facing higher labor costs than low-income economies. Huang (2016) for instance points out that the real challenge for an economy after reaching the middle-income level is to continuously encourage the development of new competitive industries and companies.

With regard to China specifically, Huang (2016) draws attention to the diminishing demographic dividend and ageing population as key challenges which may compound the problem of rising labor costs. Liu (2015) shows that the contribution of total factor productivity to China’s growth has significantly declined since 2008 and argues that capital investment-driven growth is not sustainable. Improving productivity growth is thus crucial for China to escape the middle-income trap. This appears to be a recurring theme in many papers (See for example Zhuang *et al.*, 2012; Cai, 2016; and Wu, 2014). Besides sustaining productivity growth, the literature on China has also highlighted other key policy areas of concern. Zhuang *et al.*, (2012) for instance suggest that Chinese policy-makers should focus on encouraging innovation, moving-up the value chain, deepening structural reforms and maintaining macroeconomic and financial stability. A similar emphasis is placed by Huang (2016) who highlights that China must focus on enhancing research capacity and human capital, while also drawing attention to the need for reforming the financial system and construct new legal and political institutions.

In this paper, we do not wade into the debate on the existence of the middle-income trap. Rather, we investigate the growth paths of economies at all levels of development and identify factors which make growth slowdown more likely at these different levels. Our research effort is therefore in line with the growing literature on growth dynamics which has emerged in the wake of Pritchett (2000). Specifically, the papers related to study include Eichengreen *et al.*, (2012), Eichengreen *et al.*, (2013), Aiyar *et al.*, (2013) which focus on growth slowdown in middle-income economies and Zhang and Puy (2015) which analyzes growth slowdown in low-income economies. In comparison to these studies, we believe that our paper is more comprehensive as we analyze economies at all levels of development, including low-, lower-middle-, upper-middle- and high-income economies.

In addition, one of the key contributions of our paper to this literature is that we make an effort to understand the growth dynamics of the Greater China economies by combining data of Hong Kong and Taiwan with the provincial data for the mainland China provinces. To date, Wu (2014), which employs China’s regional data is the closest empirical study on middle-income trap with the most granular data, similar to ours. However, we not only undertake this empirical investigation at the provincial level but also analyze the phenomenon of growth slowdown by moving beyond just focusing on middle-income trap. It is useful to reiterate here that the other papers reviewed in this section, and in fact, most of the existing empirical growth literature, treat China in its entirety without accounting for the diversity within Greater China. As Section 3 will demonstrate, economies in Greater China are significantly different in terms of their stages of development, as captured for instance by the variations in their GRDP per capita. As a result, they are likely to face dissimilar growth problems and challenges, which need to be probed carefully.

### 3. Economic Growth Landscape of the Greater China Economies: Stylized Facts

Before delving into the growth slowdown analysis, it is important to track the development progress of the Greater China economies so that we can understand the differences in their current levels of development. In this paper, we distinguish the economies' development levels by classifying them into four different income groups: low, lower-middle, upper-middle and high-income. The classification criteria we adopt are based on the economy's GRDP per capita as measured in 1990 Purchasing Power Parity dollar (PPP\$). Details about how we obtain GRDP per capita in 1990 PPP\$ data for the Greater China economies and the income classification methodology are discussed in Section 4.1 and Section 4.2 respectively.

Tables 1 and 2 show the GRDP per capita (in 1990 PPP\$) for all Greater China economies during periods 1990-2000 and 2001-2014, respectively. For ease of reference, the GRDP per capita for all economies are color-coded with red representing economies in the low-income group; yellow for lower-middle-income economies; green for upper-middle-income economies; and blue for high-income economies.

**Table 1: Gross Regional Domestic Product (GRDP) per capita for Greater China Economies (in 1990 PPP\$), 1990-2000**

Economy	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Anhui	1,015	922	975	1,044	1,061	1,315	1,313	1,384	1,394	1,478	1,596
Beijing	4,038	4,381	4,570	4,731	4,873	5,265	5,411	6,050	6,467	7,245	7,767
Chongqing	1,934	2,006	2,189	2,402	2,638	1,634	1,657	1,793	1,775	1,839	2,106
Fujian	1,506	1,611	1,789	2,100	2,473	2,827	2,901	3,160	3,247	3,500	3,699
Gansu	943	950	975	942	913	999	1,115	1,149	1,194	1,279	1,403
Guangdong	2,151	2,353	2,664	3,117	3,306	3,774	3,739	3,983	4,048	4,326	4,161
Guangxi	923	960	1,049	1,166	1,277	1,440	1,409	1,417	1,386	1,422	1,467
Guizhou	697	714	718	727	726	792	775	807	795	859	919
Hainan	1,353	1,431	1,915	2,205	2,235	2,192	2,022	1,999	1,990	2,127	2,237
Hebei	1,274	1,379	1,447	1,585	1,639	1,934	2,028	2,189	2,196	2,320	2,532
Heilongjiang	1,767	1,841	1,889	1,954	2,092	2,350	2,421	2,569	2,492	2,570	2,774
Henan	946	955	1,026	1,102	1,176	1,435	1,509	1,579	1,568	1,636	1,784
Hong Kong	17,219	17,999	18,869	19,688	20,421	20,376	20,692	21,399	19,990	20,321	21,682
Hubei	1,327	1,326	1,385	1,392	1,424	1,596	1,634	1,757	1,787	1,849	2,104
Hunan	1,064	1,074	1,119	1,171	1,243	1,457	1,505	1,592	1,577	1,673	1,813
Inner Mongolia	1,293	1,318	1,357	1,430	1,472	1,639	1,689	1,791	1,825	1,985	2,174
Jiangsu	1,833	1,872	2,195	2,554	2,766	3,187	3,216	3,376	3,398	3,628	3,912
Jiangxi	985	993	1,039	1,082	1,130	1,258	1,308	1,398	1,391	1,489	1,618
Jilin	1,500	1,478	1,565	1,669	1,744	1,917	1,965	2,013	2,022	2,140	2,438
Liaoning	2,346	2,407	2,605	2,953	2,898	2,982	2,921	3,127	3,165	3,400	3,739
Macau	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ningxia	1,208	1,197	1,213	1,253	1,294	1,492	1,483	1,531	1,546	1,657	1,784
Qinghai	1,367	1,324	1,348	1,394	1,398	1,524	1,437	1,477	1,489	1,596	1,709
Shaanxi	1,068	1,115	1,109	1,169	1,154	1,289	1,307	1,380	1,375	1,497	1,659
Shandong	1,558	1,691	1,812	1,903	2,122	2,486	2,564	2,688	2,693	2,868	3,105
Shanghai	5,119	5,338	5,884	6,685	7,028	7,716	7,937	8,525	8,801	9,661	9,936
Shanxi	1,297	1,274	1,314	1,341	1,300	1,528	1,583	1,697	1,722	1,769	1,905
Sichuan	837	865	880	919	988	1,282	1,301	1,389	1,387	1,451	1,580
Taiwan	9,938	10,610	11,304	11,950	12,731	13,418	14,050	14,696	15,069	15,843	16,628
Tianjin	3,080	3,017	3,173	3,447	3,752	4,322	4,506	4,793	4,869	5,321	5,697
Tibet	1,093	1,081	1,037	957	933	1,021	1,014	1,125	1,231	1,407	1,530
Xinjiang	1,497	1,729	1,807	1,832	1,943	2,143	2,031	2,186	2,148	2,229	2,471
Yunnan	1,060	1,095	1,147	1,197	1,196	1,338	1,430	1,479	1,498	1,541	1,589
Zhejiang	1,901	2,075	2,307	2,680	2,998	3,598	3,672	3,816	3,843	4,136	4,397

■ Low-Income ( $Y_t < \$2,000$ )

■ Lower-Middle-Income ( $\$2,000 \leq Y_t < \$7,250$ )

■ High-Income ( $\$11,750 \leq Y_t$ )

■ Not Available

■ Upper-Middle-Income ( $\$7,250 \leq Y_t < \$11,750$ )

**Note:**  $Y_t$  denotes GRDP per capita (in 1990 PPP\$) of an economy in year  $t$ .

**Source:** Authors' calculation based on data obtained from the National Bureau of Statistics of China database, various provincial statistical yearbooks, the World Bank World Development Indicators and the Total Economy Database, May 2015 version.

**Table 2: Gross Regional Domestic Product (GRDP) per capita for Greater China Economies (in 1990 PPP\$), 2001-2014**

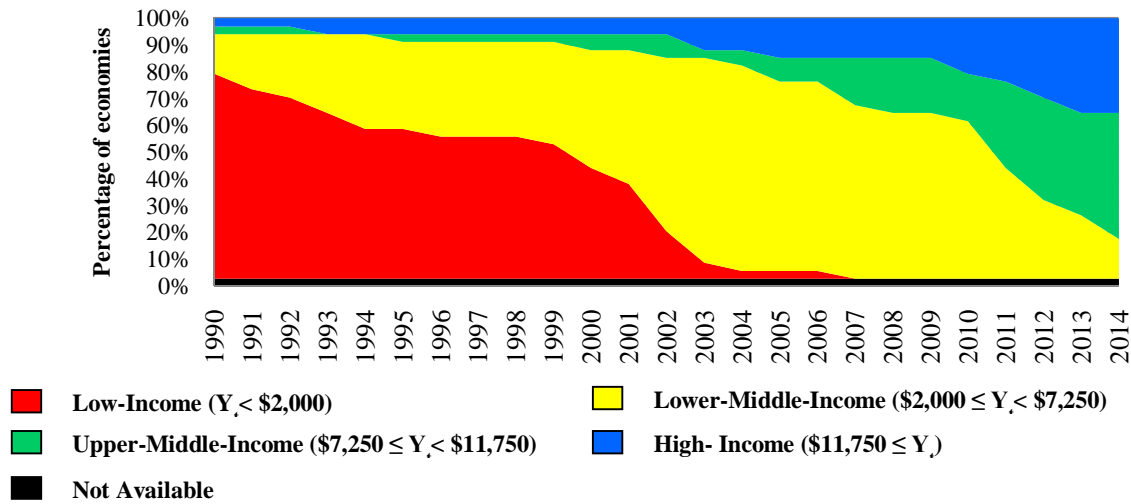
Economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anhui	1,778	1,969	2,232	2,507	2,760	3,040	3,391	3,771	4,293	5,063	5,775	6,321	6,862	7,322
Beijing	8,984	10,424	12,061	13,259	14,307	15,409	16,558	16,402	17,089	17,555	18,133	19,003	20,145	21,175
Chongqing	2,345	2,728	3,198	3,565	3,913	4,229	4,680	5,333	5,974	6,704	7,726	8,519	9,261	10,189
Fujian	3,967	4,418	4,991	5,359	5,818	6,429	7,216	7,773	8,730	9,739	10,634	11,559	12,468	13,502
Gansu	1,497	1,673	1,935	2,180	2,399	2,717	2,991	3,244	3,468	3,928	4,411	4,820	5,276	5,636
Guangdong	4,626	5,249	6,200	6,794	7,746	8,557	9,271	9,721	10,194	10,755	11,410	11,846	12,630	13,504
Guangxi	1,597	1,799	2,037	2,304	2,699	3,056	3,442	3,810	4,179	5,066	5,684	6,122	6,589	7,043
Guizhou	1,001	1,114	1,293	1,410	1,697	1,926	2,238	2,588	2,893	3,228	3,703	4,325	4,969	5,633
Hainan	2,442	2,751	3,087	3,288	3,503	3,874	4,183	4,600	5,008	5,798	6,480	7,079	7,639	8,282
Hebei	2,763	3,072	3,586	4,085	4,614	5,052	5,524	5,987	6,409	6,918	7,627	8,018	8,346	8,512
Heilongjiang	2,985	3,279	3,730	4,084	4,557	4,938	5,236	5,681	5,870	6,602	7,392	7,853	8,110	8,382
Henan	1,943	2,158	2,492	2,888	3,564	4,000	4,520	4,994	5,371	5,992	6,462	6,920	7,359	7,910
Hong Kong	21,611	21,822	22,368	24,133	25,705	27,311	28,875	29,352	28,621	30,599	32,068	32,521	33,311	33,938
Hubei	2,301	2,553	2,935	3,244	3,644	4,066	4,616	5,184	5,927	6,803	7,681	8,467	9,199	10,052
Hunan	1,949	2,153	2,453	2,764	3,292	3,684	4,186	4,733	5,332	5,957	6,717	7,338	7,918	8,577
Inner Mongolia	2,415	2,799	3,511	4,170	5,131	6,222	7,453	9,085	10,364	11,523	13,033	14,025	14,572	15,154
Jiangsu	4,312	4,923	5,851	6,544	7,739	8,630	9,495	10,431	11,539	12,847	14,005	15,009	16,195	17,468
Jiangxi	1,744	1,995	2,315	2,647	2,971	3,376	3,742	4,141	4,518	5,169	5,874	6,322	6,857	7,388
Jilin	2,644	2,991	3,453	3,781	4,208	4,771	5,456	6,143	6,948	7,700	8,661	9,547	10,204	10,715
Liaoning	4,027	4,464	5,000	5,191	6,019	6,620	7,321	8,279	9,166	10,296	11,423	12,449	13,338	13,927
Macau	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ningxia	2,011	2,267	2,693	2,997	3,245	3,652	4,247	5,091	5,663	6,514	7,411	7,957	8,480	8,881
Qinghai	1,926	2,214	2,563	2,837	3,159	3,596	4,071	4,805	5,077	5,854	6,625	7,267	7,900	8,432
Shaanxi	1,847	2,115	2,472	2,831	3,366	3,897	4,376	5,142	5,733	6,615	7,530	8,469	9,264	10,011
Shandong	3,413	3,889	4,642	5,369	6,270	7,149	7,756	8,585	9,362	9,970	10,603	11,356	12,210	12,969
Shanghai	10,482	11,521	13,294	14,435	15,448	16,359	17,060	17,175	17,807	18,190	18,424	18,647	19,440	20,747
Shanxi	2,081	2,426	3,022	3,514	3,981	4,393	5,004	5,605	5,616	6,283	7,045	7,376	7,507	7,472
Sichuan	1,769	2,003	2,288	2,587	2,839	3,233	3,663	4,047	4,522	5,213	5,884	6,500	7,005	7,489
Taiwan	16,238	17,001	17,547	18,564	19,367	20,340	21,470	21,554	21,092	23,300	24,197	24,437	24,967	25,834
Tianjin	6,414	7,342	8,943	9,968	11,823	12,616	13,277	14,932	16,021	17,330	18,798	20,066	21,111	22,140
Tibet	1,769	2,078	2,387	2,619	2,805	3,100	3,330	3,534	3,900	4,128	4,504	5,005	5,625	6,186
Xinjiang	2,668	2,910	3,421	3,692	4,091	4,514	4,740	5,130	5,181	6,073	6,741	7,391	8,025	8,612
Yunnan	1,674	1,835	2,049	2,290	2,457	2,703	2,980	3,274	3,530	3,831	4,326	4,866	5,432	5,807
Zhejiang	4,895	5,761	7,008	7,761	8,488	9,418	10,253	10,762	11,397	12,421	13,327	13,918	14,777	15,573

<span style="color: red;">■</span> Low-Income ( $Y_t < \$2,000$ )	<span style="background-color: yellow;">■</span> Lower-Middle-Income ( $\$2,000 \leq Y_t < \$7,250$ )
<span style="background-color: lightgreen;">■</span> Upper-Middle-Income ( $\$7,250 \leq Y_t < \$11,750$ )	<span style="background-color: lightblue;">■</span> High-Income ( $\$11,750 \leq Y_t$ )
<span style="background-color: black;">■</span> Not Available	

**Source:** Authors' calculation based on data obtained from the National Bureau of Statistics of China database, various provincial statistical yearbooks, the World Bank World Development Indicators and the Total Economy Database, May 2015 version; See Table 1 for other notes.

After nearly three decades of market-oriented economic reforms undertaken by China since 1978, there is no Greater China economy remaining in the low-income group by 2007 according to the GRDP per capita thresholds that we adopt (see Table 2). All Greater China economies are either in the lower-middle-income, upper-middle-income or high-income group. China's remarkable growth performance with more than 680 million people lifted out of extreme poverty is reflected in Figure 1, where the proportion of low-income economies in Greater China declined from 78.8% in 1990 to a startling 0% in 2007. Most of the transition from low-income to lower-middle-income group has occurred between 1999 and 2003, where a steep decline in the red shaded area is observed in Figure 1. Only two economies remained in the low-income group by 2003 which were Gansu and Guizhou, in contrast to 17 economies in 1999. Guizhou was the last economy which graduated from low-income in 2007.

**Figure 1: Area Chart for Distribution of Greater China Economies by Income Categories, 1990-2014**

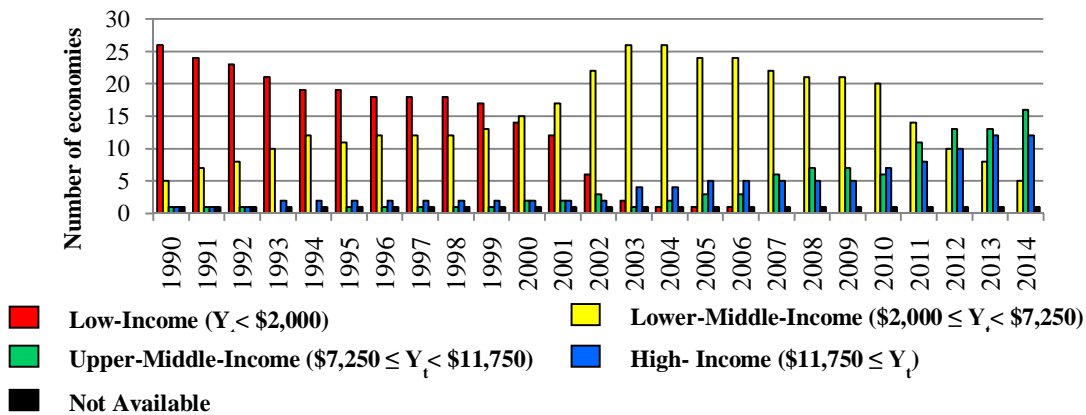


**Note:**  $Y_t$  denotes GRDP per capita (in 1990 PPP\$) of an economy in year  $t$ .

**Source:** Authors' calculation based on data obtained from the National Bureau of Statistics of China database, various provincial statistical yearbooks, the World Bank World Development Indicators and the Total Economy Database, May 2015 version.

As economies have moved from the low-income to lower-middle-income group, we observe a peak in the number of economies within the lower-middle-income group in 2003 and 2004. As illustrated in Figure 2, this number subsequently dwindled from 26 in 2004 to merely five in 2014 with most of the graduation from lower-middle-income to upper-middle-income group happening during the 2010-2014 period. By 2014, the five lower-middle-income economies were all in Western China, namely Gansu, Guangxi, Guizhou, Tibet and Yunnan, implying the development gap between Western and other parts of China. Meanwhile, the number of economies in the upper-middle-income group has increased steadily throughout the years, as depicted by the rising green bar in Figure 2. In 1990, only one economy (i.e. Taiwan) was in the upper-middle-income group, but by 2014, nearly half of the Greater China economies (16 economies) were in this group. Of the 16 economies which are in the upper-middle-income group, two are from Eastern Coastal Area in China, six each from Central and Western China, and two from North-eastern China.

**Figure 2: Bar Chart for Distribution of Greater China Economies by Income Categories, 1990-2014**



**Note:** See note to Figure 1.

**Source:** Authors' calculation based on data obtained from the National Bureau of Statistics of China database, various provincial statistical yearbooks, the World Bank World Development Indicators and the Total Economy Database, May 2015 version.

Hong Kong has achieved high-income status even before 1990 while Taiwan became one in 1993. The first two mainland China economies which have graduated into the high-income group are Beijing and Shanghai in 2003. Since then, the number of economies in high-income has risen gradually, which is linked to rapid globalization as China joined the World Trade Organization (WTO) in 2002, becoming the factory of the world. By 2014, there were altogether 12 Greater China economies in the high-income group, namely Beijing, Fujian, Guangdong, Hong Kong, Inner Mongolia, Jiangsu, Liaoning, Shandong, Shanghai, Taiwan, Tianjin and Zhejiang. Among the mainland China economies which have attained high-income status by 2014, about 80% are located in Eastern China. It is unsurprising that the Eastern region performs better than the rest in terms of GRDP per capita because in addition to its stronger investment capacity and more favorable investment climate, it was the first region that enjoyed a series of preferential policy treatments and resource support from other regions during the early years of reform and opening up.

Most Greater China economies experienced only upward movement when they transition from one income group to another during the period of 1990-2014. The only two exceptions were Chongqing and Hainan, where the economies fluctuated between the low-income group and lower-middle-income group during the 1990s. Their GRDP per capita have subsequently increased steadily as they moved from lower-middle-income group to upper-middle-income group. For the rest of the Greater China economies, most of them made two transitions during the study period with the most common movement being from the low-income group to the lower-middle-income group and then finally to the upper-middle-income group. We have witnessed a handful of economies which have experienced astonishing growth in GRDP per capita where they moved across four income groups over the short span of 25 years. The economies that moved from low-income to join the high-income league during the 1990-2014 periods are Fujian, Inner Mongolia, Jiangsu, Shandong and Zhejiang.

Table 3 lists the compound annual growth rate of GRDP per capita (in 1990 PPP\$) for Greater China economies over different periods. Between 1990 and 2014, Inner Mongolia achieved the highest growth rate of 10.8% while Hong Kong recorded the lowest growth rate of 2.8%. Though in general economies in Eastern China enjoyed higher GRDP per capita as compared to other regions and are members of the high-income league, Central and Western China are catching up. On average, economies in Central and Western regions have grown at promising annual rates of 8.7% and 8.5%, respectively in contrast to the Eastern region of 8.4%.

**Table 3: Compound Annual Growth Rate of Gross Regional Domestic Product (GRDP) per capita (in 1990 PPP\$) for Greater China Economies over Different Periods**

Economy	Compound Annual Growth Rate of GRDP per capita (in 1990 PPP\$) for the Period 1990-2014	Compound Annual Growth Rate of GRDP per capita (in 1990 PPP\$) for the Period 2005-2009	Compound Annual Growth Rate of GRDP per capita (in 1990 PPP\$) for the Period 2010-2014
Anhui	8.6%	11.7%	9.7%
Beijing	7.2%	4.5%	4.8%
Chongqing	7.2%	11.2%	11.0%
Fujian	9.6%	10.7%	8.5%
Gansu	7.7%	9.7%	9.4%
Guangdong	8.0%	7.1%	5.9%
Guangxi	8.8%	11.6%	8.6%
Guizhou	9.10%	14.3%	14.9%
Hainan	7.8%	9.3%	9.3%
Hebei	8.2%	8.6%	5.3%
Heilongjiang	6.7%	6.5%	6.2%
Henan	9.3%	10.8%	7.2%
Hong Kong	2.9%	2.7%	2.6%
Hubei	8.8%	12.9%	10.3%
Hunan	9.1%	12.8%	9.5%
Inner Mongolia	10.8%	19.2%	7.1%
Jiangsu	9.9%	10.5%	8.0%
Jiangxi	8.8%	11.1%	9.3%
Jilin	8.5%	13.4%	8.6%
Liaoning	7.7%	11.1%	7.8%
Ningxia	8.7%	14.9%	8.1%
Qinghai	7.9%	12.6%	9.6%
Shaanxi	9.8%	14.2%	10.9%
Shandong	9.2%	10.6%	6.8%
Shanghai	6.0%	3.6%	3.3%
Shanxi	7.6%	9.0%	4.4%
Sichuan	9.6%	12.3%	9.5%
Taiwan	4.1%	2.2%	2.6%
Tianjin	8.6%	7.9%	6.3%
Tibet	7.5%	8.6%	10.6%
Xinjiang	7.6%	6.1%	9.1%
Yunnan	7.3%	9.5%	11.0%
Zhejiang	9.2%	7.7%	5.8%

**Source:** Authors' calculation based on data obtained from the National Bureau of Statistics of China database, various provincial statistical yearbooks, the World Bank World Development Indicators and the Total Economy Database, May 2015 version.

As discussed in Section 1, China's economy has been slowing down as it rebalances away from an export-led growth model since 2010. The last two columns of Table 3 compare the five-year period compound annual growth rate of GRDP per capita (in 1990 PPP\$) for Greater China economies before and after 2010 (i.e. for the periods 2005-2009 and 2010-2014). We notice that out of the 31 mainland China economies, only five have higher growth rates in the second period (i.e. 2010-2014), including Beijing, Guizhou, Tibet, Xinjiang, and Yunnan. On average, the rest of the economies have experienced a decrease in growth by 2.9%. Among others, Inner Mongolia has particularly caught our attention as its growth rate declined at an alarming difference of 12.1% over the two periods. This fall in growth rate of GRDP per capita for most economies seems to be in line with the modest macroeconomic outlook as described in Section 1.



## 4. Methodology<sup>11</sup>

### 4.1. Obtaining GRDP per capita in 1990 PPP\$

As stated above, GRDP per capita of all economies in our study are measured in 1990 PPP\$. With regard to the Greater China economies, Hong Kong and Taiwan data can be obtained from existing data sources (see Section 5). However, there is no database which compiles GRDP per capita in 1990 PPP\$ for the mainland China provinces. In addition, there is no readily available conversion factor for 1990 PPP\$. Thus, we adopt the following approach to obtain the required data.

First, GRDP data in current prices of local currency are collected and divided by the corresponding population data. The resultant nominal GRDP per capita in local currency is then converted to constant 1990 PPP\$ by multiplying them with a year-specific conversion factor, which is calculated as follows.

$$\text{Conversion factor in year } t = \frac{\text{National GDP per capita in 1990 PPP\$ in year } t}{\text{National GDP per capita in current prices of local currency unit in year } t'}$$

The numerator of the conversion factor is obtained from the Total Economy Database, May 2015 version while the denominator is collected from the World Bank, World Development Indicators. All mainland China provinces share a common conversion factor for each year. By doing so, we assume that the ratio of GRDP per capita expressed in 1990 PPP\$ to that of in the current prices of local current unit for a province is the same as that for the national level. We also apply the method outlined above to obtain GRDP per capita in 1990 PPP\$ data for the Indian and Indonesian sub-national economies. These data are reported in Tan *et al.*, (2016b; 2016c).

### 4.2. Income Thresholds Classification

In order to classify the economies into different income groups, we adopt the classification criteria based on absolute level of GRDP per capita in 1990 PPP\$ as proposed by Felipe (2012). The classification thresholds are outlined in Table 4 and are held constant over time. Felipe (2012) develops the thresholds using the World Bank's Gross National Income per capita thresholds as benchmarks. As such, each income group classified according to Felipe (2012)'s approach is likely to retain the same underlying information (both income and non-income measures of well-being) encapsulated in the corresponding World Bank's income category.

**Table 4: Income Classification Thresholds Adopted**

Income Group	Classification Thresholds
Low-income	GRDP per capita < PPP\$ 2,000
Lower-middle-income	PPP\$ 2,000 ≤ GRDP per capita < PPP\$ 7,250
Upper-middle-income	PPP\$ 7,250 ≤ GRDP per capita < PPP\$ 11,750
High-income	GRDP per capita ≥ PPP\$ 11,750

Source: Author's compilation.

### 4.3. Identification of Growth Slowdown

Following Eichengreen *et al.*, (2012) and Hausmann *et al.*, (2005), we define an episode as a growth slowdown, if growth has hitherto been fast but slowed non-negligibly. Formally, a slowdown is identified when conditions (1) and (2) below are fulfilled along with one of the conditions (3), depending on which income group the economy is in at time  $t$ :

$$\begin{aligned}
 g_{t,t-n} &\geq 0.035 && (1) \\
 g_{t,t-n} - g_{t,t+n} &\geq 0.02 && (2) \\
 y_t &< \text{PPP\$ } 2,000 && (3a) \\
 \text{PPP\$ } 2,000 &\leq y_t < \text{PPP\$ } 7,250 && (3b) \\
 y_t &\geq \text{PPP\$ } 7,250 && (3c)
 \end{aligned}$$

<sup>11</sup> Sections 4.2 to 4.5 draw on Tan *et al.* (2016a).

where  $y_t$  is the GDP per capita in 1990 PPP\$ in year  $t$  while  $g_{t,t-n}$  and  $g_{t,t+n}$  are the least square growth rate of the GDP per capita from year  $t - n$  to  $t$  and the least square growth rate of the GDP per capita from year  $t$  to  $t + n$ , respectively. Mathematically,  $g_{t,t-n}$  takes the following form:

$$\ln(y_{t-n+i}) = a + \ln(1 + g_{t,t-n}) * i, \text{ where } i = 0, 1, \dots, n$$

In this paper, we set  $n = 5$ . Due to the structure of conditions (1) and (2), growth slowdown cannot be identified for the first and last five years of the study period. As our regression analysis for growth slowdown covers the period 1993-2013, slowdown episodes between 1998 and 2008 are identified. In any particular year  $t$ , we assign the value 1 to economies for which a slowdown episode is identified, and 0 for the economies within same income group but do not experience slowdown. In this way, we create income group-specific dummy variables representing the occurrence of growth slowdown or the lack thereof. Generally, economies in our sample can shift across different income groups, resulting in year-specific observations in respective income groups over the entire study period.

#### 4.4. Regression Analysis on Determinants of Growth Slowdown

We specify income group-specific logistic regression models using the slowdown dummy created as the dependent variable to examine the impact of various determinants on the probability of an economy experiencing growth slowdown. We specify three distinct models: one for the low-income economies, one for the lower-middle-income economies and one for the combined group of upper-middle-income and high-income economies. Observations in the upper-middle-income and high-income group are pooled because of data constraints whereby we do not have enough observations to run separate regressions for these two income groups. Repressors in our models include GRDP per capita (in 1990 PPP\$) as a control variable and measures for demographic, infrastructure, human capital, macroeconomic conditions and exogenous factors. When conducting the logistic regressions, we also pool all the observations of the same income group from economies in ASEAN, Greater China, India, and Indonesia together.<sup>12</sup> We also employ the Bayesian Model Averaging (BMA) techniques for the combined group of upper-middle-income and high-income economies to address model uncertainty problems. The procedure of BMA and the rationale for it are discussed in more detail in Tan *et al.* (2016a).

#### 4.5. Predictive Probability of an Economy Falling into a Slowdown

Based on the income group-specific models which link the probability of growth slowdown with the various determinants, we can compute the predictive probability of a particular economy experiencing growth slowdown in the near future by applying the relevant estimated logistic regression coefficients to the latest available data for that economy. As  $n = 5$  and the latest year with available data for all determinants is 2012, we are able to generate predictive probabilities reflecting the likelihood of growth slowdown during the 2012-2017 period.

Economies with higher probabilities can be interpreted as facing greater risk of growth slowdown over these years. In contrast, low predictive probability does not necessarily imply a bright prospect for the economy, as it can reflect either one of the two following scenarios: the economy is indeed a fast growing economy with a sustainable growth momentum, or the economy's growth rate is low to begin with and therefore fails to satisfy condition (1) in Section 4.3.

### 5. Data Sources

Our dataset for the regression analysis covers 107 economies, containing nine ASEAN countries, 33 Greater China economies, 32 sub-national economies of India and 33 sub-national economies of Indonesia, and spans the 1993-2013 period.<sup>13</sup>

<sup>12</sup> A review of literature indicates that this approach of combining observations for economies from different geographical regions when running regressions to identify determinants of growth slowdown is common. Aiyar *et al.* (2013) combines annual data of 138 countries while Eichengreen *et al.* (2012) is based on a single regression conducted on annual data of countries with GDP per capita that are greater than \$10,000 in 2005 PPP\$.

<sup>13</sup> The nine ASEAN economies included in our study are Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. Brunei's data are unavailable. The 32 sub-national economies of India include all states and union territories of India except Dadra & Nagar Haveli, Daman & Diu and Lakshadweep. Andhra Pradesh and Telangana are treated as a single economy using the name Andhra Pradesh. The 33 sub-national economies of Indonesia refer to all the provinces of

The 33 Greater China economies covered in our study are the 31 mainland China provinces, Hong Kong and Taiwan as Macau data are unavailable. GRDP per capita in 1990 PPP\$ data for Hong Kong and Taiwan are obtained directly from the Total Economy Database, May 2015 version. GRDP per capita for the sub-national economies of mainland China, India and Indonesia are obtained following the method outlined in Section 4.1. For the ASEAN economies, GDP per capita in 1990 PPP\$ is calculated by dividing GDP in 1990 PPP\$ data from the Total Economy Database, May 2015 version and Maddison (2010) to total population statistics reported by the World Bank. Appendix Table 1 provides a comprehensive list of all potential independent variables we consider and the respective details on their data sources.

## **6. Empirical findings**

### **6.1. Determinants of Growth slowdown**

The income group-specific growth slowdown models we obtain are similar to those presented in Tan *et al.* (2016a). For the purpose of this paper, we note that for low-income economies, the occurrence of growth slowdown is positively associated with GRDP per capita and negatively associated with literacy rate, foreign direct investment (FDI) as a percentage of GRDP and length of roads per capita.

Meanwhile, for lower-middle-income economies, growth slowdown is positively associated with GRDP per capita and old dependency ratio while it is negatively associated with literacy rate, FDI and employment in tertiary industry (as a percentage of total employment). Finally, the risk of growth slowdown for the combined group of upper-middle-income and high-income economies is positively associated with GRDP per capita and negatively associated with literacy rate, employment in tertiary industry, openness to trade and secondary industry value-added per worker. As discussed in Section 3, all Greater China economies have graduated from the low-income group by 2007. Thus, the slowdown models of interest for policy-makers in Greater China are those pertaining to the lower-middle-income group and the combined group of upper-middle-income and high-income economies.

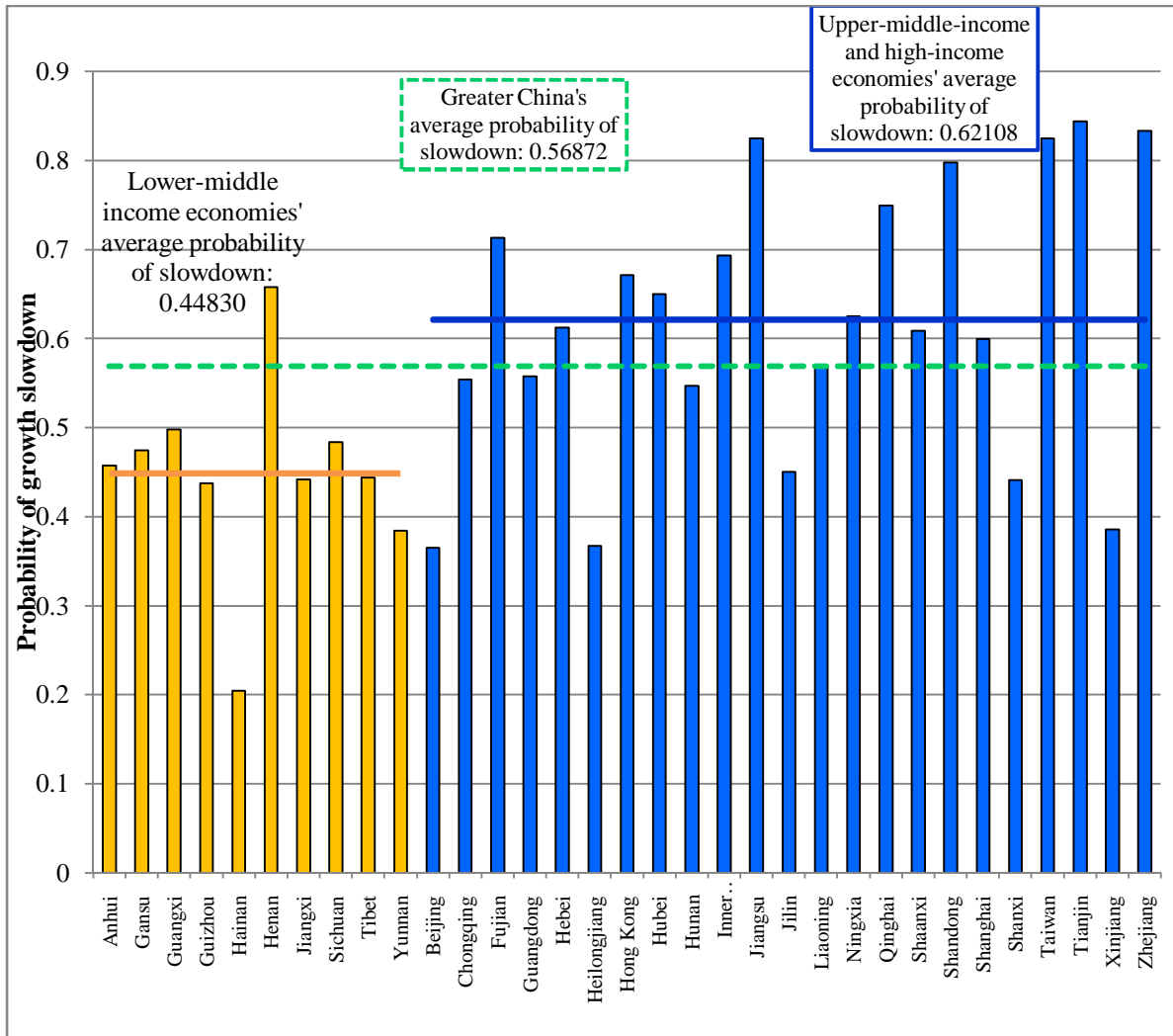
### **6.2. Predictive Probabilities of Growth Slowdown**

By 2012, there are 10 lower-middle-income economies, 13 upper-middle-income economies and 10 high-income economies in Greater China. Figure 3 gives a sober outlook on the near-future prospects of the Greater China economies.

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Indonesia. Kalimantan Utara and Kalimantan Timur are treated as a single economy using the name Kalimantan Timur because of data constraints. For more details, see (Tan *et al.* 2016a; 2016b; 2016c).

**Figure 3: Bar Chart Showing Predictive Probabilities of Growth Slowdown for Greater China Economies for the Period 2012-2017 (Based on Income-Group Specific Logistic Models)**



**Notes:** (i) Averages reported are simple averages. (ii) Predictive probability for Macau is not generated. This is because Macau's GRDP per capita in 1990 PPP\$ is not available throughout the study period.

**Source:** Authors' calculation.

The average predictive probability of growth slowdown is 0.57, indicating that on average, Greater China economies have a 57% chance of experiencing a growth slowdown in the 2012-2017 period. The average probability for the lower-middle-income an economy is 0.45 while the average probability for the combined group of upper-middle-income and high-income economies are higher at 0.62. Tianjin is the most likely to slow down as its predictive probability is 0.84.

The specific predictive probability for each Greater China economy is displayed in Table 5. Among the lower-middle-income economies, Hainan has the lowest probability of slowdown in the period 2012-2017 at 0.20 while Henan's probability at 0.66 is the highest. Henan is also the only lower-middle-income economy with more than even odds of experiencing growth slowdown. Meanwhile, among the upper-middle-income and high-income economies, Tianjin is the most at risk as indicated by its probability while Beijing has the lowest predictive probability at 0.36. However, it is a source of concern that there are a total of 19 out of 23 upper-middle-income and higher-income economies whose probabilities of slowdown are greater than 0.5.

**Table 5: Predictive Probabilities of Growth Slowdown for Greater China Economies for the Period 2012-2017 (Based on Income-Group Specific Logistic Models)**

Economy	Income Group Which Economy Belongs to in 2012	Probability of Experiencing Growth Slowdown during 2012-2017
Anhui	Lower-Middle-Income	0.45725
Beijing	High-Income	0.36496
Chongqing	Upper-Middle-Income	0.55397
Fujian	Upper-Middle-Income	0.71353
Gansu	Lower-Middle-Income	0.47441
Guangdong	High-Income	0.55792
Guangxi	Lower-Middle-Income	0.49824
Guizhou	Lower-Middle-Income	0.43732
Hainan	Lower-Middle-Income	0.20427
Hebei	Upper-Middle-Income	0.61215
Heilongjiang	Upper-Middle-Income	0.36684
Henan	Lower-Middle-Income	0.65772
Hong Kong	High-Income	0.67176
Hubei	Upper-Middle-Income	0.65030
Hunan	Upper-Middle-Income	0.54672
Inner Mongolia	High-Income	0.69361
Jiangsu	High-Income	0.82471
Jiangxi	Lower-Middle-Income	0.44164
Jilin	Upper-Middle-Income	0.45034
Liaoning	High-Income	0.56794
Ningxia	Upper-Middle-Income	0.62526
Qinghai	Upper-Middle-Income	0.74988
Shaanxi	Upper-Middle-Income	0.60882
Shandong	Upper-Middle-Income	0.79765
Shanghai	High-Income	0.59953
Shanxi	Upper-Middle-Income	0.44111
Sichuan	Lower-Middle-Income	0.48405
Taiwan	High-Income	0.82490
Tianjin	High-Income	0.84396
Tibet	Lower-Middle-Income	0.44361
Xinjiang	Upper-Middle-Income	0.38547
Yunnan	Lower-Middle-Income	0.38452
Zhejiang	High-Income	0.83346

**Note:** Predictive probability for Macau is not generated. This is because Macau's GRDP per capita in 1990 PPP\$ is not available throughout the study period.

**Source:** Author's calculation.

The prospects of the Greater China economies appear even more worrying as we compare them to economies in ASEAN, India and Indonesia. The average predictive probabilities for ASEAN, India and Indonesia are 0.21, 0.43 and 0.10 respectively (Tan *et al.*, 2016a; 2016b; 2016c) which are all lower than the average probability for Greater China. Thus, Greater China economies are more at risk of experiencing growth slowdown than other developing Asian economies in our study. More tellingly, Greater China upper-middle-income and high-income economies are also more vulnerable than their counterparts in ASEAN, India and Indonesia as they have the highest average predictive probability of slowdown.<sup>14</sup>

<sup>14</sup> The average predictive probability for Greater China upper-middle-income and high-income economies is 0.62108. In comparison, the average probabilities for upper-middle-income and high-income economies in ASEAN, India and Indonesia are 0.32362, 0.61294 and 0.22144 respectively (Tan *et al.*, 2016a; 2016b; 2016c).

The probability of a growth slowdown may be partially attributed to the ongoing readjustment of the growth strategy in mainland China from investment-driven to consumption-driven growth. However, the risk also arises from weaknesses of the Greater China economies in terms of the determinants of growth slowdown as identified in our models.

## 7. Concluding Remarks

The Chinese government has realized the pressing need to avoid the middle-income trap by improving the quality of economic growth to be more inclusive and sustainable. The ten objectives of the 13<sup>th</sup> Five-Year Plan (2016-2020) which include “maintaining economic growth, transforming patterns of economic development, optimizing the industrial structure, promoting innovation-driven development, accelerating agricultural modernization, reforming institutional mechanisms, promoting coordinated development, strengthening ecological construction, safeguarding and improving people’s livelihoods and promoting pro-poor development” have been set out with this final goal of achieving quality economic growth in mind (Lou 2015).

In this context, our research has focused on studying the issue of growth slowdown in China at the disaggregated provincial level rather than that at the macro level. In addition to the mainland China provinces, Hong Kong and Taiwan experiencing a growth slowdown are also investigated empirically. Even though the GRDP per capita levels for the Greater China economies have steadily increased over time since 1990, significant regional disparity still exists across the various economies within Greater China. Based on the income thresholds classification we adopted, there were 12 Greater China economies in the high-income group by 2014, among which most were from the Eastern Coastal area of China. Conversely, five economies from Western China still remained in the lower-middle-income group, namely Gansu, Guangxi, Guizhou, Tibet and Yunnan. The rest of the 16 economies have attained upper-middle-income status as of 2014.

By conducting logistic regression analysis as well as employing BMA techniques, we find that growth slowdown in various income groups tend to be associated with different sets of determinants. Lower-middle-income economies are more likely to experience growth slowdown when they have higher level of GRDP per capita, lower FDI, higher old dependency ratio, lower employment in tertiary industry and lower literacy rate. On the other hand, growth slowdown in the combined group of upper-middle-income and high-income economies is associated with high GRDP per Capita, low openness to trade, low literacy rate, low employment in tertiary industry, and low secondary industry value-added per worker.

Having identified the underlying drivers of growth slowdown in each income group, we assess whether each Greater China economy is prone to experience growth deceleration. Overall, we discover that Greater China economies have a 57% chance of experiencing growth slowdown in the 2012-2017 period on average. Greater China economies are more vulnerable than their counterparts in ASEAN, India and Indonesia as they have the highest average predictive probability of slowdown. Among the Greater China economies, Tianjin is the most likely to slow down.

The determinants of slowdown identified in our model provide at least a prima facie evidence on how development policy can be shaped. Local policy-makers in Greater China economies can benchmark their economies’ performances in these aspects vis-à-vis other economies of the same income group so as to assess the economy’s relative strengths and weaknesses. Our results thus provide a basis for policy-makers to identify areas for policy intervention and to craft appropriate policies to combat the risk of growth slowdown in future.

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**Appendix Table 1: Unit and Data Sources for Independent Variables**

No.	Independent Variables	Unit	Data Sources for Economies in the Region			
			ASEAN	Greater China	India	Indonesia
1	Total Dependency Ratio	Percentage	<ul style="list-style-type: none"> <li>• Abbas <i>et al.</i> (2010)</li> <li>• Barro &amp; Lee (2013)</li> <li>• Bluedorn <i>et al.</i> (2013)</li> <li>• Centre for Research on the Epidemiology of Disaster, The International Disaster Database</li> <li>• Euromonitor International, Global Market Information Database</li> <li>• Fraser Institute, Economic Freedom of the World database</li> <li>• International Labor Organization, Key Indicators of the Labor Market, 8<sup>th</sup> Edition</li> <li>• International Monetary Fund, World Economic Outlook Database, April 2015</li> <li>• Maddison (2010)</li> <li>• The Conference Board, Total Economy Database, May 2015 version</li> <li>• United Nations Conference on Trade and Development</li> <li>• World Bank, World Development Indicators</li> </ul>	<ul style="list-style-type: none"> <li>• Almanac of China's Population</li> <li>• China Compendium of Statistics 1949-2008</li> <li>• China Energy Statistical Yearbook</li> <li>• China Population &amp; Employment Statistical Yearbook</li> <li>• China Statistical Yearbook</li> <li>• China Statistical Yearbook on Science and Technology</li> <li>• Global Market Information Database (GMID)</li> <li>• Hong Kong Annual Digest</li> <li>• Provincial Statistical Yearbook</li> <li>• Taiwan Statistical Yearbook</li> <li>• Taiwan Statistical Data Book</li> <li>• The Conference Board, Total Economy Database, May 2015 version</li> <li>• World Bank, World Development Indicators</li> </ul>	<ul style="list-style-type: none"> <li>• CEIC database</li> <li>• Census of India: 1991, 2001 and 2011</li> <li>• Centre for Monitoring Indian Economy Pvt. Ltd (CMIE): States of India database</li> <li>• Indiatat</li> <li>• Ministry of Statistics and Program Implementation (MOSPI), Central Statistics Office</li> <li>• Ministry of Statistics and Program Implementation (MOSPI), National Sample Survey Office</li> <li>• The Conference Board, Total Economy Database, May 2015 version</li> <li>• World Bank, World Development Indicators</li> </ul>	<ul style="list-style-type: none"> <li>• CEIC Database</li> <li>• Indikator Kesejahteraan Rakyat</li> <li>• Investment Coordinating Board (BKPM)</li> <li>• Keuangan Pemerintah Provinsi</li> <li>• PDRB Menurut Penggunaan</li> <li>• PDRB Provinsi Menurut Lapangan Usaha</li> <li>• Proyeksi Penduduk Indonesia</li> <li>• Statistik Indonesia</li> <li>• Statistik Kesejahteraan Rakyat</li> <li>• Statistik Keuangan Pemerintah Provinsi</li> <li>• Statistik Perhubungan</li> <li>• Statistik Perhubungan</li> <li>• Statistik Transportasi</li> <li>• The Conference Board, Total Economy Database, May 2015 version</li> <li>• World Bank Indo-Dapoer</li> <li>• World Bank, World Development Indicators</li> </ul>
2	Old Dependency Ratio	Percentage				
3	Young Dependency Ratio	Percentage				
4	Openness to Trade	Percentage of GRDP				
5	Percentage Change in Nominal Exchange Rate	Percentage				
6	World GDP Real Growth Rate	Percentage				
7	Foreign Direct Investment Inflows as Percentage of GRDP	Percentage of GRDP				
8	Employment in Primary Industry as Percentage of Total Employment	Percentage of Total Employment				
9	Employment in Secondary Industry as Percentage of Total Employment	Percentage of Total Employment				
10	Employment in Tertiary Industry as Percentage of Total Employment	Percentage of Total Employment				
11	Literacy Rate	Percentage				
12	Overall Productivity	Constant 1990 PPP\$				
13	Primary Industry Value-added per Worker	Constant 1990 PPP\$				
14	Secondary Industry Value-added per Worker	Constant 1990 PPP\$				
15	Tertiary Industry Value-added per Worker	Constant 1990 PPP\$				
16	Length of Road	Kilometer				
17	Road Density	Kilometer per Square Kilometer				
18	Length of Road per Capita	Kilometer per 10000 People				
19	Primary Industry Value-added as Percentage of GRDP	Percentage of GRDP				
20	Secondary Industry Value-added as Percentage of GRDP	Percentage of GRDP				
21	Tertiary Industry Value-added as Percentage of GRDP	Percentage of GRDP				
22	Government Consumption Expenditure as Percentage of GRDP	Percentage of GRDP				

Source: Author's compilation