ASIA-PACIFIC METROMONITOR 20 14

ENGINES OF GLOBAL GROWTH

BROOKINGS

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SUMMARY

In recent years, a significant share of global economic output and growth has concentrated in large cities in the Asia-Pacific region—the stretch of countries from East Asia to Oceania to the western parts of North and South America. Analyzing growth in employment and GDP per capita in the 100 largest metropolitan economies in the Asia-Pacific region, this report finds that:

➤ **The 100 largest metropolitan economies in the Asia-Pacific region together accounted for 20 percent of global GDP and 29 percent of global GDP growth in 2014.** They are some of the fastest-growing economies in the world, registering 3.5 percent output growth, 2.6 percent GDP per capita growth, and 1.5 percent employment growth in 2014, outpacing global averages.

➤ **Within the Asia-Pacific, Chinese metro economies experienced the fastest GDP per capita growth, and North American metro areas registered the fastest employment growth in 2014.** Seventy percent of the fastest-growing Asia-Pacific metro areas were located in mainland China. By contrast, 65 percent of the slowest-growing metro economies were in Australia and Japan.

➤ **Nearly 30 percent of Asia-Pacific metro areas were "pockets of growth" in 2014, growing faster than their national economies on both GDP per capita and employment.** About half of these pockets of growth were in China, and all but five of those were located in rapidly developing inland provinces. The rest of these outperforming metro economies were located in North America (6), Latin America (3), Southeast Asia (3), East Asia (2), and Oceania (1).

➤ **Asia-Pacific metro areas specializing in business, financial, and professional services registered the fastest growth in employment in 2014, while GDP per capita growth was highest among metro areas specializing in commodities and utilities.** Manufacturing is the most common industrial specialization among Asia-Pacific metro economies (31), followed by business, financial, and professional services (17); transportation (14); and trade and tourism (12).

As the engines of their respective national economies and the hubs for the trade and investment ties that increasingly bind cities across the Asia-Pacific region, their performance remains critical to prospects for lasting and broadly shared regional and global growth.

INTRODUCTION

Over the past 15 years, the locus of global economic growth has shifted decidedly toward the South and East. This market and geographic transition rests on the mutually reinforcing twin forces of urbanization and global integration. Mass urbanization developed and grew significant metropolitan economies in East Asia, while globalization connected them with markets abroad, further charging their growth.

Rising cities in China and Southeast Asia have now joined their more developed peers in Japan, Korea, and Oceania as the global hubs of production, trade, and ideas that undergird Asia's economic clout. Together, they have formed linkages across the Pacific Ocean, particularly with major urban hubs on the west coast of the Americas. Regional economic forums such as the Asia-Pacific Economic Cooperation (APEC), new trade deals such as the Trans-Pacific Partnership (TPP) and the Regional Comprehensive Economic Partnership (RCEP), and the United States' "pivot" to Asia reflect the growing market interdependence in the region.[1]

These developments have brought together a powerful set of "Pacific" cities—loosely defined as those urban areas in countries or parts of countries that border the Pacific Ocean.[2] Their shared geography notwithstanding, the Asia-Pacific region is not monolithic; its cities are highly differentiated by subregion, development stage, and industrial specialization. Measuring the individual trajectories of the region's large metropolitan economies offers new insights into sources of growth that national or regional assessments tend to obscure. And as mayors, economic officials, and civic leaders take a more active role in stewarding the region's economic competitiveness, global comparisons of metro area performance can also inform city- and region-led economic strategies across the Asia-Pacific region.

The *Asia-Pacific MetroMonitor* is the first examination of economic growth in the 100 largest metro areas in the region on two key economic indicators: annualized growth rate of real GDP per capita and annualized growth rate of employment.[3] This report uses these two indicators to measure the 2014 performance of the Asia-Pacific's 100 largest metropolitan areas in three key dimensions: relative to the global economy; relative to one another; and relative to their respective countries. These rankings do not attempt to measure which metro areas are most competitive, wealthy, or livable, as incredible differences in wealth and prosperity exist within the sample. Rather, they aim to capture how Asia-Pacific metro areas are responding to continued change in the world economy, and to illuminate the underlying factors contributing to their diverse performance.

> "The *Asia-Pacific MetroMonitor* reaffirms the shift in global economic growth toward the East and South, as Asia continues to grow via urbanization and industrialization. The Asia-Pacific's 100 largest metro economies are at the vanguard of these trends."

DATA AND METHODS

The *Asia-Pacific MetroMonitor* largely follows the methodology used in previous editions of the *Global MetroMonitor*, which tracks the economic performance of the 300 largest metropolitan economies in the world.[4] This study defines a metropolitan area as an economic region including one or more cities and their surrounding areas, all linked by economic and commuting ties (see Appendix B). The sample comprises the 100 largest metropolitan economies in the Asia-Pacific region for which industry trend data were available, based on the size of their economies in 2014 at purchasing power parity (PPP) rates (see Appendix A for a list of the 100 metros, ranked by a performance index for 2013-2014). The *Asia-Pacific MetroMonitor* employs a few key variables to assess the economic performance of metropolitan areas: gross domestic product (GDP), employment, and population from 2000 to 2014. In addition, the study uses gross value-added (GVA) and employment by major industry sector.[5] To analyze economic circumstances in the current year (2014), this study employs nominal GDP and GVA data in U.S. dollars at PPP rates. For trend analysis, it uses GDP and GVA data at 2009 prices and expressed in U.S. dollars.

BOX 1. KEY TERMS USED IN THE *ASIA-PACIFIC METROMONITOR*

Gross domestic product (GDP): The sum of the market value of goods and services produced in an economy, such as a metropolitan area, country, or the world.

Output (gross value-added) of an industry: The difference between an industry's gross output and its intermediary purchases, domestic or imported.

Employment: The number of people who performed any work at all in the reference period, for pay or in-kind, or who were temporarily absent from a job for such reasons as illness, maternity or parental leave, holiday, training, or industrial dispute.

GDP per capita: The size of an economy relative to population. It is not personal income or household income, and does not reflect the distribution of income, but proxies the average standard of living in an area.

Population: The number of residents of a metropolitan area or country.

Asia-Pacific region: The 100 largest metro areas in Australia, Canada (Pacific coast), Chile, China, Colombia, Hong Kong, Indonesia, Japan, Macau, Malaysia, Mexico, New Zealand, Peru, the Philippines, Singapore, South Korea, Taiwan, Thailand, Vietnam, and the United States (Pacific coast).

The report focuses on metropolitan performance on two key economic indicators: annualized growth rate of real GDP per capita, and annualized growth rate of employment. It combines these indicators into an economic performance index by which the 100 metro areas are ranked for 2014 (see Appendix B).[6] The data in this report reflect updates to the forecasts reflected in this year's *Global MetroMonitor.*

To interpret performance, this report categorizes the 100 largest metro economies in the Asia-Pacific region into six subregions:

➤ **China:** 49 metro areas in mainland China plus Hong Kong and Macau.

➤ **East Asia:** 19 metro areas in Japan, South Korea, and Taiwan.

➤ **Latin America:** seven metro areas in Chile, Colombia, Mexico, and Peru.

➤ **North America:** 12 metro areas on the Pacific coast of Canada and the United States.

➤ **Oceania:** six metro areas in Australia and New Zealand.

➤ **Southeast Asia:** seven metro areas in Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

The report also categorizes metro areas by six major industrial sectors for which GVA and employment data are available at the metropolitan level (see Appendix B).

"If the Asia-Pacific's 100 largest metro areas were a single country, they would be the largest national economy on earth, accounting for one-fifth of global GDP ($21.9 trillion) in 2014."

FINDINGS

The top 100 metropolitan economies in the Asia-Pacific region together accounted for 20 percent of global GDP and 29 percent of global GDP growth in 2014.

Together, the Asia-Pacific's major metropolitan areas are critical hubs of population and economic activity. The 100 largest metro areas in the Asia-Pacific region house 722 million inhabitants, ranging from 37 million in Greater Tokyo to 574,000 in Macau. If the Asia-Pacific's 100 largest metro areas were a single country, they would be the largest national economy on earth. In 2014, they accounted for $21.9 trillion in output, one-fifth of global GDP. Over the past 15 years, output in these 100 metro areas has expanded by 75 percent (Figure 1), GDP per capita has risen by 45 percent, and employment has grown by 42 percent.

Asia-Pacific metro areas are also some of the fastest-growing economies in the world. In 2014, GDP in these metro areas grew by 3.5 percent, accounting for 29 percent of global growth that year.[7] Strong GDP gains were accompanied by growth rates of 2.6 percent for GDP per capita and 1.5 percent for employment. These outpaced global growth averages of 2.5 percent for GDP, 1.4 percent for GDP per capita, and 1.4 percent for employment.

FIGURE 1. REAL GDP LEVELS (2000=100), 100 LARGEST ASIA-PACIFIC METROPOLITAN ECONOMIES AND WORLD ECONOMY, 2000-2014
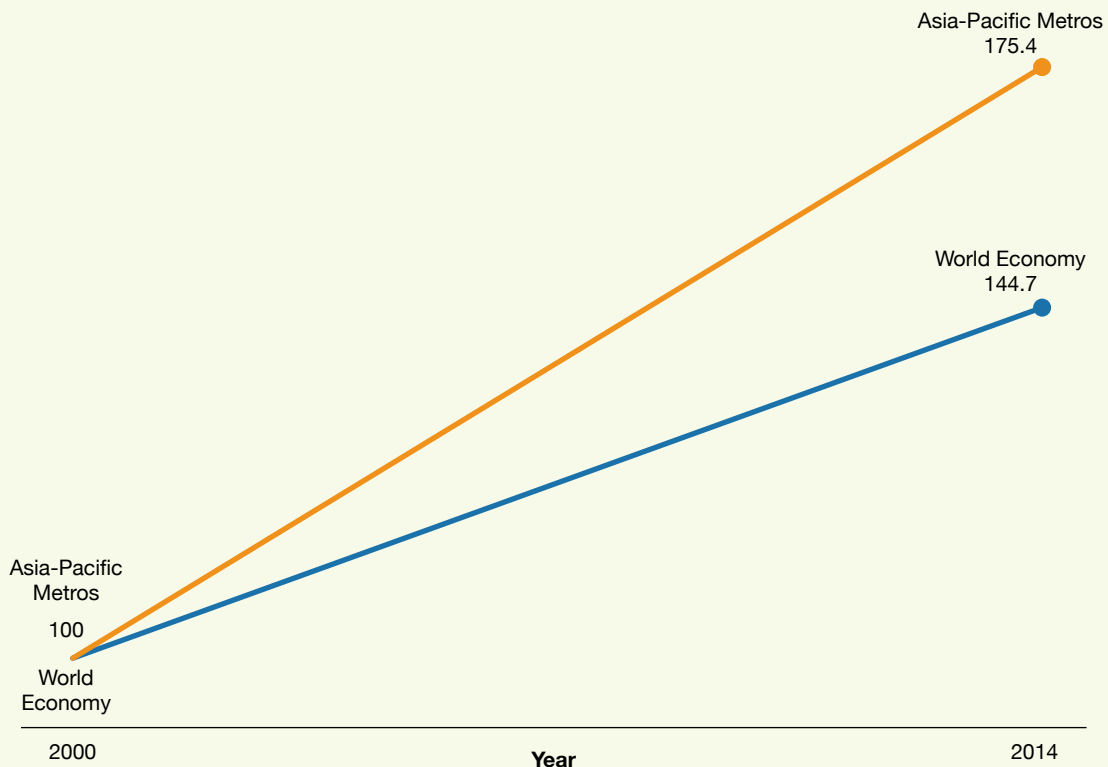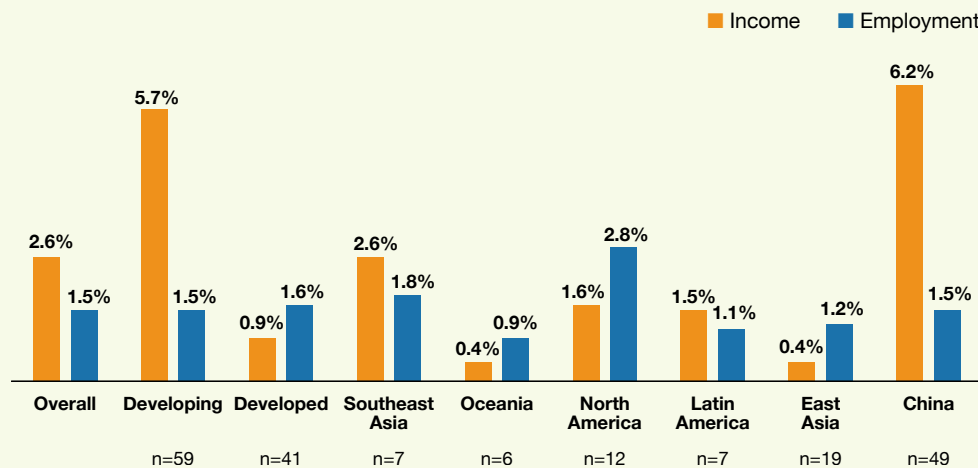

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau.

Within the Asia-Pacific region, Chinese metro economies experienced the fastest GDP per capita growth, and North American metro areas registered the fastest employment growth in 2014.

While the Asia-Pacific region as a whole grew quickly in 2014, economic performance among its major metro areas varied significantly by development status and subregion (Figure 2). Developing metro economies—the 59 urban areas in China, Southeast Asia, and Latin America—experienced much faster GDP per capita growth (5.7 percent) than their more developed peers in East Asia, North America, and Oceania (0.9 percent) in 2014. Driving this result was 6.2 percent GDP per capita growth in Chinese metro areas (including Hong Kong and Macau), which account for 47 of 59 developing metro areas in the sample. At the same time, seven metro areas in Southeast Asia continued to power that region's economic expansion with annual GDP per capita growth of 2.6 percent.

On employment, by contrast, developed metro areas grew somewhat faster than their developing counterparts. Employment grew by 1.6 percent in the Asia-Pacific's 41 developed metro areas in 2014, slightly above the 1.5 percent growth in the 59 developing metro economies. Strong employment growth in North American metro areas (2.8 percent), especially among the United States' West Coast metro areas, counterbalanced more sluggish job creation in metro areas in Oceania (0.9 percent) and developed East Asia (1.2 percent).

FIGURE 2. GROWTH IN GDP PER CAPITA AND EMPLOYMENT BY SUBREGION AND DEVELOPMENT STATUS, 100 LARGEST ASIA-PACIFIC METROPOLITAN ECONOMIES, 2013-2014

	Income	Employment
Overall	2.6%	1.5%
Developing (n=59)	5.7%	1.5%
Developed (n=41)	0.9%	1.6%
Southeast Asia (n=7)	2.6%	1.8%
Oceania (n=6)	0.4%	0.9%
North America (n=12)	1.6%	2.8%
Latin America (n=7)	1.5%	1.1%
East Asia (n=19)	0.4%	1.2%
China (n=49)	6.2%	1.5%

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau.

Dividing the sample into five equal groups of 20 metro areas and ranking them by their economic performance further illuminates the differences in GDP per capita and employment growth within Asia-Pacific metro areas (see Map 1). Metro economies in the top quintile of performers experienced a 6.3 percent increase in GDP per capita and a 2.3 percent increase in employment in 2014. Macau was the top-performing metro area in the Asia-Pacific region on the combined performance index in 2014, though only because its rapid 7.6 percent employment growth counterbalanced a decline in GDP per capita of 2.1 percent. Gaming revenues in Macau tumbled in the latter half of the year, but the development of two major new casinos contributed to 49 percent annual employment growth in the construction sector. Questions remain, however, about the sustainability of Macau's growth given its singular reliance on gaming and tourism.[8]
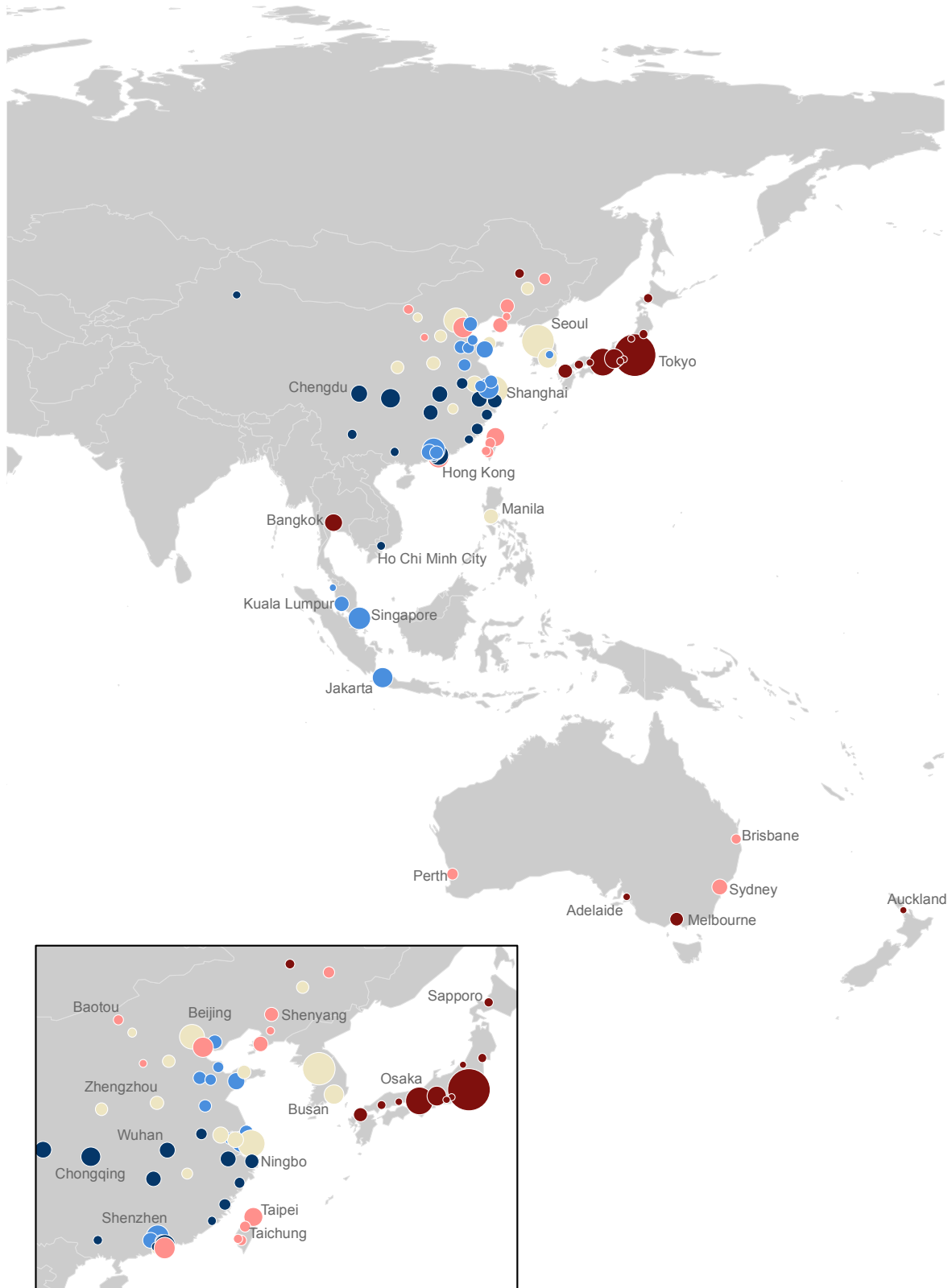
Economic Index Rank
2013 to 2014

- Top quintile
- Second quintile
- Middle quintile
- Fourth quintile
- Bottom quintile

Metropolitan Nominal GDP

(blns $, PPP rates)   100   500

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau

TABLE 1. **HIGHEST AND LOWEST PERFORMERS ON ECONOMIC PERFORMANCE INDEX, 100 LARGEST ASIA-PACIFIC METROPOLITAN ECONOMIES, 2013–2014**

Highest Performers

Rank 2014	Metro	Region	GDP per Capita	Employment	Rank 2013	Rank Change
1	Macau	China	-2.1%	7.6%	1	0
2	Xiamen	China	9.0%	2.8%	5	3
3	Fuzhou	China	8.2%	2.8%	8	5
4	Kunming	China	8.3%	2.7%	2	-2
5	Hangzhou	China	6.7%	3.2%	13	8
6	San Jose	North America	2.4%	4.6%	26	20
7	Ningbo	China	6.5%	2.7%	18	11
8	Wenzhou	China	6.5%	2.6%	22	14
9	Chengdu	China	8.3%	1.8%	9	0
10	Ho Chi Minh City	Southeast Asia	4.9%	3.2%	54	44
11	Hefei	China	10.0%	1.0%	34	23
12	Medellin	Latin America	4.3%	3.5%	45	33
13	Changsha	China	8.3%	1.7%	15	2
14	Wuhan	China	8.6%	1.5%	31	17
15	Wulumuqi	China	6.3%	2.4%	4	-11
16	Riverside	North America	1.6%	4.3%	44	28
17	Chongqing	China	7.9%	1.6%	14	-3
18	Zhongshan	China	6.7%	2.1%	12	-6
19	Nanning	China	7.2%	1.8%	16	-3
20	Shenzhen	China	6.2%	2.2%	19	-1

Bottom Performers

Rank 2014	Metro	Region	GDP per Capita	Employment	Rank 2013	Rank Change
81	Auckland	Oceania	0.8%	0.9%	46	-35
82	Honolulu	North America	0.0%	1.0%	74	-8
83	Tokyo	East Asia	-0.4%	1.1%	75	-8
84	Santiago	Latin America	0.6%	0.5%	50	-34
85	Shizuoka	East Asia	0.7%	0.4%	86	1
86	Hamamatsu	East Asia	0.7%	0.4%	88	2
87	Mexico City	Latin America	1.5%	0.0%	89	2
88	Nagoya	East Asia	-0.1%	0.7%	87	-1
89	Kitakyushu-Fukuoka	East Asia	0.0%	0.6%	82	-7
90	Sendai	East Asia	0.1%	0.4%	81	-9
91	Sapporo	East Asia	0.2%	0.4%	78	-13
92	Okayama	East Asia	0.2%	0.3%	92	0
93	Niigata	East Asia	0.5%	0.1%	91	-2
94	Monterrey	Latin America	0.9%	-0.1%	99	5
95	Osaka-Kobe	East Asia	-0.4%	0.4%	90	-5
96	Melbourne	Oceania	-0.1%	0.2%	84	-12
97	Hiroshima	East Asia	-0.4%	0.2%	93	-4
98	Daqing	China	5.1%	-2.6%	100	2
99	Adelaide	Oceania	0.6%	-1.1%	96	-3
100	Bangkok	Southeast Asia	-0.4%	-1.7%	94	-6

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau.

Mainland Chinese metro areas accounted for 15 of the 20 fastest-growing in the Asia-Pacific region. Average incomes continue to rise swiftly in places like Xiamen, Fuzhou, and Nanning, even amid concerns of an economic slowdown at the national level in 2014. Two Pacific coast metro areas in the United States managed to rank among the top performers on the composite index: San Jose (6th) and Riverside (16th). San Jose's performance derived from a booming business, financial, and professional services sector—anchored by the technology hub of Silicon Valley—and Riverside's high ranking can be partly explained by a rapidly expanding transportation sector. Medellin was the highest-performing Latin American metro area in 2014 (12th overall), where a thriving construction sector contributed to overall increases in GDP per capita of 4.3 percent and employment of 3.5 percent. Ho Chi Minh City (10th) was the lone metro area from Southeast Asia among the 20 fastest-growing economies in the Asia-Pacific region, led by a strong expansion in trade and tourism and manufacturing.

The metropolitan areas in the bottom quintile registered a combined reduction in GDP per capita of 0.2 percent and weak employment growth of 0.3 percent. Bangkok was the weakest-performing Asia-Pacific metro economy in 2014 due to contraction in its construction sector, in contrast to the rest of fast-growing Southeast Asia. Notably, 13 of the 20 slowest-growing metro areas in the Asia-Pacific region were in Japan and Australia, including Adelaide, Hiroshima, Osaka-Kobe, Niigata, and Melbourne. Growth was curtailed by sluggishness in trade and tourism in Adelaide and Osaka-Kobe; business, financial, and professional services in Hiroshima and Niigata; and transportation in Melbourne.

Nearly 30 percent of Asia-Pacific metro areas were "pockets of growth" in 2014, growing faster than their national economies on both GDP per capita and employment.

National monetary, fiscal, trade, and regulatory policies matter for metro growth, but the specific characteristics of metropolitan economies often differentiate their economic performance from that of their respective countries.

In 2014, 29 of the 97 Asia-Pacific metropolitan areas (excluding the three that are coterminous with their country or territorial boundary—Hong Kong, Macau, and Singapore) were "pockets of growth," outperforming their respective national economies on both GDP per capita and employment growth (Map 2). Nearly half of these pockets of growth were in China, and all but five of those were located in the country's rapidly developing inland provinces.[9] Southeast Asian megacities like Jakarta and Manila and more developed East Asian metro areas such as Daegu and Taoyuan also grew faster than their nations on both indicators. Perth was the only metro area from Oceania that registered faster growth compared to national economies.
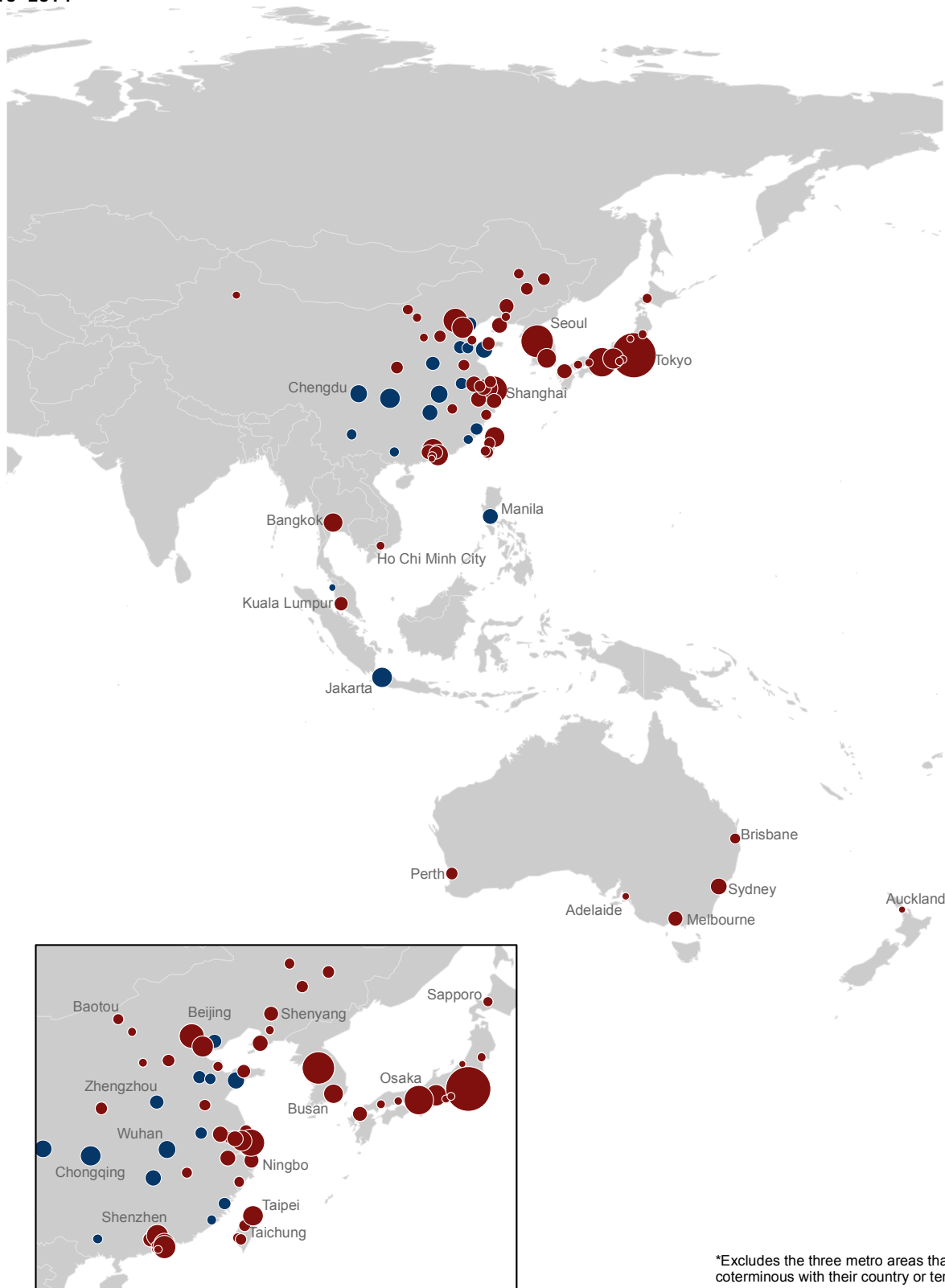
Yet, the region's growth centers are not limited to Asia. Within North America, Portland, San Francisco, San Jose, Seattle, and Vancouver all outpaced national growth averages in 2014. These metro areas all have a foothold in high-value-added industries such as financial services, information technology, and biotechnology. Within Latin America, Bogota, Guadalajara, and Medellin all outperformed their respective national economies.
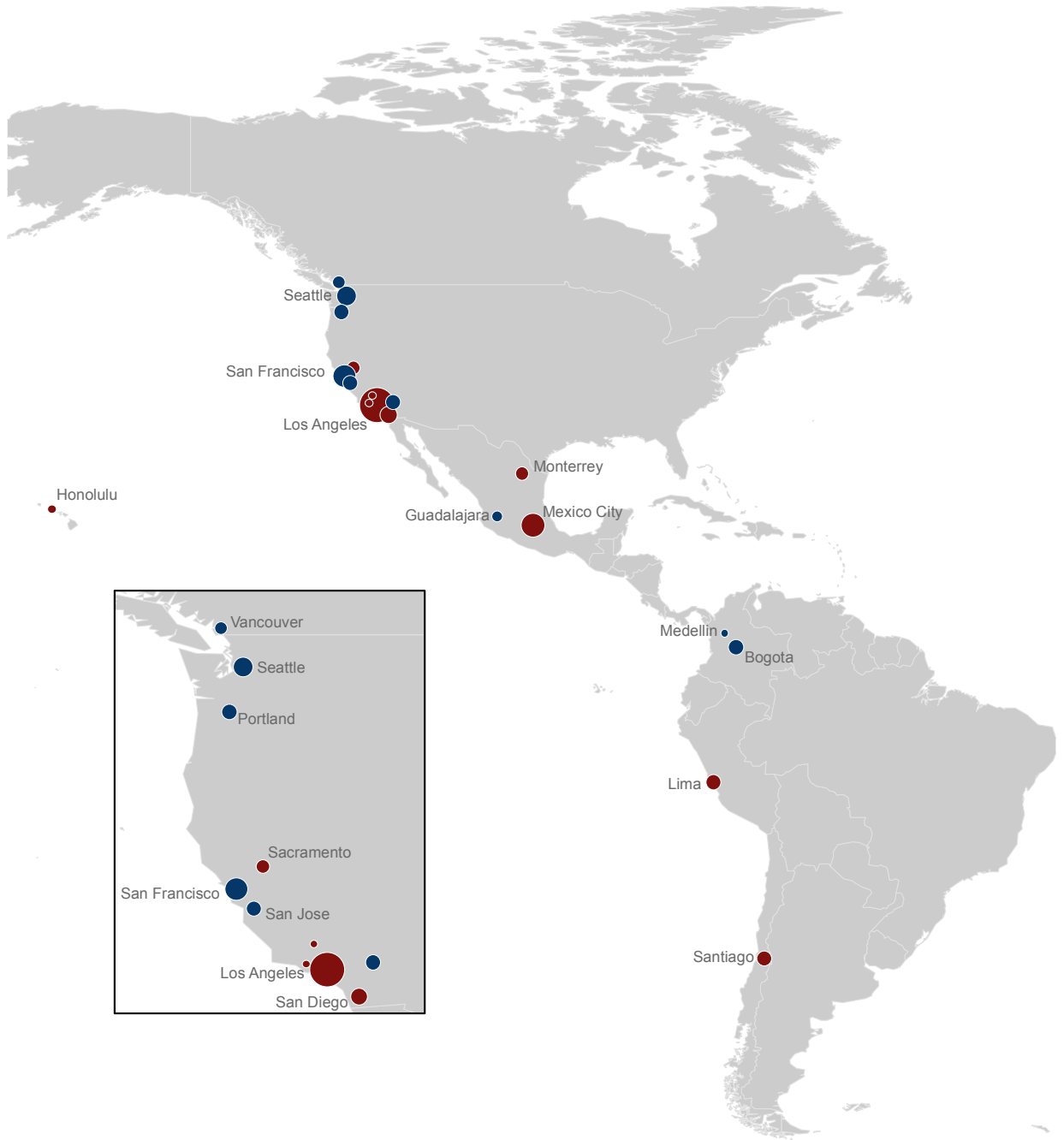
Approximately two-thirds of the 97 largest Asia-Pacific metro areas generated employment at faster clips than their national economies. Over 80 percent of the metro areas in China and North America outperformed their nations on employment growth, paced by Hangzhou, San Jose, and Xiamen (all business, financial, and professional services centers), and Riverside (construction). Metro areas in economically struggling Northeast China such as commodities-intensive Daqing and Haerbin and transportation-oriented Anshan experienced some of the slowest employment growth relative to their country (Table 2).

> "Mainland Chinese metro areas accounted for 15 of the 20 fastest-growing in the Asia-Pacific region, and were joined by Macau, San Jose, Ho Chi Minh City, Medellin, and Riverside."

Seoul

Tokyo

Chengdu

Shanghai

Manila

Bangkok

Ho Chi Minh City

Kuala Lumpur

Jakarta

Brisbane

Perth

Sydney

Auckland

Adelaide

Melbourne

Baotou

Beijing

Shenyang

Sapporo

Zhengzhou

Osaka

Wuhan

Busan

Chongqing

Ningbo

Shenzhen

Taipei

Taichung

*Excludes the three metro areas that are coterminous with their country or territorial boundary—Hong Kong, Macau, and Singapore.

Seattle

San Francisco

Los Angeles

Honolulu

Monterrey

Guadalajara   Mexico City

Medellin
Bogota

Lima

Santiago

Vancouver

Seattle

Portland

Sacramento

San Francisco

San Jose

Los Angeles

San Diego

Metro Area Performance
2013 to 2014

● Metro area growing faster than country
on both GDP per capita and employment

● Metro area growing slower than country
on GDP per capita or employment or both

Metropolitan Nominal GDP

(blns $, PPP rates)   100   500

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau

GDP Per Capita Growth Rate				Employment Growth Rate			
Faster in Metro Areas				Faster in Metro Areas			
	Metro	Nation	Difference		Metro	Nation	Difference
Hefei	10.0%	6.8%	3.3%	Hangzhou	3.2%	0.4%	2.9%
Vancouver	3.8%	1.4%	2.4%	San Jose	4.6%	1.9%	2.7%
Xiamen	9.0%	6.8%	2.2%	Xiamen	2.8%	0.4%	2.4%
Portland	3.4%	1.4%	1.9%	Riverside	4.3%	1.9%	2.4%
Wuhan	8.6%	6.8%	1.8%	Fuzhou	2.8%	0.4%	2.4%
Kunming	8.3%	6.8%	1.6%	Ningbo	2.7%	0.4%	2.3%
Chengdu	8.3%	6.8%	1.5%	Kunming	2.7%	0.4%	2.3%
Changsha	8.3%	6.8%	1.5%	Wenzhou	2.6%	0.4%	2.2%
Fuzhou	8.2%	6.8%	1.5%	Wulumuqi	2.4%	0.4%	2.0%
Chongqing	7.9%	6.8%	1.1%	Shenzhen	2.2%	0.4%	1.8%

| GDP Per Capita Growth Rate				Employment Growth Rate			
Slower in Metro Areas				Slower in Metro Areas			
	Metro	Nation	Difference		Metro	Nation	Difference
Tianjin	3.1%	6.8%	-3.6%	Daqing	-2.6%	0.4%	-3.0%
Bakersfield	-1.5%	1.4%	-2.9%	Adelaide	-1.1%	1.0%	-2.1%
Brisbane	-1.0%	0.9%	-1.9%	Haerbin	-1.0%	0.4%	-1.3%
Beijing	4.9%	6.8%	-1.9%	Anshan	-0.7%	0.4%	-1.0%
Shanghai	5.0%	6.8%	-1.7%	Santiago	0.5%	1.5%	-1.0%
Daqing	5.1%	6.8%	-1.6%	Shenyang	-0.6%	0.4%	-1.0%
Zhuhai	5.3%	6.8%	-1.5%	Honolulu	1.0%	1.9%	-0.9%
Honolulu	0.0%	1.4%	-1.5%	Dalian	-0.4%	0.4%	-0.8%
Taiyuan	5.5%	6.8%	-1.3%	Melbourne	0.2%	1.0%	-0.8%
Auckland	0.8%	2.0%	-1.2%	Baotou	-0.4%	0.4%	-0.7%

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau.

A smaller share of Asia-Pacific metro economies, 44 percent, registered higher GDP per capita growth than their national economies. No metropolitan area grew faster relative to its national economy than Hefei, where business, financial, and professional services drove 10.0 percent GDP per capita growth, versus 6.8 percent growth for China as a whole. Vancouver (led by transportation), Xiamen (trade and tourism), Portland (business, financial, and professional services), and Wuhan (business, financial, and professional services) rounded out the top five in this category. Chinese metro areas accounted for eight of the 10 metro areas within the Asia-Pacific region that most outperformed their countries on GDP per capita growth. By contrast, Tianjin, Bakersfield, Brisbane, Beijing, and Shanghai exhibited considerably slower GDP per capita growth (or declines) compared to their countries.

Asia-Pacific metro areas specializing in business, financial, and professional services registered the fastest growth in employment in 2014, while GDP per capita growth was highest among metro areas specializing in commodities and utilities.

Examining the industrial makeup in the Asia-Pacific's metro economies reveals a diversity of industry specializations and provides new insights about drivers of economic growth (Map 3). To examine these trends, this analysis assigned 97 metropolitan areas one of six industrial specializations: business, financial, and professional services; commodities and utilities; construction and local/nonmarket services; manufacturing; trade and tourism; and transportation. Industrial specializations were assigned using location quotients, which are based on the ratio of an industry's share of metropolitan real GVA to its share of national real GVA (see Appendix B). (A metro area's specialization here reflects the industry with the highest location quotient.)
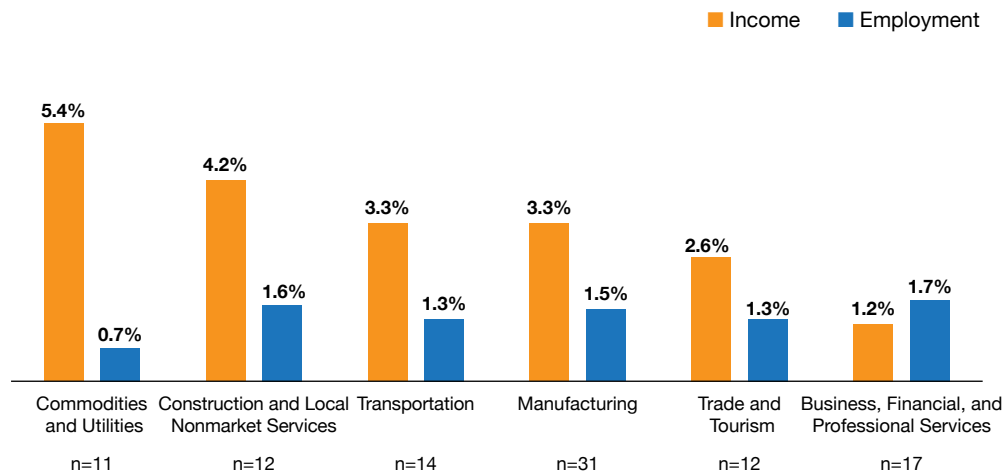
Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau.

Nearly one-third of Asia-Pacific metro areas (31 total) specialize in manufacturing, the most common specialization in the region (Figure 3). China, Japan, and the United States account for three-quarters of metro areas in this group thanks to world-class industrial clusters within the Pearl River Delta region (Foshan, Zhongshan, and Zhuhai), the Pacific coast of the United States (Portland, San Jose, and Seattle), and western Japan (Hiroshima, Hamamatsu, Okayama, Nagoya, and Shizuoka). Manufacturing-intensive metro areas registered above-average growth rates of 3.3 percent growth for GDP per capita and 1.5 percent for employment in 2014, likely due to the significant presence of Chinese metro areas within this industry group.

Another 17 Asia-Pacific metro areas specialize in business, financial, and professional services, the second largest group after manufacturing. These metro economies registered the largest increases in employment (1.7 percent), but the slowest growth in GDP per capita (1.2 percent). Metropolitan areas in this group include global financial capitals such as Mexico City, Shanghai, and Tokyo as well as national and regional financial hubs such as Bogota, Kuala Lumpur, and Sydney. This group also includes technology centers, both established metro areas such as San Diego and San Francisco and emerging innovation hubs such as Hangzhou and Santiago.

Metro areas specializing in commodities and utilities registered the largest increases in GDP per capita in 2014 (5.4 percent), but below-average employment expansion of 0.7 percent. The capital-intensive nature of oil and gas extraction helps explain the imbalance between high levels of output expansion and relatively lower levels of job creation. Increases in petroleum production in the U.S. and China partly explain the success of places like Bakersfield and Haerbin, while sustained demand for rare earth metals and other commodities boosted income growth in the Chinese mining centers of Baotou and Hefei.[10]

Metropolitan areas focused in transportation, the third most common industrial specialization in the region, registered income and employment growth rates of 3.3 and 1.3 percent, respectively. Metropolitan economies in this industry specialization include critical nodes in China's massive transportation system such as Xiamen and Dalian, as well as regional and national hubs in Southeast Asia (Bangkok and Ho Chi Minh City) and Oceania (Brisbane and Auckland).

Seoul
Tokyo
Chengdu
Shanghai
Shenzhen
Manila
Bangkok
Ho Chi Minh City
Kuala Lumpur
Jakarta
Brisbane
Perth
Sydney
Auckland
Adelaide
Melbourne

Baotou
Beijing
Shenyang
Sapporo
Zhengzhou
Busan
Wuhan
Osaka
Chongqing
Ningbo
Shenzhen
Taipei
Taichung

*Excludes the three metro areas that are coterminous with their country or territorial boundary—Hong Kong, Macau, and Singapore.

Seattle

San Francisco

Los Angeles

Honolulu

Monterrey

Guadalajara Mexico City

Medellin

Bogota

Lima

Santiago

Vancouver

Seattle

Portland

Sacramento

San Francisco

San Jose

Riverside

Los Angeles

San Diego

Metro Area Industrial Specialization

- Commodities
- Construction/Local Services
- Business/Financial Services
- Manufacturing
- Trade and Tourism
- Transportation
- Utilities

Metropolitan Nominal GDP

(blns $, PPP rates) 100 500

Source: Brookings analysis of data from Oxford Economics, Moody's Analytics, and U.S. Census Bureau

CONCLUSION

The *Asia-Pacific MetroMonitor* reaffirms the shift in global economic growth to the East and South, as Asia continues its path through urbanization and industrialization. As a result, major metro economies remain the engines of the Asia-Pacific economy and its centers for trade and investment. Cities are where the region's most significant developments—China's continued liberalization and economic expansion, the rise of Southeast Asia, and the technology-led growth occurring in North America—all come to ground. These dynamics—along with the recent push among national governments to cement trans-Pacific ties—offer the potential for a new era of shared growth and prosperity among cities in the Asia-Pacific region.

"As mayors, economic officials, and civic leaders take a more active role in stewarding the region's economic competitiveness, global comparisons of metro area performance can also inform city- and region-led economic strategies across the Asia-Pacific region."

100 LARGEST ASIA-PACIFIC METROPOLITAN ECONOMIES, 2013-2014

Rank Economic Performance 2013-2014	Metro	Country	Development Status	Real GDP per Capita Growth 2013-2014	Employment Growth 2013-2014	Rank Economic Performance 2009-2014
1	Macau	Macau	Developed	-2.1%	7.6%	12
2	Xiamen	China	Developing	9.0%	2.8%	1
3	Fuzhou	China	Developing	8.2%	2.8%	10
4	Kunming	China	Developing	8.3%	2.7%	13
5	Hangzhou	China	Developing	6.7%	3.2%	6
6	San Jose	USA	Developed	2.4%	4.6%	56
7	Ningbo	China	Developing	6.5%	2.7%	20
8	Wenzhou	China	Developing	6.5%	2.6%	23
9	Chengdu	China	Developing	8.3%	1.8%	18
10	Ho Chi Minh City	Vietnam	Developing	4.9%	3.2%	46
11	Hefei	China	Developing	10.0%	1.0%	14
12	Medellin	Colombia	Developing	4.3%	3.5%	48
13	Changsha	China	Developing	8.3%	1.7%	11
14	Wuhan	China	Developing	8.6%	1.5%	24
15	Wulumuqi	China	Developing	6.3%	2.4%	17
16	Riverside	USA	Developed	1.6%	4.3%	79
17	Chongqing	China	Developing	7.9%	1.6%	22
18	Zhongshan	China	Developing	6.7%	2.1%	16
19	Nanning	China	Developing	7.2%	1.8%	2
20	Shenzhen	China	Developing	6.2%	2.2%	27
21	George Town	Malaysia	Developing	5.1%	2.6%	44
22	Foshan	China	Developing	6.6%	2.0%	45
23	Jinan	China	Developing	7.1%	1.7%	41
24	Nantong	China	Developing	6.6%	1.9%	8
25	Kuala Lumpur	Malaysia	Developing	4.3%	2.9%	5
26	Jakarta	Indonesia	Developing	4.6%	2.7%	42
27	Daegu	South Korea	Developed	3.1%	3.4%	64
28	Xuzhou	China	Developing	6.6%	1.8%	4
29	Qingdao	China	Developing	7.1%	1.6%	21
30	Portland	USA	Developed	3.4%	3.2%	60
31	Bogota	Colombia	Developing	3.4%	3.1%	51
32	Tangshan	China	Developing	7.0%	1.5%	26
33	Dongguan	China	Developing	6.3%	1.8%	58
34	Singapore	Singapore	Developed	1.5%	3.8%	40
35	Dongying	China	Developing	6.5%	1.7%	9
36	Guangzhou	China	Developing	5.9%	1.9%	28
37	Suzhou	China	Developing	6.4%	1.6%	7
38	Changzhou	China	Developing	6.4%	1.6%	15

Rank Economic Performance 2013-2014	Metro	Country	Development Status	Real GDP per Capita Growth 2013-2014	Employment Growth 2013-2014	Rank Economic Performance 2009-2014
39	Zibo	China	Developing	6.8%	1.4%	29
40	San Francisco	USA	Developed	1.7%	3.6%	72
41	Yantai	China	Developing	6.8%	1.4%	25
42	Zhuhai	China	Developing	5.3%	1.9%	36
43	Nanjing	China	Developing	6.1%	1.4%	19
44	Beijing	China	Developing	4.9%	1.9%	49
45	Nanchang	China	Developing	6.7%	1.1%	35
46	Vancouver	Canada	Developed	3.8%	2.3%	78
47	Wuxi	China	Developing	6.1%	1.3%	3
48	Zhengzhou	China	Developing	7.7%	0.5%	31
49	Shijiazhuang	China	Developing	6.3%	0.9%	37
50	Busan-Ulsan	South Korea	Developed	2.8%	2.4%	69
51	Seoul-Incheon	South Korea	Developed	2.8%	2.4%	63
52	Seattle	USA	Developed	1.8%	2.8%	77
53	Taoyuan	Taiwan	Developed	4.0%	1.5%	50
54	Changchun	China	Developing	7.4%	0.1%	32
55	Manila	Philippines	Developing	4.6%	1.2%	55
56	Sacramento	USA	Developed	0.8%	2.7%	93
57	Los Angeles	USA	Developed	1.4%	2.4%	80
58	Shanghai	China	Developing	5.0%	0.8%	75
59	Huhehaote	China	Developing	7.6%	-0.3%	47
60	Xi'an	China	Developing	6.9%	-0.1%	39
61	Taiyuan	China	Developing	5.5%	0.4%	52
62	Baotou	China	Developing	7.2%	-0.4%	33
63	Taichung	Taiwan	Developed	3.3%	1.2%	62
64	San Diego	USA	Developed	1.1%	2.1%	83
65	Tainan	Taiwan	Developed	3.9%	0.8%	65
66	Kaohsiung	Taiwan	Developed	3.4%	0.9%	68
67	Dalian	China	Developing	6.3%	-0.4%	30
68	Taipei	Taiwan	Developed	3.0%	1.0%	61
69	Perth	Australia	Developed	1.2%	1.7%	57
70	Oxnard	USA	Developed	0.8%	1.9%	85
71	Bakersfield	USA	Developed	-1.5%	2.8%	70
72	Haerbin	China	Developing	7.4%	-1.0%	59
73	Shenyang	China	Developing	6.1%	-0.6%	38
74	Tianjin	China	Developing	3.1%	0.7%	34
75	Anshan	China	Developing	6.0%	-0.7%	43
76	Lima	Peru	Developing	0.7%	1.4%	53

Rank Economic Performance 2013-2014	Metro	Country	Development Status	Real GDP per Capita Growth 2013-2014	Employment Growth 2013-2014	Rank Economic Performance 2009-2014
77	Brisbane	Australia	Developed	-1.0%	2.0%	86
78	Hong Kong	Hong Kong	Developed	1.5%	0.8%	67
79	Guadalajara	Mexico	Developing	1.6%	0.7%	76
80	Sydney	Australia	Developed	0.8%	1.0%	81
81	Auckland	New Zealand	Developed	0.8%	0.9%	74
82	Honolulu	USA	Developed	0.0%	1.0%	84
83	Tokyo	Japan	Developed	-0.4%	1.1%	87
84	Santiago	Chile	Developed	0.6%	0.5%	54
85	Shizuoka	Japan	Developed	0.7%	0.4%	89
86	Hamamatsu	Japan	Developed	0.7%	0.4%	88
87	Mexico City	Mexico	Developing	1.5%	0.0%	71
88	Nagoya	Japan	Developed	-0.1%	0.7%	94
89	Kitakyushu-Fukuoka	Japan	Developed	0.0%	0.6%	90
90	Sendai	Japan	Developed	0.1%	0.4%	100
91	Sapporo	Japan	Developed	0.2%	0.4%	98
92	Okayama	Japan	Developed	0.2%	0.3%	95
93	Niigata	Japan	Developed	0.5%	0.1%	92
94	Monterrey	Mexico	Developing	0.9%	-0.1%	73
95	Osaka-Kobe	Japan	Developed	-0.4%	0.4%	99
96	Melbourne	Australia	Developed	-0.1%	0.2%	82
97	Hiroshima	Japan	Developed	-0.4%	0.2%	97
98	Daqing	China	Developing	5.1%	-2.6%	66
99	Adelaide	Australia	Developed	0.6%	-1.1%	91
100	Bangkok	Thailand	Developing	-0.4%	-1.7%	96

APPENDIX B. ADDITIONAL METHODOLOGICAL INFORMATION

Selection and definition of metropolitan areas

The *Asia-Pacific MetroMonitor* employs the size of metropolitan economy as the main selection criterion, given the focus on metropolitan economic performance. The sample is composed of the 100 largest Asia-Pacific metropolitan areas for which economic and industrial data were available, based on the size of their economy in 2014 at purchasing power parity rates. The sample of metropolitan areas is based upon a list of international metro areas provided by Oxford Economics and a list of U.S. metropolitan economies built with data provided by Moody's Analytics.

This study uses the general definition of a metropolitan area as an economic region with one or several cities and their surrounding areas, all linked by economic and commuting ties. In the United States, metro areas are defined by the federal Office of Management and Budget to include one or more urbanized areas of at least 50,000 inhabitants plus outlying areas connected by commuting flows.[11]

For metropolitan areas outside of the United States, this study uses the official metropolitan area definition from national statistics. Not all countries, especially developing ones, have created statistical equivalents of a metropolitan area. Due to data limitations, some metropolitan areas in this report do not reflect properly regional economies, but provincial level- and prefecture-level cities in China and municipality in Vietnam (Ho Chi Minh City).

Baseline variables and data sources

This *Asia-Pacific MetroMonitor* employs a few key variables to assess the economic performance of metropolitan areas: gross domestic product (GDP), employment, population, and GDP per capita, from 2000 to 2014. In addition, the study uses gross value-added (GVA) and employment by major industry sector. For static analysis, this study employs nominal GDP and GVA data, at purchasing power parity rates. For trends analysis, it uses GDP and GVA data at 2009 prices and expressed in U.S. dollars.[12] Data availability and comparability at metropolitan level precluded expanding the economic analysis to other indicators of interest, such as housing prices, employment rates, unemployment rates, and income distributions.

This edition employs two main databases for analysis: Moody's Analytics for metropolitan areas in the United States, and Oxford Economics for the rest of the sample. For the United States, this study also uses the U.S. Census Bureau's population estimates.

To generate GDP by metropolitan area we summed county-level GDP estimates from Moody's Analytics using county-based metropolitan area definitions.[13] Oxford Economics collects data from national statistics bureaus in each country or from providers such as Haver, ISI Emerging Markets, and Eurostat. It calculates forecasted metro GDP as the sum of forecasted industry GVA at the metropolitan level.[14]

For population, this study uses the U.S. Census Bureau's intercensal population estimates for the United States and data collected by Oxford Economics from relevant national statistical agencies for the rest of the sample. To forecast 2014 population for U.S. metro areas, annualized growth rates from 2008 to 2013 are applied to 2013 estimates. Oxford Economics forecasts metropolitan population based on official population projections produced by national statistical agencies and/or organizations such as Eurostat, adjusting migration assumptions on a case-by-case basis.

For 43 of the 47 mainland Chinese metropolitan areas included in the report, Brookings took an additional step to process the industry-level employment estimates. China's National Bureau of Statistics generates industry-level employment as well as a general category called "private and individual employees." Given the high volatility that characterizes this latter series, Brookings employed an autoregressive moving-average model.[15] This model applied a weighted-moving-average filter with one lag period, one current period, and one future period, and assigned weights of 1, 1.5, and 1, respectively. Once private employment was smoothed we allocated total private and individual employees to the industry-level employment categories proportionally to their share of the total for that metropolitan area. We repeated this process for all of the metro areas with private and individual employees for all years between 2000 and 2014.

For industry analysis, this report collected industry-level data and estimates for metropolitan employment and GVA. This edition uses the eight major industrial sectors from the previous edition of *Global MetroMonitor*, for which GVA and employment data were available at the metropolitan level (see Table B1). In large part, this industrial identification was driven by data availability with the goal of reaching a balance between industry disaggregation and consistency of categories across metros and countries.

INDUSTRY CATEGORIES IN *ASIA-PACIFIC METROMONITOR*

Industry	Category	Approximate NAICS Code
Commodities	Agriculture, Forestry, Fishing, and Hunting	11
	Mining, Quarrying, Oil and Gas Extraction	21
Manufacturing	Manufacturing	31-33
Utilities	Utilities	22
Construction	Construction	23
Trade and Tourism	Wholesale Trade	42
	Retail Trade	44-45
	Accommodation and Food Services	72
Transportation	Transportation and Warehousing	48-49
Business, Financial, and Professional Services	Finance and Insurance	52
	Real State and Rental and Leasing	53
	Professional, Scientific, and Technical Services	54
	Management of Companies and Enterprises	55
Local Nonmarket Services	Administrative and Support and Waste Management and Remediation Services	56
	Educational Services	61
	Health Care and Social Assistance	62
	Arts, Entertainment, and Recreation	71
	Other Services (Except Public Administration)	81
	Government (Public Administration)	92
	Information	51

For U.S. metro areas, Moody's Analytics provides GVA and employment by industry, using the North American Industry Classification System (NAICS) 2007. For metro areas outside of the United States, Oxford Economics reports data available from local and national statistical agencies.

Moody's Analytics bases industry employment forecasts for U.S. metro areas on two U.S. Bureau of Labor Statistics series: the monthly **Current Employment Statistics** (CES) and the **Quarterly Census of Employment and Wages** (QCEW). In forecasting industry GVA and employment for metro areas, Oxford Economics employs different methods depending on the type of industry. For tradable sectors (primary industries and business and financial services), the GVA forecasts take into account the historical relationship between the growth of the industry in a metro area compared with the respective national average. Public services forecasts follow the same method, adding metro population to reflect the nature of demand for local services. GVA forecasts for trade and tourism and transportation are modeled against the performance of the previous two categories of industries (tradable sectors and public services), to reflect local multiplier effects. Industry employment forecasts are based on GVA industry forecasts and trends in labor productivity.

Metro economic performance score

The report focuses on the economic performance of metropolitan areas using a standardized score composed of two indicators: the annualized growth rate of real GDP per capita and the annualized growth rate of employment. These two indicators reflect the importance that people and policymakers attach to achieving rising incomes and standards of living (GDP per capita), and generating widespread labor market opportunity (employment). Identifying economic data available across the entire sample of 100 metro areas limited the choice and number of additional indicators to be included in the standardized score. For example, while changes in the employment rate or the unemployment rate may better indicate labor market opportunity, there are no consistent data on the number of unemployed people or the size of the labor force across metropolitan areas worldwide.

The scoring method compares each value of a variable (X_i) to the median (X_{med}), then divides the difference by the distance between the value of that variable at the 90th percentile of the distribution (X_{90}) and the 10th percentile (X_{10}):

$$Standardized\ score = \frac{X_i - X_{med}}{X_{90} - X_{10}}$$

Each of the two indicators (annualized growth rates of income (GDP per capita) and employment) is standardized using this method for the time period corresponding to 2013-2014 as well as for compound growth rates for both indicators for the 2009-2014 period. Once standardized, the scores for each of the two indicators are added for each metro area, therefore yielding a total score and ranking for each metro area for each time period.

Interdecile range standardization helps minimize the influence of outliers by using the 90th and the 10th percentile values instead of the minimum and maximum values, and best reflects the nonnormal distribution of metro economic growth rates. This method was judged more appropriate for these data than Z-score standardization, which compares each value of a variable to the mean and divides the difference by the standard deviation, as they do not follow a normal distribution. It was also preferred to range standardization (which compares each value of a variable to the minimum and divides the residual by the distance between the minimum and the maximum) because of the sensitivity of this latter method to outliers.

Comparison across regions, industries, and specializations

In the report we present comparisons of metropolitan areas grouped by industries, regions, and industry specializations. To conduct this analysis rather than present the average of an indicator (real GDP per capita or employment growth) by category, we calculate the absolute level of that indicator according to the category of analysis. For example, when calculating income growth by region we did not average the growth rate of all the metro areas in a particular region; we rather summed the real GDP of all the metros in that category and divided it by total population of metros in the same category. This approach was selected given the fact it reduces the weight of observations with extreme values in a specific indicator but that have a small share in the total.

Metropolitan specialization

Based on their industrial mix in 2014, this study classifies metropolitan areas into six industrial specializations, reflecting the eight categories described above, with construction and local nonmarket services, and commodities and utilities, grouped into one category. Industrial specializations were assigned using location quotients, which are based on the ratio of an industry's share of real GVA to the industry's share of national real GVA. The industry specialization was determined by the highest location quotient, as long as this ratio was higher than 1 and that industry represented more than 5 percent of metropolitan output in 2014. The location quotient was determined based on real GVA industrial data, rather than employment, due to better data quality. Three metropolitan areas were excluded because they coincide with the country baseline (Singapore, Hong Kong, and Macau).

While industry specialization of a metro area relative to the world or other metro areas in its world region might be more appropriate for the scope of this report, the available and heterogeneity of the data limit such classification. There is a larger degree of consistency in the data collection and estimation methodology for the industry output of a metro and its country than across metros in different countries.

ENDNOTES

1. Hillary Clinton, "America's Pacific Century," *Foreign Policy*, October 11, 2011.

2. In some cases we included metropolitan economies that are not located next to the Pacific but whose trade or FDI economic activity is heavily oriented toward the coasts of the Pacific.

3. Alan Berube and Philipp Rode, *Global MetroMonitor* (Washington and London: Brookings Institution and London School of Economics, 2010). These are by no means the only metrics that should guide economic policymakers in cities. That noted, the two key metrics in this report reflect the importance that policymakers and the public attach to achieving rising incomes and standards of living (GDP per capita), as well as generating widespread labor market opportunity (employment). Data are currently unavailable to compare the distribution of income gains across global metropolitan areas. Employment growth, in addition to GDP per capita growth, provides an indirect measure of whether increased labor market opportunity is accompanying growth in the average standard of living.

4. Berube and Rode, *Global MetroMonitor*.

5. Sources for definitions: U.S. Bureau of Economic Analysis, International Labor Organization, United Nations Department of Economic and Social Affairs.

6. Economic performance in this study refers to how well an economy is doing in terms of growth of GDP per capita and employment.

7. These numbers are estimated from the previous version of the *Global MetroMonitor*.

8. Josh Noble and Julie Zhu, "Macau: The Big Gamble," *Financial Times*, April 21, 2015; Linette Lopez, "2 Massive Casinos Are About to Open in Macau, and They Could End Up Being One Giant Disaster," *Business Insider*, May 12, 2015.

9. Kris Hartley, "The Rise of China's Inland Cities," *Diplomat*, May 2, 2015.

10. In 2014 U.S. production of petroleum increased 13 percent, while China posted 0.5 percent growth. U.S. Energy Information Administration, 2014 US and Other Top 5, Total Petroleum and Other Liquids Production, available at: http://www.eia.gov/beta/international/, accessed on May 20, 2015.

11. For this report we use the 2013 metropolitan statistical area delineations defined by U.S. Office of Management and Budget, *Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas*, OMB Bulletin No. 13-01 (OMB, 2013).

12. The purchasing power parity (PPP) rates come from a variety of sources such as the International Monetary Fund and other national statistics agencies. If national and metropolitan GDP and industry GVA data were available both in current and constant prices, Oxford Economics rebased the constant price series to 2009 for consistency, and then applied the 2009 U.S. dollar exchange rate (which comes from various national statistics offices) to the whole series. Where constant price series were not available for a metropolitan area, Oxford Economics used the respective national industry deflators to create constant price series for that specific metropolitan area.

13. The GDP by county, estimated or forecasted, is obtained through allocating U.S. Bureau of Economic Analysis' state GDP to component counties based on the counties' share of employment in state employment. Moody's Analytics uses the Bureau of Labor of Statistics **Quarterly Census of Employment and Wages** as a basis for county employment estimates. For real GDP Moody's uses chain-weighting for every industry.

14. It is also important to mention that Moody's Analytics' GDP figures are lower than what other international agencies such as the IMF publish for the United States. This results in a more accurate depiction of the state of the U.S. economy, but results in an underestimation of economic performance when compared to other countries and metro peers.

15. Philip Hans Franses, *Time Series Models for Business and Economic Forecasting* (Cambridge University Press, 1998).

GLOBAL CITIES INITIATIVE
A Joint Project of Brookings and JPMorgan Chase

ABOUT THE GLOBAL CITIES INITIATIVE
A Joint Project of Brookings and JPMorgan Chase

The Global Cities Initiative equips city and metropolitan area leaders with the practical knowledge, policy ideas, and connections they need to become more globally connected and competitive.

Combining Brookings' deep expertise in fact-based, metropolitan-focused research and JPMorgan Chase's market expertise and longstanding commitment to investing in cities, this initiative:

➤ Helps city and metropolitan leaders better leverage their global assets by unveiling their economic starting points on key indicators such as advanced manufacturing, exports, foreign direct investment, freight flow, and immigration.

➤ Provides metropolitan area leaders with proven, actionable ideas for how to expand the global reach of their economies, building on best practices and policy innovations from across the nation and around the world.

➤ Creates a network of U.S. and international cities interested in partnering together to advance global trade and commerce.

The Global Cities Initiative is chaired by Richard M. Daley, former mayor of Chicago and senior advisor to JPMorgan Chase. It is co-directed by Bruce Katz, Brookings vice president and co-director of the Brookings Metropolitan Policy Program, and Amy Liu, senior fellow and co-director of the Brookings Metropolitan Policy Program.

Launched in 2012, the Global Cities Initiative will catalyze a shift in economic development priorities and practices resulting in more globally connected metropolitan areas and more sustainable economic growth.

Core activities include:

Independent Research: Through research, the Global Cities Initiative will make the case that cities and metropolitan areas are the centers of global trade and commerce. Brookings will provide each of the largest 100 U.S. metropolitan areas with baseline data on its current global economic position so that metropolitan leaders can develop and implement more targeted strategies for global engagement and economic development.

Catalytic Convenings: Each year, the Global Cities Initiative will convene business, civic and government leaders in select U.S. metropolitan areas to help them understand the position of their metropolitan economies in the changing global marketplace and identify opportunities for strengthening competitiveness and expanding trade and investment. In addition, GCI will bring together metropolitan area leaders from the U.S. and around the world in at least one international city to explore best practices and policy innovations for strengthening global engagement, and facilitate trade relationships.

Global Engagement Strategies: In order to convert knowledge into concrete action, Brookings and JPMorgan Chase launched the Global Cities Exchange in 2013. Through a competitive application process, economic development practitioners in both U.S. and international cities are selected to receive hands-on guidance on the development and implementation of actionable strategies to enhance global trade and commerce and strengthen regional economies.

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