

Knowledge Leadership

Worldwide Centers of Commerce Index™

2007



Executive Summary¹

Urbanization has been accelerating in recent years on a global basis. In 2006, a turning point was reached: for the first time in human history more people lived in urban areas than in rural areas. It is not an exaggeration to say that, from the perspective of cultural evolution, humans are rapidly becoming an urban-dwelling species.

Integral to this global urbanization is the rise in the number of large cities. In terms of population size and economic activities, many cities today are far larger than a significant number of sovereign states. Today, 58 countries have populations less than 2.5 million; and about 35 have less than 500,000. In comparison, 89 cities worldwide have populations greater than 2.5 million. If cities and their agglomerations are counted (an agglomeration is comprised of urban communities linked to a neighboring city through transportation networks, to efficiently create a single metropolitan region.²); then there are 153 cities plus their agglomerations with more than 2.5 million people.³

It is not just their size but also their economic functions that make cities more important than ever before. Today many of these metropolises are “global cities”⁴ that perform critical functions connecting markets and commerce across the world. Simply put, they are nodes of connectivity through which global commerce can take place. A growing number of cities in developed countries generate half or more of their national GDP. These include cities as diverse as Seoul, Copenhagen, Dublin, Helsinki, and Brussels. Major cities in Canada – Toronto, Montreal and Vancouver – each generate half or more of the economic outputs of their respective provinces. London, Stockholm, Tokyo, Paris, Oslo, Auckland and Prague each generate a third or more of their respective nation’s GDP. In many emerging markets, cities play a leading role in integrating with global markets, and creating powerful business and industry clusters in the process, as evidenced by Shanghai and Mumbai.

For global businesses, an in-depth understanding of how these global cities are connected and how their growth dynamics are configured, is a

prerequisite for success in the global market today. Multinational companies used to be firmly based in their home countries, mainly in the U.S. and Western Europe, and operated internationally through a network of representative offices based in local markets around the world. In this model, all core functions and decision-making resided within the global headquarters in the home country. In recent years, this model has been gradually transformed by a more integrated approach. Because of globalization and the dynamics of emerging markets, many local offices have proven to be far more efficient in performing many of the core functions, such as planning, R&D, finance and accounting, than the global headquarters. Companies, on the other hand, are increasingly concerned with clustering effects, created by networks of suppliers (both competitors and partners) working in close proximity; innovations and logistical efficiency, which are all determined by local market conditions – in other words, location advantages. As a result, location advantages have become important as parts of a company’s competitive advantage. Leveraging location advantages in turn requires a company to have the ability to effectively allocate and then integrate its operations horizontally and globally.

At times, location advantages work in counterintuitive ways. As pointed out by Michael Porter,⁵ Houston, Texas, is an important center for the oil and gas industry today even though very little of the world’s oil and gas is now produced in Texas. It is important because of the high concentration of intellectual capital and companies with advanced technologies vital to industry located there, rather than in the Middle East. Ultra deep-water offshore drilling and advanced reservoir recovery are the cutting-edge processes in the oil and gas industry today. The most sophisticated equipment for these operations are made by companies located in Houston, supported by a wide cluster of efficient and innovative suppliers. These deeply entrenched location advantages make Houston an important center for the oil and gas industry globally.

The successful company of the future will be transnational, operating seamlessly as a single global entity employing people and positioning resources

wherever appropriate, in accordance with location advantages on a global basis. Core functions, while remaining central to the company's operations, will be spread out geographically to leverage those location advantages wherever they are found. This approach will require a strong grasp of how global cities are interrelated; and how they compete with and complement one another, so that transnationals can leverage the benefits of these cities.

For businesses in the consumer markets, knowledge of the formation and rise of global cities, and how they function as centers of commerce, is indispensable. This is because global cities are where wealth is created, where the most skilled knowledge workers, the most innovative companies, and the best public and private institutions are concentrated. As a result,

both companies and their employees have levels of productivity much higher than if they were dispersed and operating on their own ⁶. Higher productivity means businesses can afford to pay higher wages. A higher concentration of well-paid workers in turn means a dynamic consumer market. Not surprisingly, the most exciting consumer markets globally are to be found among centers of commerce.

Many multinational companies claim to be global businesses today. In the coming decades, however, only those with the capability of building a globally integrated structure may succeed. Understanding the dynamics of global cities, and their critical role as Worldwide Centers of Commerce, is a good way to begin.

The MasterCard Worldwide Centers of Commerce Index™

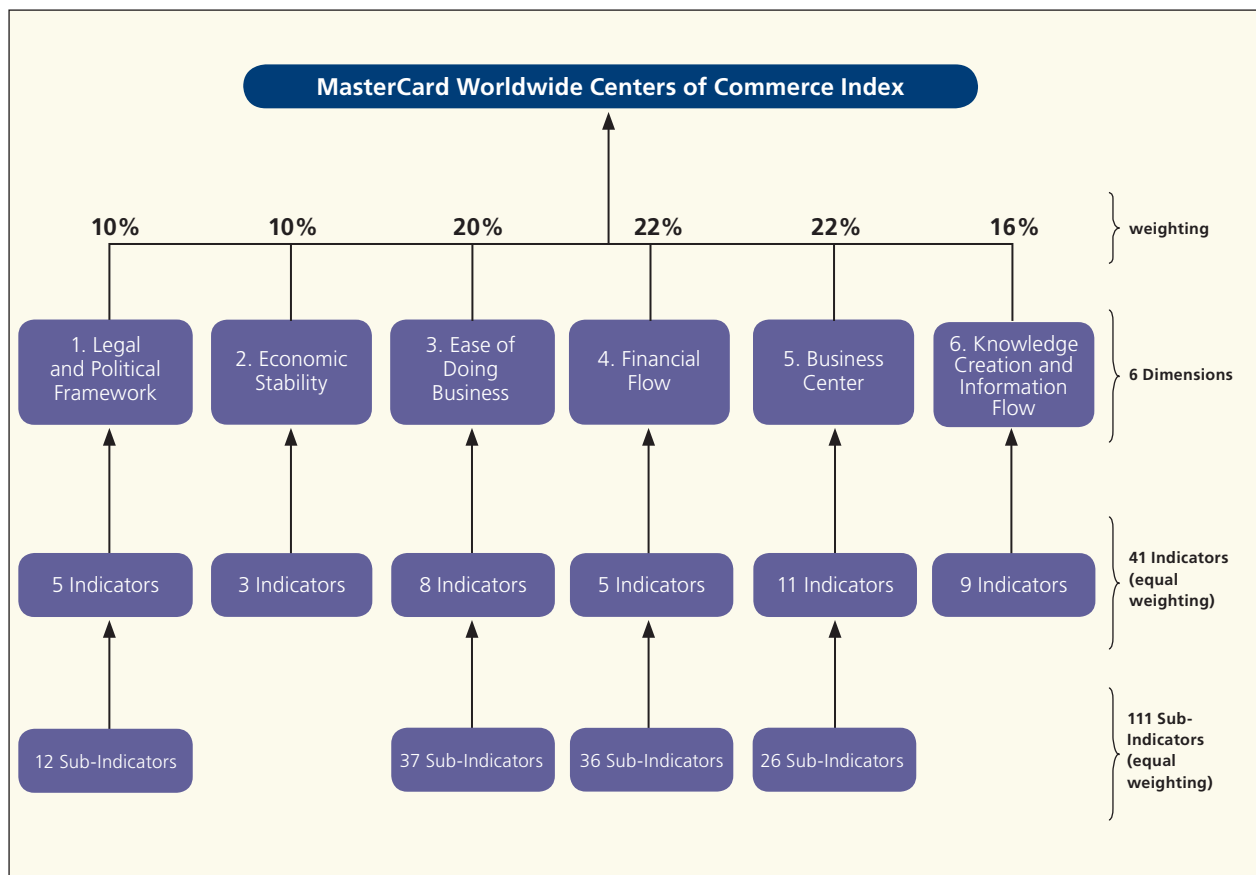
The MasterCard Worldwide Centers of Commerce Index™ is a research project that ranks the world's top cities in terms of their performance as Centers of Commerce in the global economy. An index structure consisting of six dimensions was designed by a team of leading experts (see Appendix A for members of the Knowledge Panel that guided the development of the project). Each of these six dimensions in turn consists of a number of indicators, and each indicator is made up of a number of sub-indicators. All told, the index involves six dimensions, 41 indicators and more than 100 sub-indicators.⁷

As shown in Chart 1, the six dimensions are: (1) legal and political framework; (2) economic

stability; (3) ease of doing business; (4) financial flow; (5) business center; and (6) knowledge creation and information flow. Collectively these six dimensions are meant to cover the key functional characteristics of a city considered to be among the world's Centers of Commerce. Institutional factors are covered by the "legal and political framework" dimension. The intensity of global connectivity and volume of throughput are captured by the "financial" and "business center" dimensions. Risk factors associated with the city are covered by the "economic stability" dimension.

The Index also incorporates factors beyond those considered by traditional definitions of international financial and business centers. For example, in the "ease of doing business" dimension, factors related to quality of life are included, which in turn require consideration of public policy challenges in urban development and related social policies. Taking into

Chart 1
MasterCard Worldwide Centers of Commerce Index Map



account the increasingly important role of innovation and creativity in driving global economic activities, a whole dimension, “knowledge creation and information flow,” is added to assess the performance of the Worldwide Centers of Commerce.

The weights assigned to each of the six dimensions are determined by the knowledge panel. The overall pattern reflects the view that economy-wide data should have less weight than city-specific data.

Ranking of the Top 50 Worldwide Centers of Commerce

Applying the Index structure and using 2006 data, the world’s top 50 Worldwide Centers of Commerce are ranked (see Appendix B for the full list of the 50 and their Index values; and Appendix C for details of the Index calculation). Chart 2 presents the world’s top 10 Centers of Commerce.

That London, New York, and Tokyo are the top three Worldwide Centers of Commerce is no surprise, and consistent with many other studies on global cities. London beats New York by a narrow margin of only 3.99 in the overall Index value. The three Asian economic tigers, Hong Kong, Singapore and Seoul, are among the top 10.

The Index values of the six dimensions for London are summarized in Chart 3. It scores the highest in being the most economically stable (93.54), followed by “ease of doing business” (87.87) and “legal and political framework” (84.11). It scores the lowest in “knowledge creation and information flow” (52.72), which is lower than what New York and Tokyo score in this dimension (61.55 and 55.94, respectively).

Nine U.S. cities are among the top 50, and all are ranked in the top 25. U.S. cities benefit from strong scores in the “legal and political framework” and in the “economic stability” dimensions; and interestingly, they also all score very high in the “knowledge creation and information flow” dimension, although many of

Chart 2
2007 Global Ranking

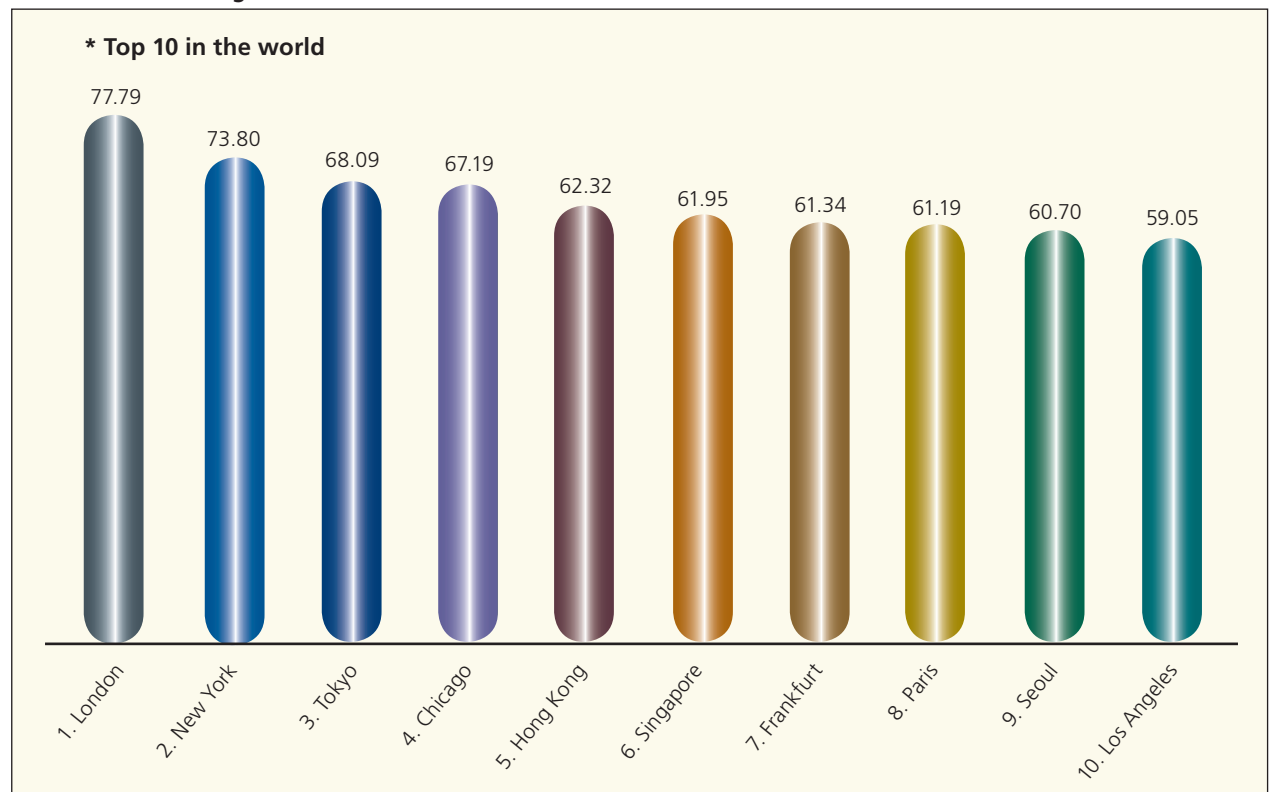
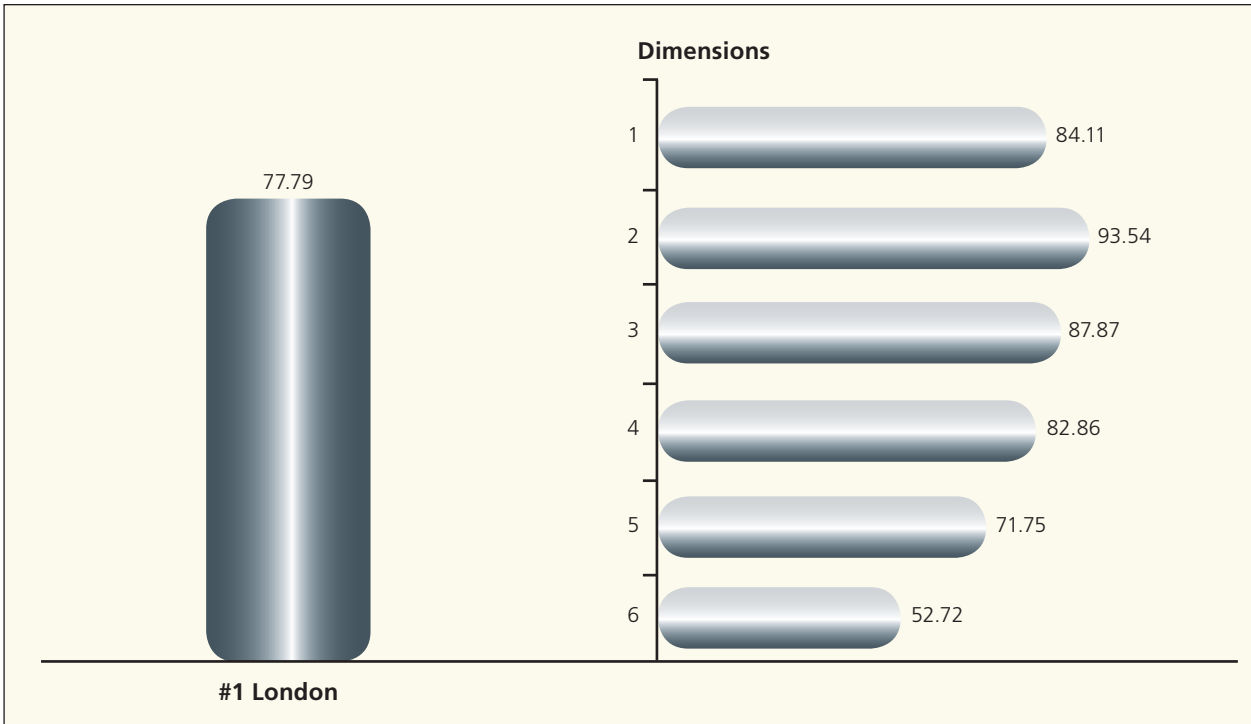


Chart 3
2007 Global Ranking



them score much lower in the other dimensions, such as “ease of doing business,” “financial flow” and “business center” dimensions, compared with the leading European cities.

The high rankings of cities in Western Europe are no surprise, given their highly developed business and economic infrastructures, high investment in education, and overall higher per capita income. The one exception is perhaps Madrid, which ranks 16. This is likely because Madrid is such an important business center for South American companies and a key conduit for them into the European market.

The Asia/Pacific, Middle East and Africa (APMEA) region, including Australia, is well represented with 10 cities included in the top 50; and they are also spread out, with five cities in the top 25, including Sydney, which ranks 14. Three cities in China are in the top 50: Hong Kong ranks number five, Shanghai is at 32 and Beijing ranks 46. One city in India is in the top 50, Mumbai, which ranks 45. In the Middle East, Dubai ranks 37 and Tel Aviv ranks 44.

Among the top 50 Worldwide Centers of Commerce ranked, the sole city in Africa to be

included, is Johannesburg, ranked 47. Three cities from Latin America are also in the top 50.

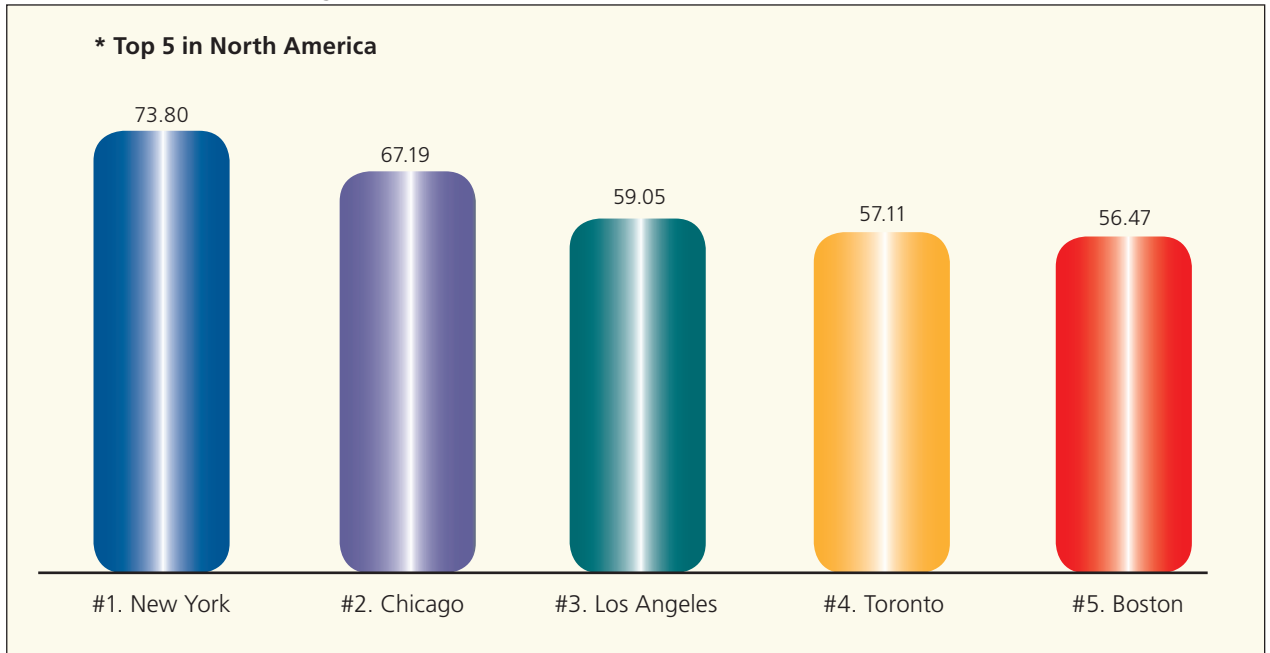
Regional Ranking

North America

The top five Worldwide Centers of Commerce within the North American region are New York, Chicago, Los Angeles, Toronto and Boston, as shown in Chart 4. There are 12 cities from the North American region that are in the top 50; all are U.S. cities, with the exceptions of Toronto, Montreal and Vancouver in Canada.

The top ranking city in the North American region is New York, which, as mentioned earlier, is ranked second in the top 50 of the world. The Index values of the six dimensions for New York are summarized in Chart 5. New York scores higher than number-one ranked London in the “legal and political framework” and “knowledge creation and

Chart 4
2007 North America Ranking



information flow” dimensions; about the same in the “economic stability” and “ease of doing business” dimensions; but lower in the “financial flow” and “business center” dimensions. The two cities are, however, very close: London is ahead of New York by an Index value of only 3.99.

Asia/Pacific, Middle East & Africa

The top-ranking city in the Worldwide Centers of Commerce Index in the Asia/Pacific, Middle East & Africa (APMEA) region is Tokyo, which ranks third in the world’s top 50. Tokyo is followed by Hong Kong,

Chart 5
2007 North America Ranking

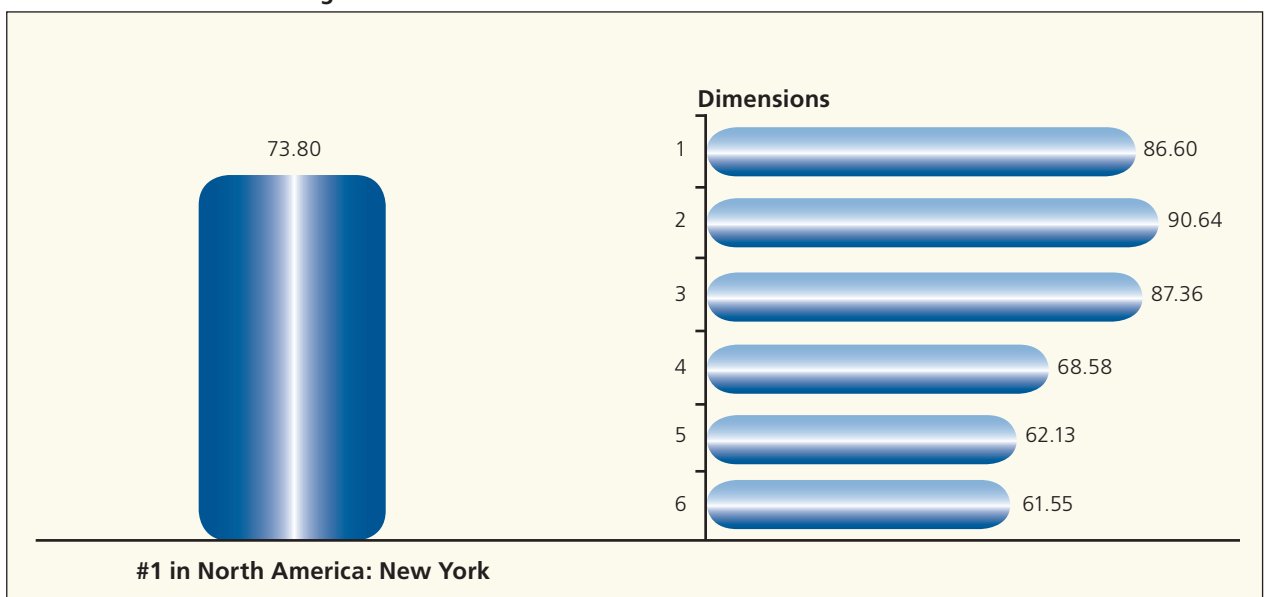
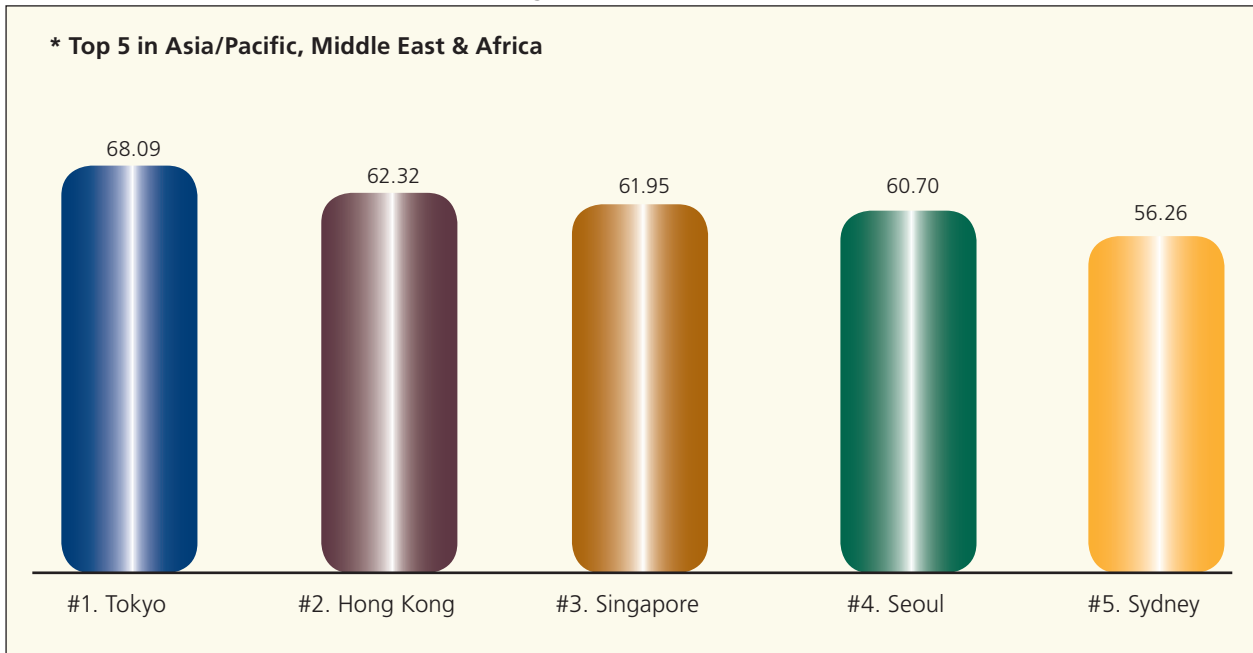


Chart 6
2007 Asia/Pacific, Middle East & Africa Ranking

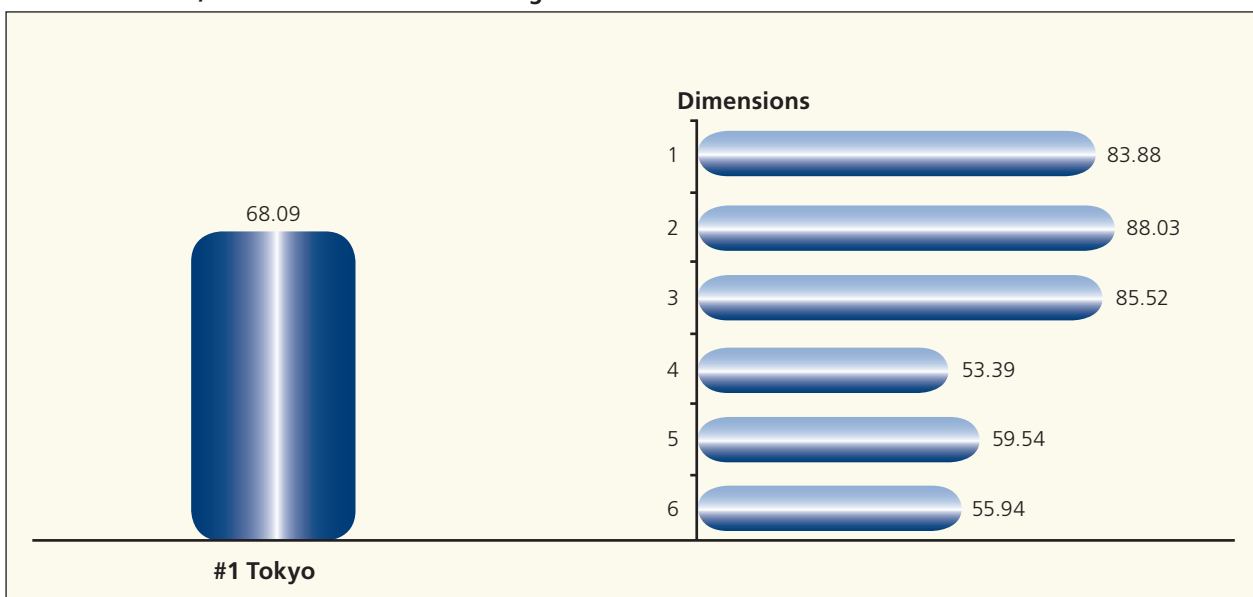


Singapore, Seoul and Sydney as the region's top five have been illustrated in Chart 6.

The Index values of the dimensions for Tokyo are summarized in Chart 7. Compared with London and New York, Tokyo scores very well in the three dimensions of "legal and political

framework," "economic stability," and "ease of doing business"; but significantly lower in the three dimensions of "financial flow," "business center," and "knowledge creation and information flow." This is to a large extent a reflection of Tokyo being primarily a hub for Japan itself and Northeast Asia,

Chart 7
2007 Asia/Pacific, Middle East & Africa Ranking



but relatively weak in its connectivity beyond its sub-region.

India is represented by Mumbai, which ranks 45 in the world's top 50. Two cities in the Middle East, Dubai and Tel Aviv, are in the top 50, ranking 37 and 44, respectively. As mentioned earlier, only one city in Africa, Johannesburg, which ranks 47, is included in the world's top 50. A common trait among these cities is their lower score in the "knowledge creation and information flow" dimension.

Europe

The top-ranking city in the Worldwide Centers of Commerce Index in Europe is London, placing number one in the world's top 50. London is followed by Frankfurt, Paris, Amsterdam, and Copenhagen in the European regional ranking, as shown in Chart 8. But there is a wide gap in the overall Index value among London and the rest; scores drop from London's 77.79 to Frankfurt's 61.34, Paris' 61.19, Amsterdam's 57.30 to Copenhagen's 56.14

Chart 8
2007 Europe Ranking

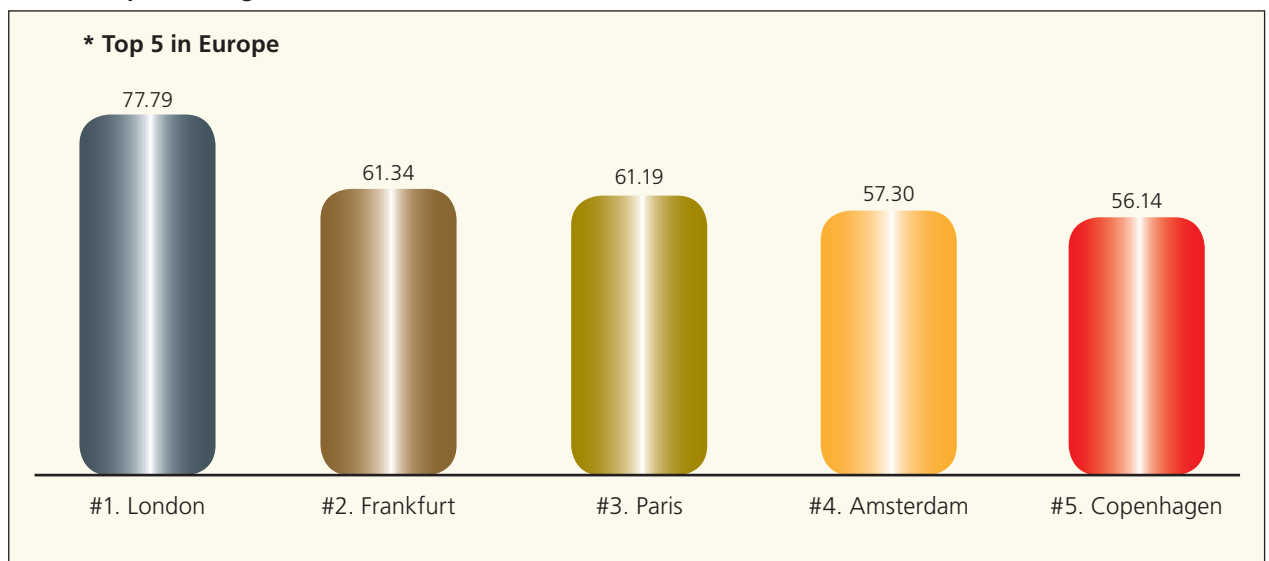
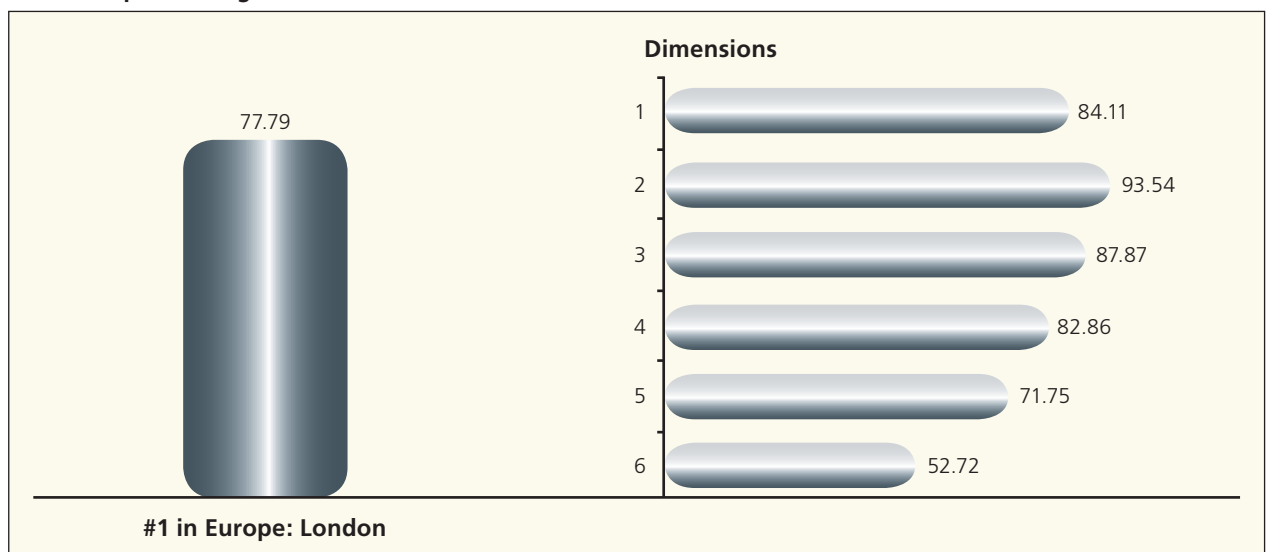


Chart 9
2007 Europe Ranking



and Copenhagen's 56.14. The Index values of the dimensions for London are summarized in Chart 9.

Within the European cities included in the world's top 50, there is an obvious gap between the index values of the cities of Western Europe and Eastern Europe. Rome ranks the lowest among Western European cities, with an overall index value of 43.18. Budapest ranks the highest among Eastern European cities, with an overall Index value of 43.75. Budapest outperforms Prague by a very small margin (0.20),

possibly as a result of Hungary's longer period of exposure to the global marketplace. Warsaw and Moscow rank 49 and 50, respectively, in the list of the top 50, with overall index values of 40.56 and 39.80.

Latin America and the Caribbean

The top three cities in the Latin American and the Caribbean regions are Santiago, Mexico City, and São Paulo as shown in Chart 10.

Chart 10
2007 Latin America and the Caribbean Ranking

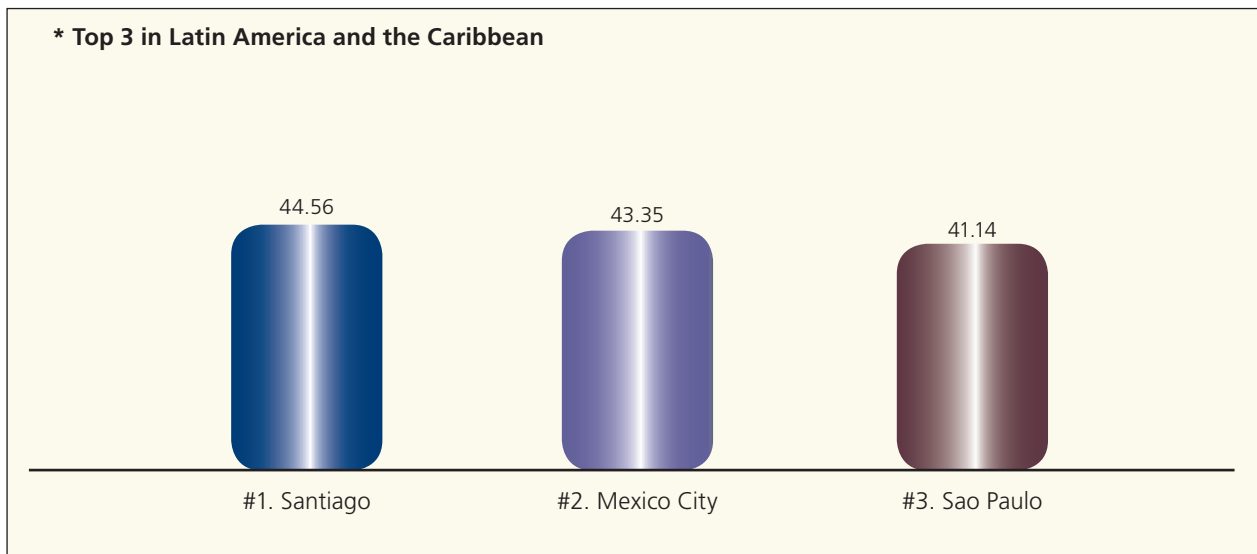
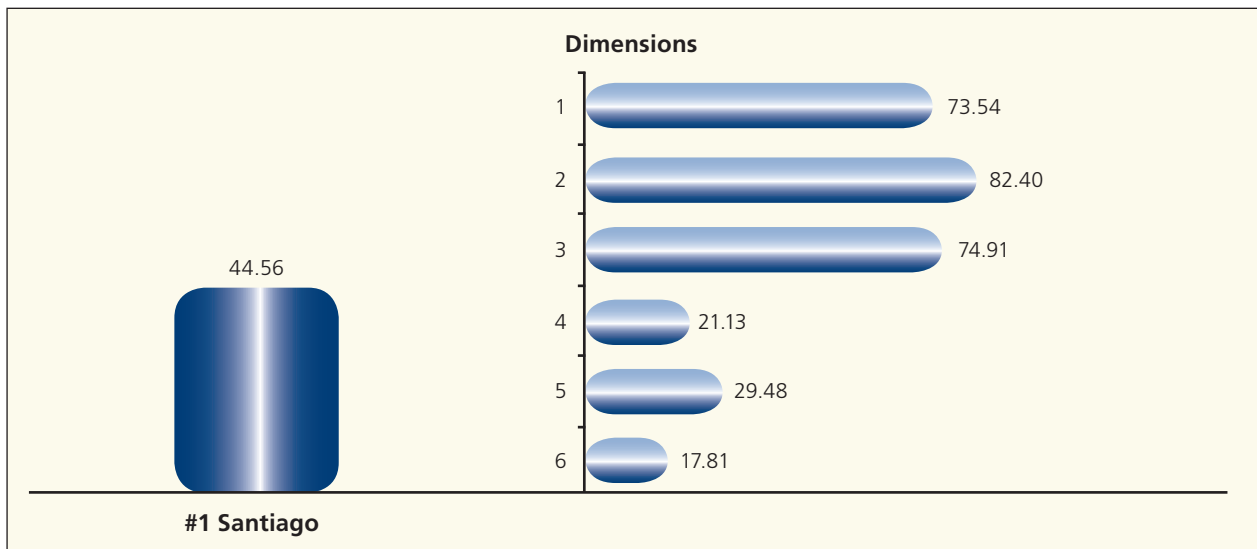


Chart 11
2007 Latin America and the Caribbean Ranking



The dimensional Index values of Santiago are summarized in Chart 11. As is visually clear, the Index values for the “financial flow,” “business center,” and “knowledge creation and information flow” dimensions are low compared to its northern neighbors. Nonetheless, the fact that three cities from Latin America are among the world’s top 50 Worldwide Centers of Commerce is a strong statement of how the region is increasingly becoming more global and competitive.

Dimension Rankings

The rankings according to each of the six dimensions reveals specific areas of strengths and weaknesses of the Worldwide Centers of Commerce included in the world’s top 50.

Legal and Political Framework Dimension

The “legal and political framework” dimension is derived from the indicators and sub-indicators noted in Chart 12.

Table 1 summarizes the ranking of the “legal and political framework” dimension, of which two features are evident: The first is that with the exception of Singapore and Tokyo, all of the top cities are in North America and Western Europe, and their Index values are very close. This reflects the maturity of institutional development of the countries in which these cities are located, which is not something that emerging markets could replicate quickly. The second feature is that the indicators and sub-indicators used for calculating the Index value of this dimension are based on country-wide values; hence, cities in the same country have identical Index values, such as the case of cities in the U.S. in Table 1. This in turn explains the dominance of

Chart 12
Dimension 1: Legal and Political Framework

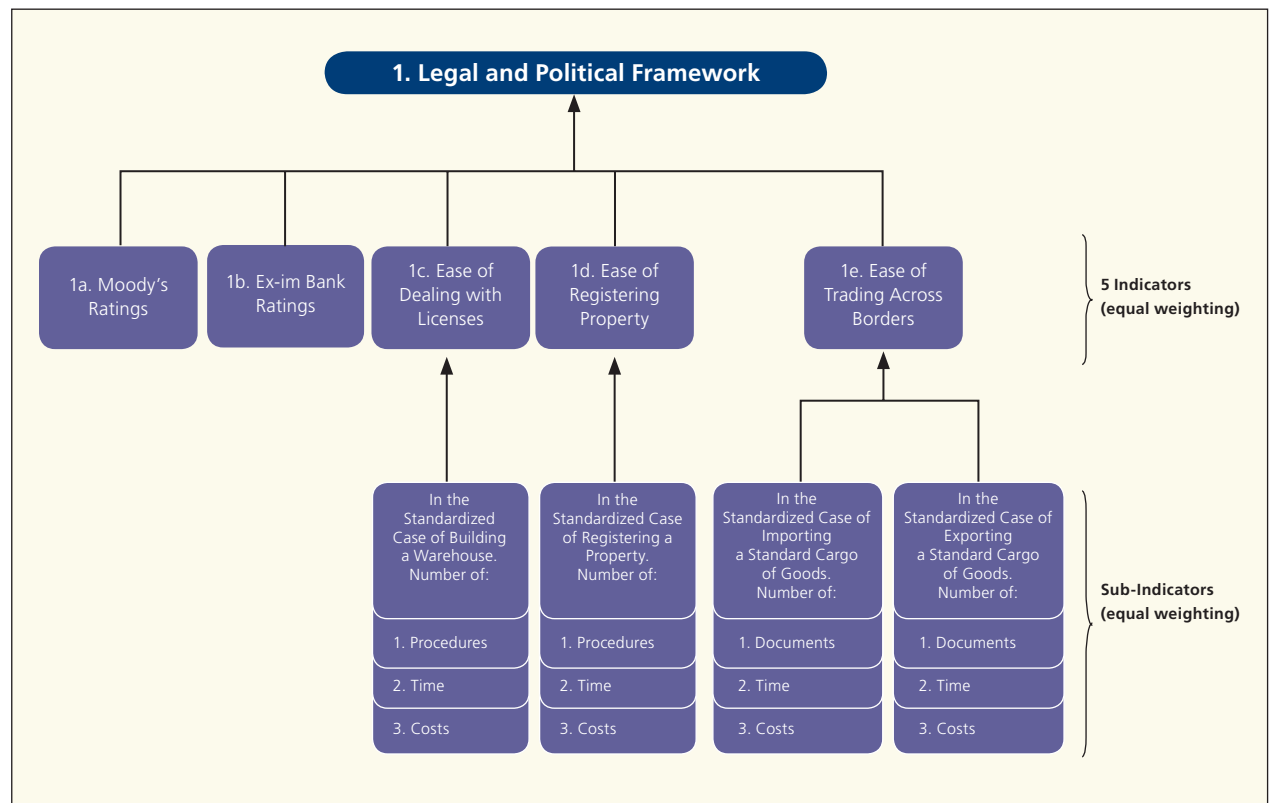


Table 1
Legal and Political Framework Dimension

Index Value	Worldwide Centers of Commerce
88.78	Stockholm
88.73	Copenhagen
88.12	Singapore
86.60	Atlanta, Boston, Chicago, Houston, Los Angeles, Miami, New York, San Francisco, Washington D.C.
85.83	Montreal, Toronto, Vancouver
84.68	Berlin, Frankfurt, Munich
84.11	London
83.88	Tokyo
83.42	Geneva, Zurich
83.32	Vienna

U.S. cities in this dimension: nine U.S. cities share the fourth highest Index value. London, the world’s top global city in the Centers of Commerce Index, has the seventh highest Index value in this dimension, with a score of 84.11.

Economic Stability Dimension

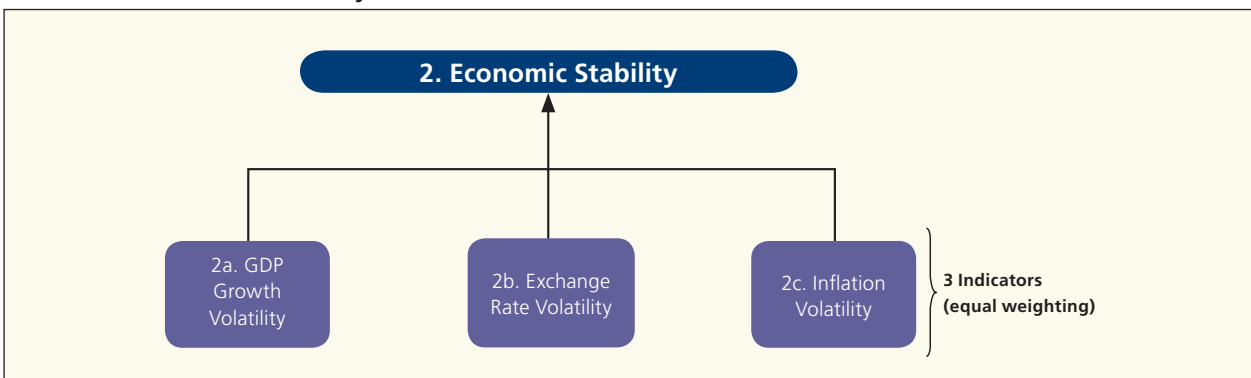
Chart 13 shows how the “economic stability” dimension is derived.

Table 2
Economic Stability Dimension

Index Value	Worldwide Centers of Commerce
94.52	Barcelona, Madrid
93.93	Vienna
93.54	London
93.32	Paris
93.06	Milan, Rome
92.89	Brussels
92.64	Copenhagen
92.63	Berlin, Frankfurt, Munich
92.42	Geneva, Zurich
91.86	Amsterdam

As with the “legal and political framework” dimension, the “economic stability” dimension is also highly dependent on the maturity of institutional development; and its indicators and sub-indicators are based on country-wide values, just as in the first dimension. Hence, cities in the same country share the identical Index values as shown in Table 2. The top 15 Worldwide Centers of Commerce in this dimension are all from Western Europe, while New York, ranked second among the Worldwide Centers of Commerce,

Chart 13
Dimension 2: Economic Stability



with an Index value of 90.64 in this dimension, does not make it to the top 15.

Ease of Doing Business Dimension

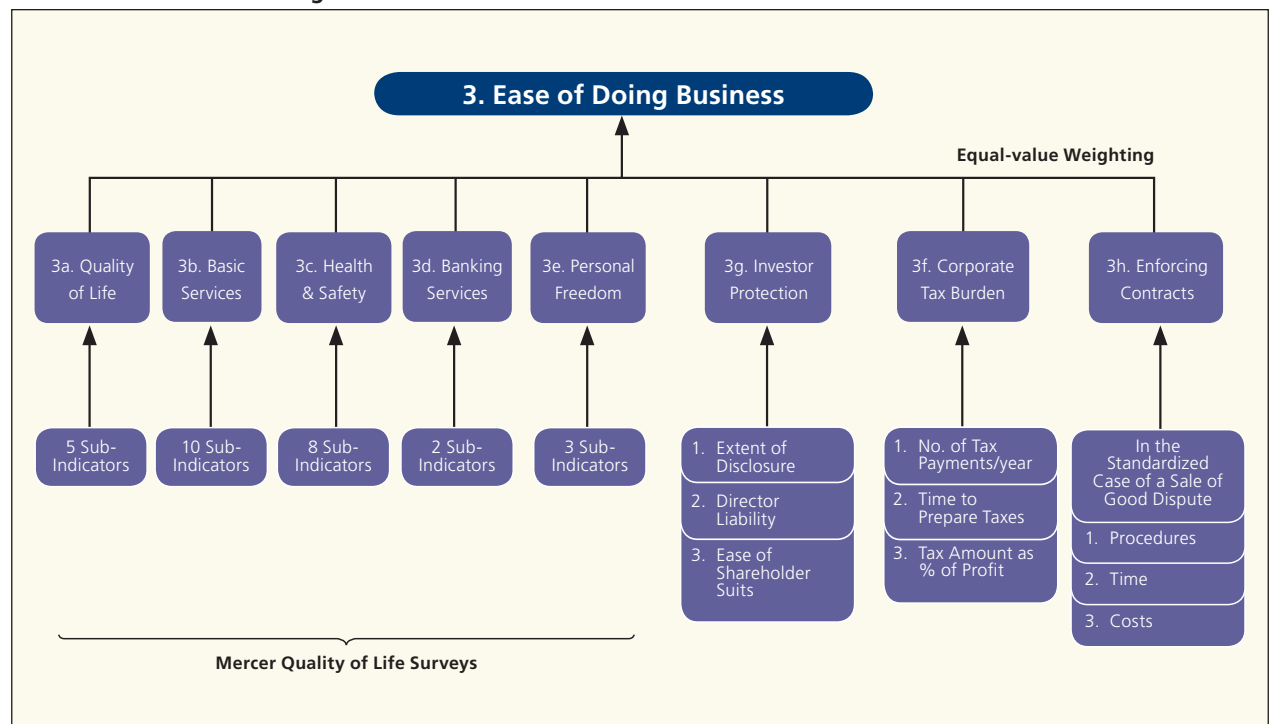
Chart 14 shows the indicators and sub-indicators used to derive the “ease of doing business” dimension.

Table 3 summarizes the ranking of the “ease of doing business” dimension. This is a dimension that incorporates quality of life measures, which are city-specific, and is dominated by three cities in Canada: Vancouver, followed by Toronto and Montreal. In Asia, only Singapore makes it to the top 10 in this dimension. London ranks fifth in this dimension, and New York ranks ninth. The Index values of the top 10 cities in this dimension are also very close. In addition to measuring the general quality of life, this dimension also includes assessments of the ease with which contracts are enforced, investor protection, quality of banking, and other basic services.

Table 3
Ease of Doing Business Dimension

Index Value	Worldwide Centers of Commerce
89.95	Vancouver
88.85	Toronto
88.48	Montreal
88.24	Singapore
87.87	London
87.69	Dublin
87.44	Copenhagen
87.40	San Francisco
87.36	New York
87.30	Los Angeles

Chart 14
Dimension 3: Ease of Doing Business



Financial Flow Dimension

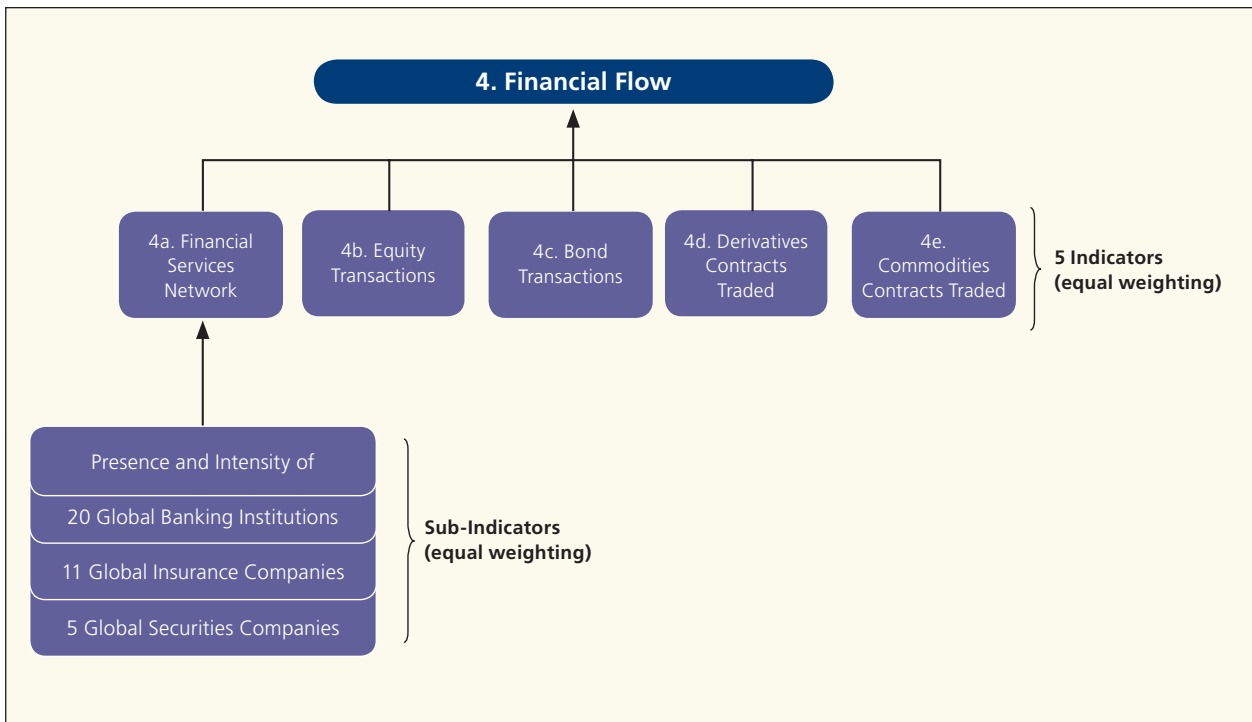
Chart 15 shows the indicators and sub-indicators used for the “financial flow” dimension.

The Index values of the Centers of Commerce in the “financial flow” dimension show a much higher level of variance than the previous three dimensions as can be seen in Table 4. The Index value in this dimension is city-specific. London ranks first in this dimension with an index value of 82.86. The Index value of the second ranking, New York, drops to 68.58. The relatively large gap between London and New York is mostly due to London’s much higher volume in bond trading. European cities dominate in this dimension too, accounting for five of the top 10. Three cities in APMEA make it to the top 10: Tokyo, Seoul, and Mumbai, which made it to the top 10 in this dimension due to its high trading volumes in bonds and equities. These top-ranking Centers of Commerce conform to the network of global financial transactions and flow; although more detailed analysis would show specialization between the centers in areas such as bonds, derivatives and equity trading.

Table 4
Financial Flow Dimension

Index Value	Worldwide Centers of Commerce
82.86	London
68.58	New York
55.84	Chicago
53.50	Frankfurt
53.39	Tokyo
53.00	Seoul
43.22	Paris
41.22	Madrid
39.09	Milan
38.71	Mumbai

Chart 15
Dimension 4: Financial Flow



Business Center Dimension

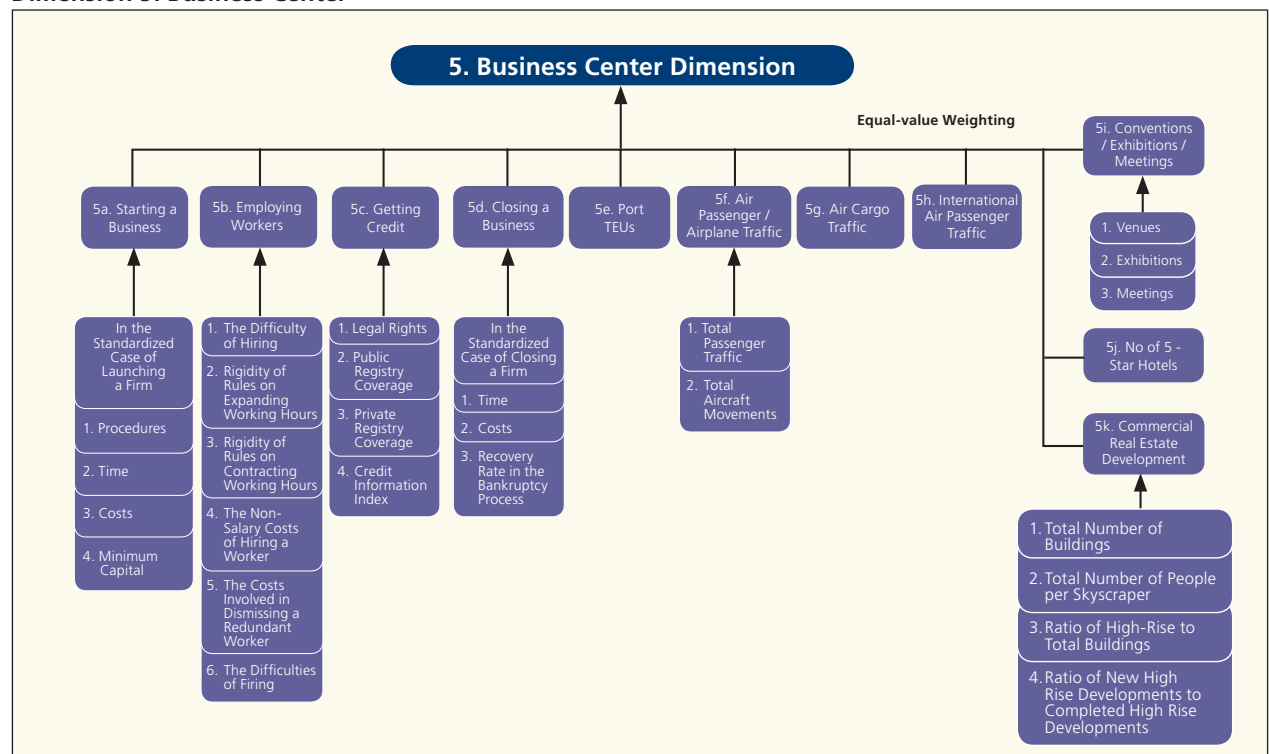
The indicators and sub-indicators used for calculating the Index value of the “business center” dimension are summarized in Chart 16.

The “business center” dimension values show significant differences between cities, as can be seen in Table 5. Hong Kong leads in this dimension and is one of four cities in Asia that makes the top 10. London and New York rank second and fourth, respectively, in this dimension which depends on the clustering effect of business formation, supported by efficiency in logistics and transportation linkages. Cities with less sophisticated logistics and transportation infrastructures scored lower in the rankings of this dimension.

Table 5
Business Center Dimension

Index Value	Worldwide Centers of Commerce
71.89	Hong Kong
71.75	London
66.16	Singapore
62.13	New York
59.54	Tokyo
56.19	Los Angeles
55.21	Paris
53.88	Chicago
53.03	Amsterdam
52.09	Shanghai

Chart 16
Dimension 5: Business Center



Knowledge Creation and Information Flow Dimension

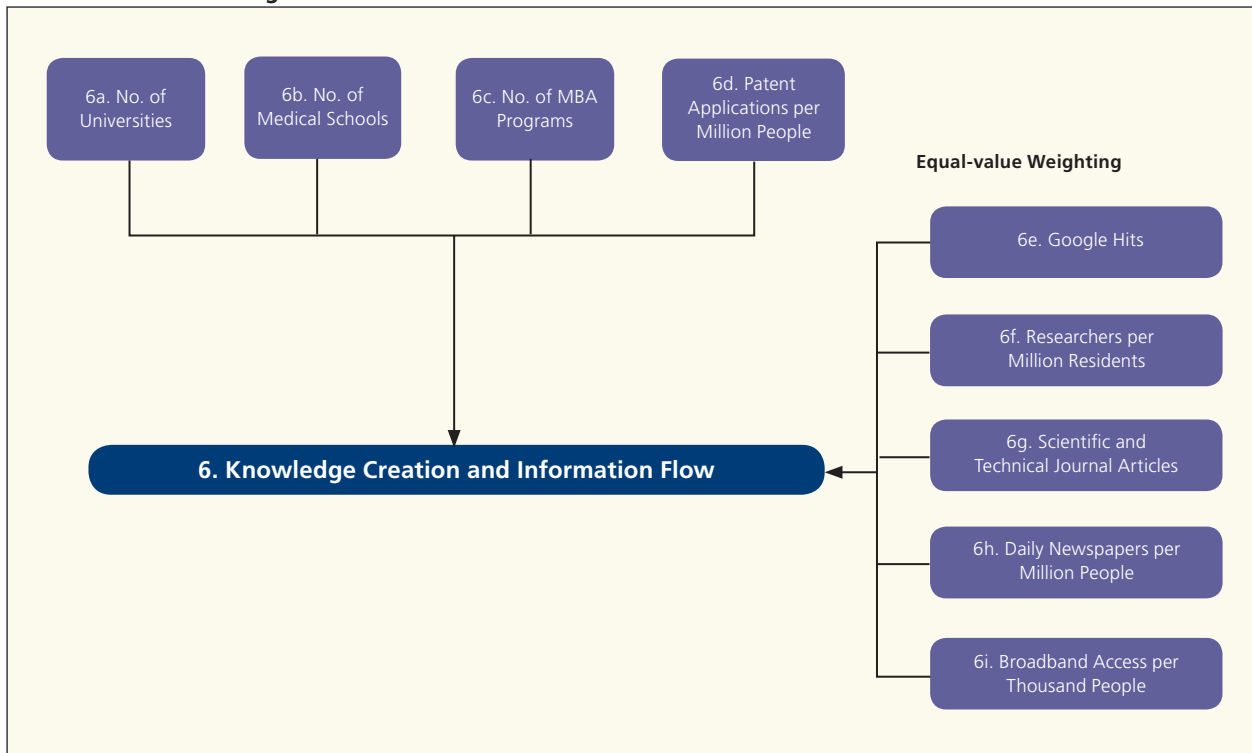
Chart 17 shows the indicators and sub-indicators used for calculating the index value of the “knowledge creation and information flow” dimension.

The Index values of the top 10 in the “knowledge creation and information flow” dimension are summarized in Table 6. The Index values differ significantly among cities in this dimension. New York ranks first with an Index value of 61.55, and is one of seven U.S. cities in the top ranking for this dimension. A higher concentration of universities, MBA programs, research institutions and numbers of researchers drive this dimension; so, too, the numbers of scientific publications and citations. These are precisely the areas in which the U.S. excels. Quality and quantity of education therefore count a great deal in this dimension; along with a general environment conducive to innovation and creativity.

Table 6
Knowledge Creation and Information Flow Dimension

Index Value	Worldwide Centers of Commerce
61.55	New York
55.94	Tokyo
52.72	London
50.71	Chicago
46.51	Boston
46.03	Los Angeles
43.06	Atlanta
42.95	Seoul
42.08	Washington D.C.
41.57	Houston

Chart 17
Dimension 6: Knowledge Creation and Information Flow



Future Research

This is the first Index ranking of the Worldwide Centers of Commerce, and is based on a snapshot in time. It is not surprising that larger, more established global cities, such as London, New York and Tokyo dominate in the rankings; even though many smaller centers score surprisingly high and rank among the top 10 in each of the six dimensions.

An important aspect of the development of the Worldwide Centers of Commerce is their change

dynamics. The plan for the 2008 ranking is to add a “growth index” which captures precisely the pace and scope of their dynamic changes. Since the values of the growth index will not be affected by the current size of the Worldwide Centers of Commerce, they will provide a very different perspective to understand how global commerce is evolving.

In addition, a new “emerging centers” list will be created to supplement the top 50 list. This supplementary list will help shed light on centers in regions, such as Sub-Saharan Africa, that are under-represented in the current top 50 of the world.

Appendix A: Members of the Knowledge Panel

Dr. Yuwa Hedrick-Wong, Knowledge Panel Chair and Economic Advisor, Asia/Pacific, MasterCard Worldwide

Dr. Yuwa Hedrick-Wong is a business strategist and economist with 20 years of experience gained in over thirty countries. He is a Canadian who grew up in Vancouver, British Columbia, and spent the last 20 years working in Europe, Sub-Saharan Africa, and Asia/Pacific. He has served as strategy advisor to over 30 leading multinational companies in the Asia/Pacific region.

As the economic advisor to MasterCard Worldwide in Asia/Pacific since 2001, Dr. Hedrick-Wong has been responsible for monitoring and forecasting economic growth and emerging business development trends in the region. In this capacity, he has devised market entry strategies, dissected and addressed public policy challenges, analyzed business impacts of demographic and lifestyle changes, and assessed market-specific business development potential and constraints.

In order to tap deeper local knowledge and market-specific insights, Dr. Hedrick-Wong chairs a global knowledge panel of leading economists, policy analysts, academics and business strategists, with members including experts from China, Japan, South Korea, Hong Kong, Southeast Asia, India, Europe, Canada and the U.S. for regular discussions, exchange of perspectives and knowledge sharing.

Dr. Hedrick-Wong is a frequent speaker at numerous international high-profile conferences and is also often invited to provide commentary in the media on current economic, policy and business issues in Asia/Pacific. He is a published author in consumer markets, economic development, trade and international relations.

Prior to moving to Singapore, he served for three years as Chief Project Economic Advisor in the British High Commission in Dhaka, Bangladesh; with responsibilities later extended to cover the Indian sub-continent. In the early 1990s he worked as a consulting economist in Sub-Saharan Africa on

behalf of several multilateral institutions, covering the countries of Ghana, Nigeria, Uganda, Kenya and Tanzania. Before his African sojourn, he was managing partner in a Vancouver-based economic consultancy that provided investment and market advice on Asia to some of the leading Canadian companies and industry organizations.

As a student of philosophy, political science, economics and history, Dr. Hedrick-Wong received his education in these disciplines at Trent University and post-graduate training at Simon Fraser University and the University of British Columbia in Canada, where he received his Ph.D. His post-doctoral level training was in health economics, energy and environmental economics, and scenario forecast and planning.

Manu Bhaskaran

Mr. Manu Bhaskaran is partner at Centennial Group based in Singapore. He heads the group economic research practice, which provides in-depth analysis of macro trends in Asia for investment institutions, government agencies and companies with interests in Asia.

Mr. Bhaskaran supervised Asian economic and investment strategy analysis for Societe Generale's Asian investment banking division. He was a member of the Executive Committee, in charge of Asian equity research. In 12 years with the firm, Mr. Bhaskaran helped to establish the firm's business presence in Southeast Asia and in South Asia as well as contributing to the development of the firm's highly rated equity research. Mr. Bhaskaran also supervised a team preparing strategic political and economic assessments of Asia for Singapore's senior government officials. He is also a member of the Competition Appeals Board, Singapore and a member of the Board of Advisors, Centre for Analytical Finance, Indian School of Business, Hyderabad, India; Senior Adjunct Fellow, Institute of Policy Studies, Singapore.

He is also: council/executive committee member, Singapore Institute of International Affairs (SIIA) (council secretary in effect July 2005); vice-president, Economics Society of Singapore. He serves as: (December 2003) chairman, board of directors, EH Ltd, a company mostly owned by the

Temasek Holdings; (August 2002) director, Silk Air Ltd (subsidiary of Singapore Airlines); (June 2003) director, Aspen Networks Inc.; (February 2004) director, International Factors Singapore Ltd.; (August 2005) director, Surbana Corporation Pte Ltd (Temasek Holdings); (October 2005) director, CIMB-GK Pte Ltd, a regional investment bank.

Professor Fan Gang

Professor Fan Gang is one of China's leading economists. He is director of the National Economic Research Institute, as well as the China Reform Foundation in Beijing. In addition to being a key advisor to the top leadership of China, Professor Fan has also served as advisor to the Board of Monetary Policy of the People's Bank of China, the Board of Foreign Exchange Administration, and the Monetary Administration of the Hong Kong SAR. Professor Fan holds academic appointments at the Maastricht School of Management in the Netherlands, and the Center for Studies in Economic Development of the University of Clermont-Ferrand in France.

He has been international advisor to the Center for International Development at Harvard University since 1993, and a fellow of the World Economic Forum since 1994. He was elected as one of the "Global Leaders for Tomorrow" at the World Economic Forum in Davos in 1995; and in 2005, as one of the world's "top 100 public intellectuals" by *Foreign Policy* (USA) and *Prospectus* (UK) magazines. Professor Fan was educated at Beijing University and received his Ph.D. in economics from the Graduate School of the Chinese Academy of Social Sciences.

Dr. Michael Goldberg

Dr. Michael Goldberg is currently chief academic officer at Universitas 21Global in Singapore and professor emeritus, Sauder School of Business, University of British Columbia. He is responsible for the leadership of the academic programs and related academic services as well as institutional, government and corporate linkages. U21Global is an eight-year old international consortium of 17 research universities from 11 countries. Dr. Goldberg played a central role in

the initial planning for U21Global, an online graduate school created by a partnership between U21Global and the Thomson Corporation. Immediately prior to joining Universitas 21Global in January, 2005, he was the associate vice president international at the University of British Columbia (UBC), and the HR Fullerton Professor of Urban Land Policy in the UBC Sauder School of Business. Dr. Goldberg was Dean of the Sauder School of Business at UBC from 1991 to 1997.

Dr. Goldberg was chair of the Canadian Federation of Deans of Management and Administrative Studies (1992-1994); served as president of the American Real Estate and Urban Economic Association in 1984; and site visitor for the U.S. National Science Foundation. He has also sat on the advisory board of the Vancouver Economic Development Commission, the British Columbia Economic Forecast Council, the Canadian Deposit Insurance Advisory Committee and the Vancouver Board of Trade. Dr. Goldberg has consulted to businesses and governments in Canada, the U.S. and Asia, and lectured at 50 universities and research institutes in 16 different countries. He has sat on the editorial boards of six North American scholarly journals and reviewed articles for more than a dozen international academic journals. Dr. Goldberg has authored or co-authored nine books and more than 200 academic and professional articles. He has served as external examiner to universities in Asia, including the National University of Singapore. His specific areas of research interest include urban transportation and property markets, and urban and regional economic development, strategy and policy. Dr. Goldberg earned his M.A. and Ph.D. in Economics at the University of California at Berkeley.

Professor William Lever

Professor William Lever is emeritus professor of Urban Studies at the University of Glasgow, and was recently Tinbergen Fellow at the University of Amsterdam; visiting professor at the University de Quebec at Montreal, and visiting professor at the University of Warsaw, Poland. Professor Lever is a leading expert in comparative urban policy, European regional development, the knowledge base of cities,

urban competitiveness, migration, location of public services, and is currently the managing editor of the journal, *Urban Studies*. He has served as consultant to the Royal Bank of Scotland, CALA Homes, and Yorkshire and Humberside Regional Development Agency. Professor Lever was educated at Oxford University, where he received his D.Phil.

Professor Maurice D. Levi

Professor Maurice Levi holds the chair of Bank of Montreal Professor of International Finance at the University of British Columbia, Vancouver, Canada. Widely acknowledged as one of the world's leading experts on global commerce, monetary policy and banking, and international finance, Professor Levi has also taught as visiting professor at the Hebrew University in Jerusalem, UC Berkeley, MIT, London Business School, and the University of New South Wales. He is the author of 21 books and 75 papers in academic journals; and has served as reviewer for 26 international journals, including the *American Economic Review*, *Journal of Banking and Finance*, and *Economic Inquiry*. Professor Levi has lectured as distinguished scholar at the Ministry of International Trade of the Government of China in Beijing, the Shanghai Institute of Foreign Trade, the China-Europe International Business School in Shanghai, and the United Nations Conference on Technology and Development.

As a consultant, he has been engaged by a wide range of organizations, including the Asia Pacific Foundation of Canada, the Hong Kong Bank of Canada, and the BC Securities Commission; and has conducted numerous internal corporate briefings, such as for LG, the Hanjung Corp, and Korean Telecom in Korea, and the Shanghai Telecom in China. He is an advisor to the Federal Budget Task Force and the Federal-Provincial Western Development Task Force of the Government of Canada, and the Vancouver Board of Trade. Professor Levi was educated at the University of Manchester and the University of Chicago, where he received his Ph.D. in economics, with the late Nobel Laureate Milton Friedman, arguably the most influential economist in the 20th century, as his thesis supervisor.

Dr. Anthony Pellegrini

Dr. Anthony Pellegrini is partner and director of the Urban and Infrastructure Policy and Finance Practice of the Centennial Group, an international financial advisory firm. Dr. Pellegrini is also a cofounder and president of the International Association of Municipal Development Funds (IADF), an international institution established to support learning among specialized institutions that provide finance to cities and towns in the developing world. From 1996 to 2000, Dr. Pellegrini was director of the transportation, Water and Urban Development Department at the World Bank, where he was responsible for urban development and infrastructure sector policy. Dr. Pellegrini also chaired the Urban Development and the Water and Sanitation Sector Boards, which brought together all regional sector managers responsible for urban issues.

Dr. Pellegrini was instrumental in helping to establishing the Cities Alliance a donor-funded partnership, which has the objective of helping to improve cities of the developing world on a sustainable basis. Until recently he was chairman of the international Advisory Board of Paracidade, a development fund that lends to local governments in Parana State, Brazil.

Professor Saskia Sassen

Saskia Sassen is the Ralph Lewis Professor of Sociology at the University of Chicago, and Centennial Visiting Professor at the London School of Economics. She has just completed a five-year project for UNESCO on sustainable human settlement, for which she set up a network of researchers and activists in over 30 countries; it is published as one of the volumes of the *Encyclopedia of Life Support Systems* (Oxford, UK: EOLSS Publishers) [www.eolss.net]. Her latest book is *Territory, Authority, Rights: From Medieval to Global Assemblages* (Princeton University Press, 2006).

Other recent books are the third fully updated *Cities in the World Economy* (Sage, 2006), *A Sociology of Globalization* (W.W. Norton & Company, 2007), and the co-edited *Digital Formations: New Architectures for Global Order* (Princeton University Press, 2005). *The Global City* came out in a new, fully updated

edition in 2001. Her books have been translated into 16 languages. She serves on several editorial boards and is an advisor to several international bodies. She is a member of the Council on Foreign Relations, the National Academy of Sciences Panel on Cities, and chair of the Information Technology and International Cooperation Committee of the Social Science Research Council (USA). Her comments have appeared in *The Guardian*, *The New York Times*, *Le Monde diplomatique*, *The International Herald Tribune*, *Vanguardia*, *Clarín*, *Newsweek International*, and *The Financial Times*, among others.

Professor Peter J. Taylor

Peter J. Taylor is professor of Geography and co-director of the Globalization and World Cities (GaWC) Study Group and Network at Loughborough University, Leicestershire, UK; and adjunct faculty and associate director of the Metropolitan Institute at Virginia Polytechnic Institute. He was elected

an academician of the Academy of Social Sciences (UK) in 2001; Received distinguished Honours by the Association of American Geographers in 2003; named a fellow of the British Academy in 2004; and was awarded an honorary doctorate by the University of Oulu (Finland) in 2006.

He is author or editor of over 20 books, the most recent of which include *World City Network: a Global Urban Analysis* (Routledge, 2004), *Cities in Globalization* (Routledge, 2006), and *Political Geography: World-Economy, Nation-State, Locality* (Prentice Hall, Fifth Edition, 2006). He has over 300 publications, over 50 of which have been translated into one or more of over 20 different languages. He has held visiting appointments at the University of Iowa, University of Alberta, Clark University, Dartmouth College, University of Illinois at Champaign-Urbana, Binghamton University, Virginia Tech, University of Delaware, Maison des Sciences de l'Homme (Paris), University of Amsterdam and Ghent University both in Holland.

Appendix B: Details of Ranking of the Top 50 Worldwide Centers of Commerce

Rank	City	Country	Index Values	DIMENSIONS*					
				1	2	3	4	5	6
1	London	UK	77.79	84.11	93.54	87.87	82.86	71.75	52.72
2	New York	USA	73.80	86.60	90.64	87.36	68.58	62.13	61.55
3	Tokyo	Japan	68.09	83.88	88.03	85.52	53.39	59.54	55.94
4	Chicago	USA	67.19	86.60	90.64	86.08	55.84	53.88	50.71
5	Hong Kong	China	62.32	77.57	85.94	87.07	38.06	71.89	27.31
6	Singapore	Singapore	61.95	88.12	91.64	88.24	32.59	66.16	28.78
7	Frankfurt	Germany	61.34	84.68	92.63	82.64	53.50	50.91	25.67
8	Paris	France	61.19	74.43	93.32	82.15	43.22	55.21	39.57
9	Seoul	Korea	60.70	74.63	86.42	73.83	53.00	51.37	42.95
10	Los Angeles	USA	59.05	86.60	90.64	87.30	18.80	56.19	46.03
11	Amsterdam	Netherlands	57.30	82.49	91.86	82.41	32.89	53.03	28.04
12	Toronto	Canada	57.11	85.83	88.06	88.85	30.79	49.14	27.26
13	Boston	USA	56.47	86.60	90.64	86.77	21.94	41.48	46.51
14	Sydney	Australia	56.26	82.58	86.40	84.56	37.61	47.54	23.24
15	Copenhagen	Denmark	56.14	88.73	92.64	87.44	33.75	38.95	28.28
16	Madrid	Spain	56.06	81.30	94.52	79.44	41.22	44.03	23.99
17	Stockholm	Sweden	54.51	88.78	89.77	85.93	26.72	36.79	34.36
18	San Francisco	USA	54.36	86.60	90.64	87.40	13.00	45.11	39.80
19	Zurich	Switzerland	54.33	83.42	92.42	82.84	32.48	35.09	33.20
20	Atlanta	USA	54.19	86.60	90.64	84.36	9.40	48.34	43.06
21	Miami	USA	53.76	86.60	90.64	85.40	7.80	50.64	38.12
22	Houston	USA	52.96	86.60	90.64	84.21	8.60	44.76	41.57
23	Washington D.C.	USA	52.68	86.60	90.64	87.08	6.40	42.74	42.08
24	Berlin	Germany	52.24	84.68	92.63	82.23	19.31	39.27	32.33
25	Milan	Italy	52.23	72.67	93.06	76.00	39.09	42.05	16.27
26	Munich	Germany	51.85	84.68	92.63	82.39	20.00	40.51	27.03

Rank	City	Country	Index Values	DIMENSIONS*					
				1	2	3	4	5	6
27	Montreal	Canada	51.35	85.83	88.06	88.48	10.99	44.11	25.93
28	Vancouver	Canada	51.10	85.83	88.06	89.85	8.40	43.63	26.84
29	Brussels	Belgium	51.05	70.82	92.89	85.13	21.05	41.88	23.80
30	Vienna	Austria	50.94	83.32	93.93	82.13	19.47	37.39	26.73
31	Dublin	Ireland	50.72	79.30	86.34	87.69	19.24	41.41	20.46
32	Shanghai	China	50.33	68.63	79.40	64.46	38.30	52.09	17.16
33	Barcelona	Spain	50.15	81.30	94.52	79.44	20.51	39.31	22.01
34	Melbourne	Australia	48.89	82.58	86.40	83.47	8.00	45.20	22.47
35	Geneva	Switzerland	48.05	83.42	92.42	82.46	8.80	31.50	31.94
36	Bangkok	Thailand	47.96	68.01	88.13	68.71	23.21	49.50	16.27
37	Dubai	UAE	46.61	78.04	75.63	73.76	23.04	48.82	4.24
38	Kuala Lumpur	Malaysia	45.82	64.74	84.67	76.04	25.80	39.69	7.90
39	Santiago	Chile	44.56	73.54	82.40	74.91	21.13	29.48	17.81
40	Budapest	Hungary	43.75	61.99	82.25	75.10	23.08	30.67	15.48
41	Prague	Czech Republic	43.55	70.00	89.47	74.72	19.31	30.49	10.63
42	Mexico City	Mexico	43.35	66.44	81.18	67.48	25.73	33.50	12.90
43	Rome	Italy	43.18	72.67	93.06	73.69	6.80	33.77	18.39
44	Tel Aviv	Israel	43.00	63.17	82.20	76.54	17.50	32.48	13.46
45	Mumbai	India	42.70	50.76	90.51	55.09	38.71	30.34	14.73
46	Beijing	China	41.94	68.63	79.40	60.20	13.40	38.95	22.41
47	Johannesburg	South Africa	41.37	62.68	69.77	76.71	24.48	31.28	3.22
48	Sao Paulo	Brazil	41.14	49.83	67.83	63.06	31.43	34.23	14.50
49	Warsaw	Poland	40.56	58.71	79.85	70.25	21.11	26.02	14.30
50	Moscow	Russia	39.80	49.42	69.82	58.09	27.11	33.66	18.04

- * Dimension 1: Legal and Political Framework
- Dimension 2: Economic Stability
- Dimension 3: Ease of Doing Business
- Dimension 4: Financial Flow
- Dimension 5: Business Center
- Dimension 6: Knowledge Creation and Information Flow

Appendix C:

Methodology

The MasterCard Worldwide Centers of Commerce Index is compiled from research by a panel of eight independent economic, urban development and social science experts from leading academic and research institutions around the world, led by Dr. Hedrick-Wong. To form the index, the panel first identified 63 cities around the world that met their initial criteria.

Cities were then rated according to the six dimensions: legal and political framework; economic stability; ease of doing business; financial flow; business center; and knowledge creation and information flow. This entailed measuring a number of equally weighted, relevant indicators and sub-indicators that aggregate available data on region-specific procedures, costs and ratings, as well as criteria related to quality of life, access to technology, city livability, logistics and knowledge creations and creativity. In total, over a period of four months, from December, 2006 through March, 2007, the panel evaluated six dimensions, 41 indicators and more than 100 sub-indicators based on year-end 2006 data to derive an index ranking for each city, exceeding traditional measures used to measure worldwide financial and business activities.

It is important to note that the calculation of the sub-indicators in the “financial flow” dimension is treated to transform the data to a 100-point index with a set of algorithmic rules. This is necessary because not all centers have similar trading and transactional activities. The algorithmic rules are:

- if the city does not have an exchange that trades the sub-indicator product, then $X = 0$, else X starts with a base of 20;
- if $X < \text{Max A}$, then $X = 20 (\text{Base}) + (20 + X / \text{Max A})$ else;
- if $X < \text{Max B}$, then $X = 20 + (40 + X / \text{Max B})$ else;
- $X > \text{Max B}$, so $X = 20 + (60 + X / \text{Max of Sub-indicator Range})$

After each sub-indicator is transformed into a 100 point index, the sub-indicators are averaged to form the Indicator Index.

The reasons for doing so are:

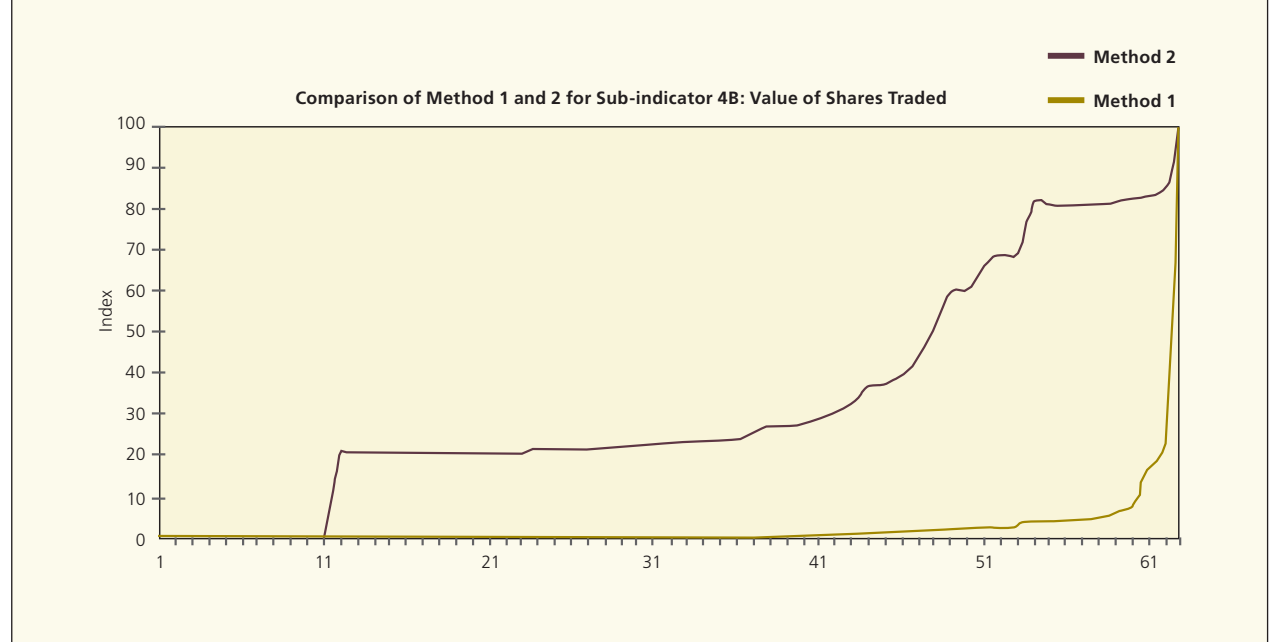
1. The 20-point initial base creates a non-negligible separation between all centers that do not trade the sub-indicator product and the center with the lowest trading level.
2. The three sub-ranges are used to spread the data points more evenly across the 100 point index base. However, we do not totally sacrifice the relative difference between the data-points, as it is this difference that determines each data-points position within its relevant sub-range.
3. This method is best used when some centers score a 0 (e.g., Chengdu does not have an exchange), and the rest of the non-zero centers cluster mostly around low scores and with two to three centers exhibiting extremely high scores relative to the rest of the cities. Chart X illustrates the difference between the use of logarithmic rules (Method 2) and not using the rules (Method 1).

Chart X
Index Methodology for Sub-Indicators 4b, 4c, 4d, 4e

The diagram below charts the difference for Sub-indicator 4B when using:

Method 1: The sub-indicator is transformed to a 100 point base by dividing each city's data point by the maximum data point among the cities and multiplying by 100 (this is the most common indexing method used among the sub-indicators), versus

Method 2: As described in the previous side



Footnotes

- 1 This report is based on research conducted on behalf of MasterCard Worldwide by a Knowledge Panel chaired by Dr. Yuwa Hedrick-Wong, who has the editorial responsibility for preparing this report. See Appendix A for members of the knowledge panel.
- 2 Tokyo and its agglomeration would include the adjacent urban communities of Yokohama, Kawasaki, and Saitama. Tokyo's population of 8.4 million is increased to over 12 million when its agglomeration is included.
- 3 See <http://www.citypopulation.de>.
- 4 See S. Sassen, 2001. *The Global City*. Princeton and Oxford: Princeton University Press.
- 5 M. Porter, "Regions and the New Economics of Competition," in A.J. Scott (ed.) 2001. *Global City-Regions: Trends, Theory, Policy*. Oxford: Oxford University Press.
- 6 These are the "clustering effects" which can be widely dispersed across the world; and yet with high local concentration of similar and associated businesses and activities, often result in high productivity in specific areas, in specific locations.
- 7 The pioneering work by Professors Peter J. Taylor and John Beaverbrook at the University of Loughborough – the Globalization and World Cities Study Group – is an important data source; updated by MasterCard to 2006 in this project.

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