See the future
Top industry clusters in 2040 revealed

Economic Views:
Future industry clusters

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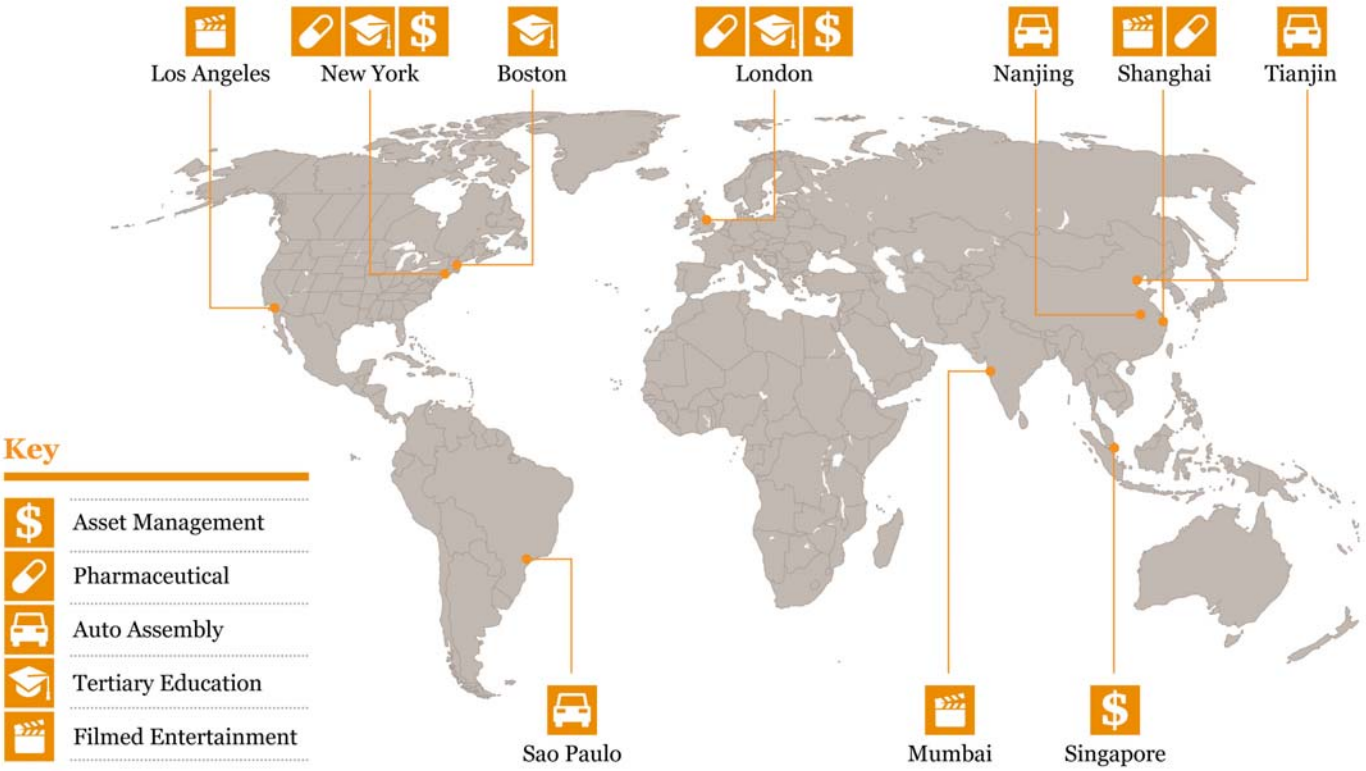
Economic Views: Future industry clusters

Executive summary

PwC's Macro Consulting team has developed a tool to map future clusters across the world. In this report we use our cluster projection tool to highlight the geographical locations that are expected to host the world's largest clusters by 2040 in the following industries:

- Pharmaceuticals;
- Automobile assembly;
- Asset management;
- Filmed entertainment; and
- Tertiary education.

Map of largest industry clusters in 2040



Key findings:

- We expect to see a general shift of the world's largest clusters from developed to emerging and developing nations as the centre of global economic gravity continues to shift towards these countries. This shift is unlikely to be uniform across the five industries we examine here. For automotive assembly, it is already well underway and set to continue apace. For pharmaceuticals, asset management and filmed entertainment, Asian clusters in particular are rising – but we expect developed economy clusters to retain top position. While for industries such as tertiary education, we expect clusters in today's developed economies to remain significantly ahead of those in developing economies in the medium to long term.
- The large increase in the share of world GDP represented by Asia over the next 30 years, helped by the expected rapid growth of economies such as China and India, should aid the development of dominant clusters in the region. This is likely to be especially apparent in industries that can benefit from large economies of scale. The top locations within Asia of some of these clusters have not yet come to light. Our expectations are that for filmed entertainment Mumbai may beat Shanghai, while for asset management we expect Singapore to beat Hong Kong and for pharmaceuticals we expect to see Shanghai emerging as the regional centre. The automotive sector currently tends to be somewhat more dispersed than the others – but we expect to see key hubs develop in China around the Nanjing/Shanghai area and Tianjin/Beijing.
- In the pharmaceutical industry we expect that the cluster in Shanghai will grow to become one of the world's most significant. However, we also expect the current leading clusters in New York and London to remain the largest. The increased affluence and aging populations in emerging markets will benefit centres such as Shanghai through boosting demand for healthcare. However, developed market centres such as London and New York benefit from their proximity and linkages with world class academic institutions which will support their continued function as major clusters in the sector.
- Growing automotive assembly clusters around Tianjin, Nanjing and Sao Paulo may rise to be amongst the world's largest by 2040. The growth of the middle classes in China, India and South America will add hundreds of millions of potential car owners to the world market between now and 2040. This will require an enormous increase in production capacity in these regions.
- In asset management we expect the existing large clusters in New York, London and Boston to be joined by Singapore, which may become the leading cluster in the Asian region. Tighter regulation and higher taxes are currently working against clusters in the United States and Europe but the key factor will be the increase in public and private capital available in Asia – which will fuel growth in asset management in the region.
- In the filmed entertainment sector Los Angeles, or Hollywood, has been the dominant cluster for many years and is the most globally recognised centre for film and television production. We expect Hollywood to retain this position up to 2040, however, it will face growing competition from rising film production clusters around Mumbai and Shanghai which are increasingly moving into mainstream productions.
- We expect that New York, London and Boston will remain the principal tertiary education clusters over the next 30 years due to the depth of quality universities they currently host, as well as offering environments in which these clusters can flourish. Many emerging and developing nations are investing heavily in tertiary education clusters, which are likely to improve significantly over the next 30 years. However, we do not expect them to surpass the existing top tertiary clusters in this timeframe.

Introduction

The old economic order is shifting. As the global economy recovers some emerging markets are likely to grow faster than traditional economic powers. At the industry level, these shifts are even more apparent with accelerating capital flows, fundamental demographic changes, and the rise of state capitalism reshaping the world map for many sectors.

PwC's Macro Consulting team has developed a tool to map future clusters across the world. This report uses this tool to highlight the geographical locations that will host the largest clusters in five industries:

- Pharmaceuticals;
- Automobile assembly;
- Asset management;
- Filmed entertainment; and
- Tertiary education.

The expected top locations in 2025 and 2040 are disclosed for each of these sectors highlighting key trends for the industry and how the new economic order will influence future geographical winners.

The evolution of clusters

Industry clusters are defined as "geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialised inputs such as components, machinery, and services and providers of specialised infrastructure".[1]

Clusters are important for a variety of reasons. They can provide three main benefits for the industries that locate there, including:

- A specialised labour force;
- Inputs in the production process that are located within close proximity; and
- A network of companies and individuals in which business-related knowledge transfers rapidly and with few barriers, which leads to technological spillovers.[2]

These factors increase productivity, which in today's globalised economy, is more important for remaining competitive than securing inputs for production. Michael Porter describes this as *competitive advantage*

[1] Porter (1998) Clusters and the new economics of competition
[2] Birkinshaw (2000) Upgrading of industry clusters and foreign investment

becoming more important than *comparative advantage* in modern economies. Competitors within a single industry benefit from being in a cluster as it "allows each member to benefit *as if* it had greater scale or *as if* it had joined with others formally – without requiring it to sacrifice its flexibility or independence."[3]

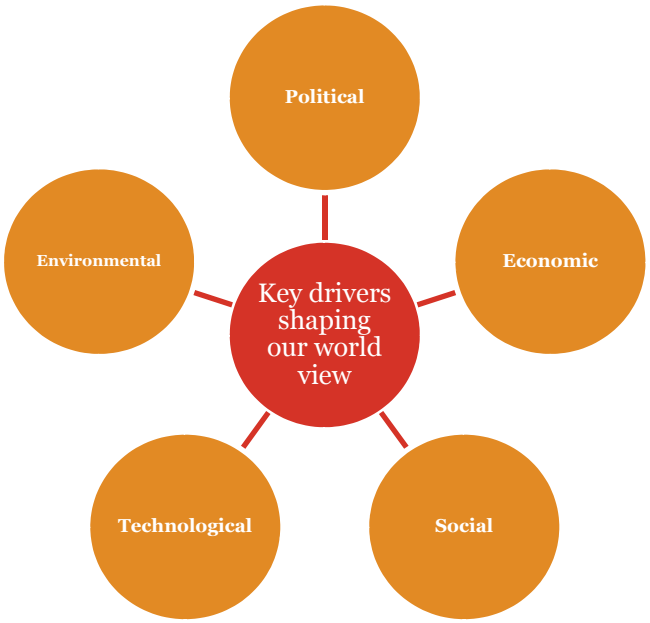
While the reasons presented above offer an explanation as to why companies may locate in an existing cluster, it is also important to understand why clusters locate in a certain area from the outset. One of the primary reasons clusters develop in a specific region is because the preferred location for a new industry will be geographically close to its source of demand as this provides the firm access to its target market and reduces transportation costs[4]. Once a firm or industry locates somewhere this encourages ancillary industries to locate to the same area in order to supply the primary industry, referred to as "circular causation" or "positive "feedback".[5]

Vision of the future world economy

Our view of where industry clusters will be based is founded on our vision for the future world economy. The key elements of this vision are summarised in Chart 1 below. Overall the vision is for a more globalised and interconnected world where international cooperation is commonplace – necessitated by the need to address global problems like climate change and assisted by technology.

In our vision of the future world the centre of economic and industrial power has shifted east – but the west still maintains a degree of cultural and knowledge leadership and is still home to many of the world's largest multinational corporations.

Chart 1 elements of our future world vision



Economic: Accelerating economic globalisation will lead to further sector specialisation, while the rise of state capitalism will mean that some of the leading corporations will have strong government links. The regions most successful at state capitalism will be those that use industrial policy wisely and sparingly, with government involvement focused on sectors where the cities or regions have comparative advantages, and not overreaching.

Social: A more inter-connected world where information is more freely and quickly shared, combined with increasingly heterogeneous populations, will require regions to be even more cosmopolitan, tolerant and open. Moreover, the growing reliance of states on soft power – brand, arts, sports, and other non-military ways of gaining influence – will be the transmission mechanisms for projecting power to the world.

Technological: Accelerating adoption and development of information and communication technologies in the developing world leads to a more intense battle of ideas between cities and countries, but the focus of innovation shifts towards renewable energy technology.

Environmental: International agreement to prevent and/or mitigate climate change, leading to a gradual shift away from fossil fuels to renewable energy sources. Climate-related natural disasters are more common.

Political: A multi-polar and more politically uncertain world, combined with a greater economic role for governments, will increase the influence and prominence of politicians.

Future pharmaceutical clusters

We estimate that the three largest pharmaceutical clusters today (measured by employment in pharmaceutical headquarters, offices and research facilities) can be found in the areas around London, New York and Zurich/Basel. The large pharmaceutical firms tend to have offices and distribution facilities all around the world but currently they base the majority of head office functions and R&D facilities in these clusters.

We expect that the key global trends affecting the pharmaceutical industry will be rising prosperity and demographic shifts. The former will provide a growing market for pharmaceutical products as wealthier households especially in emerging markets will buy more healthcare or demand greater government provision. In a previous report PwC estimated that rising prosperity in India would increase the domestic market for pharmaceuticals to US$30 billion by 2020, from US$11 billion in 2009.

The effects of demographic shifts will be more complex. Aging populations in the developed world and increasingly China, South Korea and other emerging nations will increase overall demand for health related products and services considerably. The mixture of demand will also change. Currently much care is focussed on control of infectious diseases (which disproportionately affect the young and developing nations). This will shift to a focus on management of chronic disease (which affect older people and developed nations more).

Management of chronic disease tends to be far more costly than control of infectious disease (which can often be eliminated through a vaccination costing a few dollars). In a world where the population will be larger,

[3] Porter (1998) Clusters and the new economics of competition
4 Krugman (1991) Increasing returns and economic geography
[5] Myrdal, Gunnar (1957) Economic theory and under-developed regions, and Arthur, Brian (1990) Positive feedbacks in the economy

older and wealthier; management of chronic disease will provide an enormous market for pharmaceutical companies.

The world's current largest clusters in New York, London and Zurich/Basel may be well placed to benefit from these shifts – they are already geared to serve the older and wealthier consumers in the developed world; the type of customers who will become more common in the developing world over the next 30 years. The pharmaceutical majors are already increasing their access to emerging markets through direct investment or strategic alliances with, and acquisitions of, generic medicine producers based there.

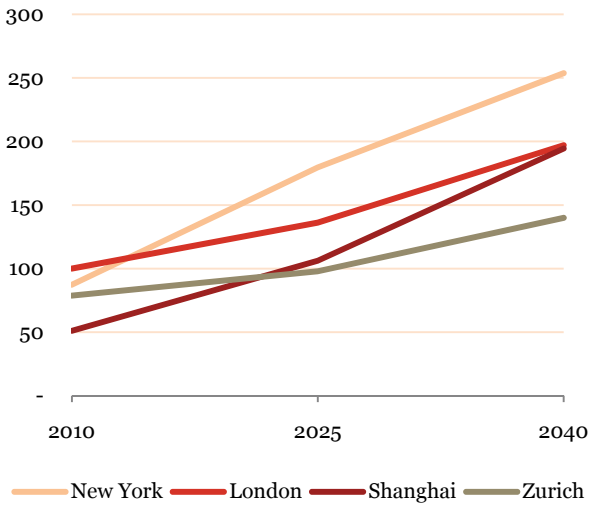
Another reason we expect the developed world to retain the largest clusters is the importance of linkages between world class tertiary education and pharmaceutical's R&D facilities. Whilst emerging nations are making great strides in developing world class educational facilities, the best university in China is ranked 226th in the world and only one BRIC university makes the top 100 (Moscow State in 77th)[6].

Linkages between R&D and education are of immense importance to pharmaceutical clusters and these linkages should support the current clusters in New York, London and Zurich/Basel.

The exception to this rule could be Shanghai. With a growing complement of pharmaceutical offices, and some of the few major R&D facilities outside of the developed world[7], we believe Shanghai is well placed to be the key cluster serving Chinese and wider regional markets. Investors also share this sentiment; Shanghai has attracted over US$1 billion in pharmaceutical foreign direct investment over the last five years.

London, New York, and Zurich/Basel will remain major clusters and centres of research excellence in the pharmaceutical industry – however a new centre will be needed closer to the largest markets in Asia. We expect Shanghai to be this centre.

Chart 2. Future pharmaceutical clusters



PwC analysis: 100 = size of largest cluster in 2010

[6] According to The Center for World-Class Universities in Shanghai

[7] For example Novartis has an R&D facility in Shanghai and another in nearby Changsu

Chart 2 above presents our view of the development of these future clusters. The numbers represent employment in these clusters where 100 equates to the size of the largest cluster in 2010.

We expect strong growth in each of the pharmaceutical clusters on account of the older and wealthier world population. London and Zurich/Basel are projected to roughly double in size by 2040. We see New York more than doubling in size as its strong academic linkages and ability to attract both foreign and domestic investment in the sector[8] mean that it is the best placed of the three developed market clusters.

Shanghai's expected rise is also tracked above; we expect its pharmaceutical cluster to rise from being half the size of London's in 2010 to being equal to London by 2040.

Future automobile assembly clusters

The global shift in economic gravity from West to East is perhaps most evident in the automobile assembly industry. Vehicle production in China had already surpassed that of the United States in 2008, with 9.3 million units compared to 8.7 million produced in the US. Production in China has soared by a further 32% in 2009, and the region also contains two other countries amongst the global top five automotive assembly nations; Japan and South Korea.

Amongst the largest clusters today is Toyota City, Aichi, Japan. This is the founding site of the Toyota Motor Corporation and still contains major production facilities; it renamed itself after the company in 1959. Another important cluster is in South Korea, the Hyundi facility in Ulsan is the world's largest integrated vehicle factory and can produce 1.6 million units per year. While despite recent troubles, the cluster in the US around Detroit remains enormous – producing over 1 million units in 2008.

These and other automotive clusters are likely to evolve according to global patterns of consumer demand. Auto assembly is typically performed in large regional facilities – due to economies of scale and relatively high transportation costs. The majority of growth in future demand will come from Asia, as increasing levels of prosperity open up the option of car ownership for many for the first time. The growth of the middle classes in China and India and South America will add hundreds of millions of potential car owners to the world market between now and 2040.

Given this, we expect the world's leading clusters to be in China by 2040. China's auto assembly is currently spread across a number of different regions. Some of the largest facilities are found around Beijing and the Shanghai area. The central government is likely to take a major role in determining where new factories are situated. For example, there is some movement towards dispersing heavy manufacturing away from large urban centres such as Beijing and Shanghai. This will inhibit growth in automotive output in these cities but potentially to the benefit of other nearby centres. Nanjing and Tianjin are two such centres which already possess significant auto assembly clusters, are ideally situated close to Shanghai and Beijing respectively, and have good access to port facilities for export. Our present view is that Tianjin and Nanjing could be best placed to become the largest automotive clusters in both China and the world, although Guangzhou is also a potential candidate.

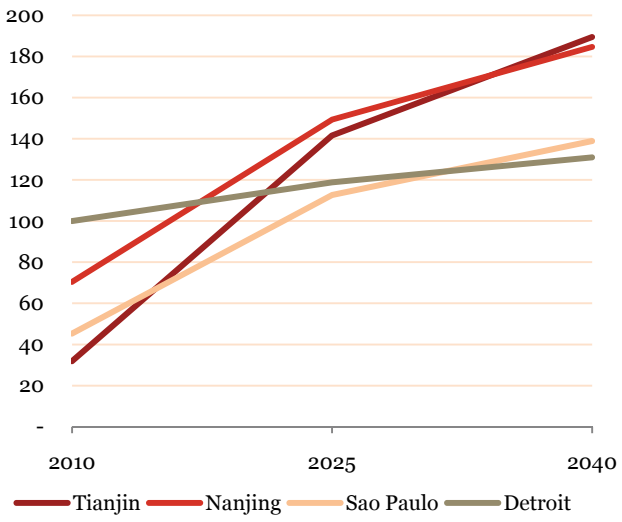
[8] New York has attracted US$2.3 billion in pharmaceutical FDi since 2003

In developed markets the expansion of existing auto production clusters will be inhibited by the maturity of markets which offer little potential for growth. In addition to this we will increasingly see the demographic shift towards an older population affect both the propensity to purchase cars and the level of usage (and so the regularity of replacement).

Less familiar, but equally important trends are occurring in social attitudes towards car ownership. Congested roads and the high cost of fuel, tax and insurance are encouraging people, especially the young, to delay or even avoid car purchase. New models of ownership such as club schemes also offer an alternative for urban, irregular users. In Japan, these social trends have become sufficiently pronounced that the term "kuruma banare" or "demotorisation" has been coined to describe levels of car ownership amongst the young. We expect these trends to mean that clusters in developed nations such as Toyota City and Detroit to lose ground to faster growing clusters in emerging markets. This trend may also affect the cluster in Ulsan, South Korea to a somewhat lesser degree. Ulsan faces a maturing local market and the current strategy for Hyundai is to service its growing international markets from production centres that are close to these markets.

The emerging markets of Latin America form the other key growth area for the automotive industry. Brazil has already risen to become one of the world's major auto producers and consumers. The principal production cluster is centred around Sao Paulo, where major Hyundai, Toyota and Volkswagen plants are located. Strong growth in demand for autos in Brazil has meant that demand has outstripped local supply in the market – meaning that imports have soared. To address this imbalance car producers have been making major investments in the area. Foreign investment into auto assembly in the Sao Paulo cluster has totalled US$4.6 billion since 2003. The Brazilian auto manufacturers association, Anfavea, expects to see an additional US$11 billion of investment by automakers by the end of 2012 for Brazil as a whole.

Chart 3. Future auto-assembly clusters



PwC analysis: 100 = size of largest cluster in 2010

Chart 3 above presents our view on the size of key auto clusters (measured in terms of numbers of vehicles assembled) over the next 30 years. We do not expect the world's current largest cluster in Detroit to see significant growth going forward. It is projected to be overtaken by Tianjin and Nanjing – which are both much better placed to benefit from growth in Asian markets.

In South America, Sao Paulo is expected to become one of the key global clusters over the next 30 years. It is currently around half the size of Detroit in terms of vehicles assembled but should surpass it before 2040. Another significant, and rapidly growing cluster over this period is likely to be in Tamil Nadu, which is positioned well to serve a large portion of the Indian market. Indian automotive clusters are currently less developed than their Chinese counterparts and despite strong growth they do not make our list of the largest clusters by 2040.

Future asset management clusters

Amongst the world's largest asset management firms are State Street Global Advisors and Barclays Global Investors with Black Rock[9]. These firms are headquartered in Boston, London and New York, respectively. These three cities are currently the largest clusters in asset management (based on the value of funds under management) and are likely to remain important in the future.

However, the 2008/09 financial crisis has changed the environment in which western asset management operates and created unique opportunities for other clusters.

The threat of stricter financial regulation and tax regimes in some western centres has created disincentives for funds to locate there. The European Union's Alternative Investment Fund Manager Directive has raised the spectre of increased regulatory burdens for firms based in London and other EU centres[10]. These factors may already be causing some asset management business to relocate. During 2010 a number of significant hedge fund managers, with collective assets under management worth more than US$50 billion, have relocated to Geneva, although In many cases the move was limited to the managers with the assets remaining domiciled in their original location.

The threat of stricter regulation in some western financial markets has also created opportunities for Asian and South East Asian markets, which are campaigning to attract funds to the region. Perhaps even more important is the potential for organic growth in Asia – driven by strong economic performance and large stock of private and public capital.

We expect to see the existing asset management clusters of Hong Kong and Singapore grow rapidly. Both locations offer less burdensome tax regimes than their western counterparts and have "well-regulated but moderate"[11] regulatory structures. However, in our view there can only be one dominant regional centre in Asia. This is because of the enormous benefits accruing from knowledge spillovers and labour force specialisation in this industry. At present, we see the competition to be the regional asset management centre between Hong Kong and Singapore.

[9] Barclays Global Advisors is no longer a separate company having been purchased by Black Rock in 2009

10 HedgeFund Intelligence (2010) Geneva may be fine for some – but not for all

11 HedgeFund Intelligence (2010) Old hands show their strength in Asia

In the first half of 2010 Hong Kong out-performed Singapore in attracting start up asset management funds with 65% of Asian fund launches during the period occurring in Hong Kong. However, with the Singaporean government actively promoting the city as a global centre for asset management and with a higher existing value of assets under management, Singapore is well-placed to compete with Hong Kong going forward.

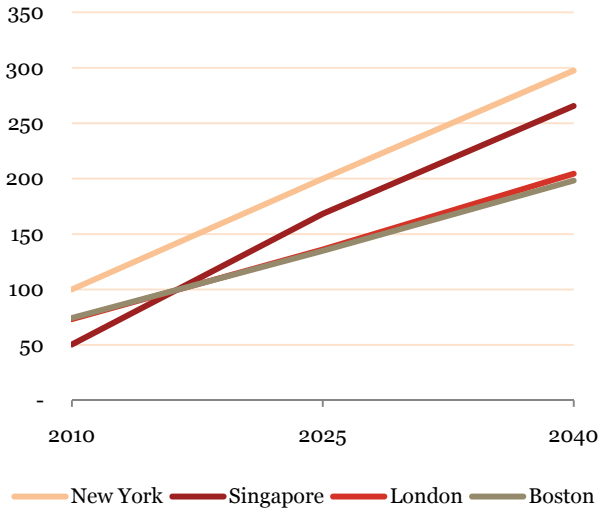
While Hong Kong's proximity to China allows it access to the growing Chinese market, it will also be competing with other financial centres within China, such as Beijing for a majority share of the Chinese asset management market. As a more independent cluster in close proximity to Indonesia, Malaysia and Thailand, we expect Singapore to attract the internationally footloose capital and become the second largest global asset management cluster by 2025.

Existing asset management clusters in Hong Kong, Tokyo and Beijing should continue to grow – but will be more likely to service more insular domestic markets.

Chart 4 illustrates our projections for the growth in asset management clusters between 2010 and 2040. By 2040, the three largest clusters by value of assets under management are projected to be New York, Singapore and London. It also shows that all clusters are expected to grow substantially, capitalising on increasing liquidity and globalisation of world savings, with Singapore exhibiting particularly rapid growth between 2010 and 2040.

Despite growth in Asian markets, New York is projected to retain its position as the dominant asset management cluster. It is assisted by a large pre-existing pool of skilled labour and well-developed infrastructure. We also expect London to perform strongly, helped by the UCITS Directive, which requires fund managers to be based in the EU.

Chart 4 Future asset management clusters



PwC analysis: 100 = size of largest cluster in 2010

Future filmed entertainment clusters

Similar to other industry clusters highlighted in this report, filmed entertainment production is currently dominated by Western centres. Presently, the top three clusters, measured by the number of major international films released in 2009, are Los Angeles, London and Paris. The former is by far the dominant of the three. London and Paris have failed to significantly increase their share of major releases in recent years, a trend we expect to continue.

Los Angeles, or Hollywood, has been the dominant centre for filmed entertainment for many years and is the most globally recognised centre for film and television production. However, film production clusters in emerging markets, especially Mumbai and Shanghai, are increasingly expanding beyond providing local language films and television into international and mainstream markets.

By 2040, we expect Los Angeles to remain the largest filmed entertainment cluster. However, Mumbai may close the gap significantly to become the second largest cluster. The film industry in Mumbai, popularly known as 'Bollywood', predominantly produces Hindi language films. Already, Bollywood produces more films in total than Hollywood, but the majority of these are not major international releases. This has been changing in recent years. Bollywood films are growing in popularity with international audiences illustrated by growth of 40% between 2004 and 2006[12]. More recently films like *My Name is Khan* and *Kites* have gone onto mainstream success.

Despite Mumbai's growing prominence as producer of major international films it still faces several challenges. The large number of regional languages in India has prompted the development of regional film clusters in order to offer content in local languages. This may draw some industry growth away from Mumbai to other clusters within India.

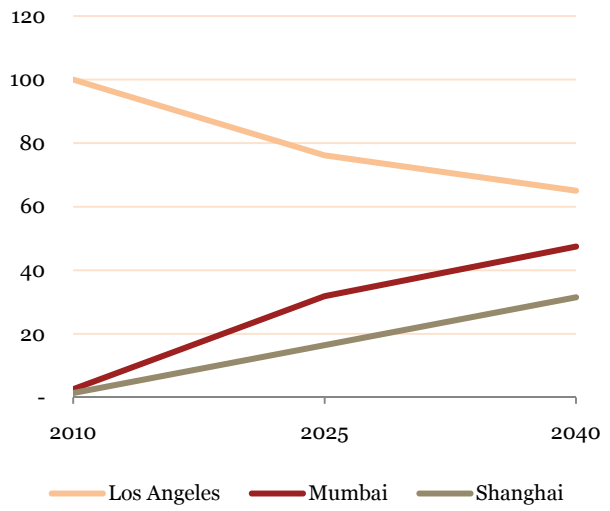
Additionally, Hollywood content remains competitive in foreign markets and has growing revenues from film distribution in India. A recent PwC report noted that this is driven by the popularity of blockbusters such as *Avatar* and *Spiderman* as well as a lack of children's content produced by Bollywood[13].

The two main film studios in Shanghai, Huayi Brothers Media Corp and the China Film Group, have been producing a greater number of films in recent years. This is due, in part, to fewer restrictions surrounding film content by the Chinese government. Indeed, the Chinese government is now actively encouraging the Shanghai film industry in order to compete with foreign producers. This also fits in with the government's objective to project Chinese culture globally.

Currently it is difficult to imagine a mainstream film audience from an unrelated country choosing Chinese cinema over that of Hollywood. This may change in the future. As part of the push to produce more films in China major facilities are being developed in the Shanghai region – such as the Hengdian world studios which have been somewhat unimaginatively dubbed "Chinawood".

[12] Kukenshoner et. Al (2008) Bollywood - Maharashtra and India's Film Cluster
[13] PwC Indian entertainment and media outlook 2010

Chart 5 Future filmed entertainment clusters



PwC analysis: 100 = size of largest cluster in 2010

Chart 5 shows a growth index of the filmed entertainment clusters in Los Angeles, Mumbai and Shanghai based on the number of major films produced each year. While we expect Shanghai and Mumbai in particular to grow significantly between 2010 and 2040, the size of Los Angeles' film cluster actually decreases in size. This is due to a shift by consumers to alternative media options going into the future such as the internet and video games. However, in spite of declining production, Los Angeles is projected to remain the largest filmed entertainment cluster by 2040.

Future tertiary education clusters

The world's finest universities are almost exclusively located in developed nations. No university outside of the OECD (plus Russia) has yet found its way into the top 100 (the highest is the National Taiwan University in 110th position). Of the top ten ranked universities, the United States boasts eight – with Cambridge and Oxford in the United Kingdom making up the remaining two places.

Our analysis of this sector has shown that the English language, as the international language of business and academia, is extremely important. The majority of the best universities are either based in English language countries or teach lessons in English. Use of English assists universities in attracting the best faculty staff as well as international students who wish to develop their linguistic skills.

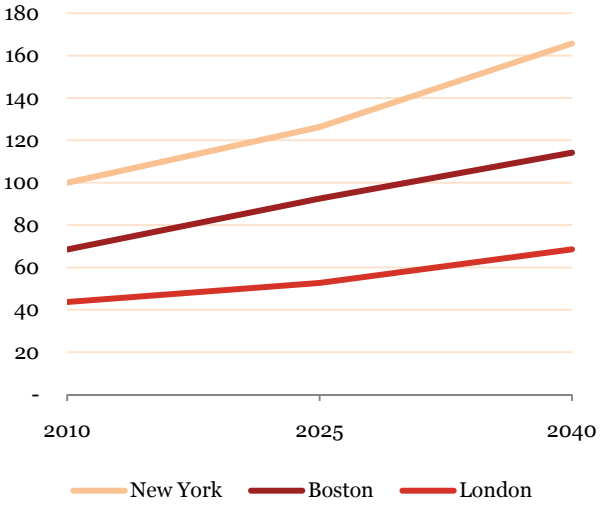
The English linguistic hegemony is not likely to remain as strong as it is currently. Other world languages are expected to grow in importance, in particular Mandarin as a result of the Chinese government's efforts to ensure universal adoption within its borders. Despite this we consider it unlikely that English will be knocked off its pedestal over the next 30 years. After all, today's graduates, who will be the business and political leaders of 2040, predominantly learn English.

It is also the case that the world's key tertiary education clusters are located in large, wealthy cities. This reflects the substantial financing needs of leading universities, which must compete to attract world-class faculty. Whilst this may no longer be a disadvantage for some emerging nations such as China, others find the large up-front investment and ongoing cost of universities to be a significant impediment.

Money is only one side of the equation. A world class university is not defined by the quality and grandeur of the facilities – but by the quality of faculty and students it attracts and the value of original research it produces. To attract people the education clusters must be located in places where people want to live – which tend to be in or near global cities (such as London and New York) which offer desirable social and cultural opportunities.

Having the right quality of people is a necessary but not sufficient condition for the university to produce valuable research output. It is also necessary to have a conducive political and culture environment in which new ideas are welcomed and can thrive. The practice of not adequately referencing academic articles, for example, can lead to difficulties with plagiarism; and a lack of full political freedoms can limit the generation and dissemination of new ideas.

Chart 6 Future tertiary education clusters



PwC analysis: 100 = size of largest cluster in 2010

Given the key trends described above – our view of the future is much the same as that of today. As shown in Chart 6 above, developed nations are likely to dominate the rankings with the clusters around New York (Colombia, Princeton); Boston (Harvard, MIT); and London (LSE, University College, Imperial) leading the way in 2040.

Developing nations are investing heavily in education and tertiary education clusters there are projected to improve significantly over the next 30 years. Even if there are successes in creating a number of world class institutions there, however, it is difficult to see them surpassing the depth of quality institutions in the developed world over the next 30 years.

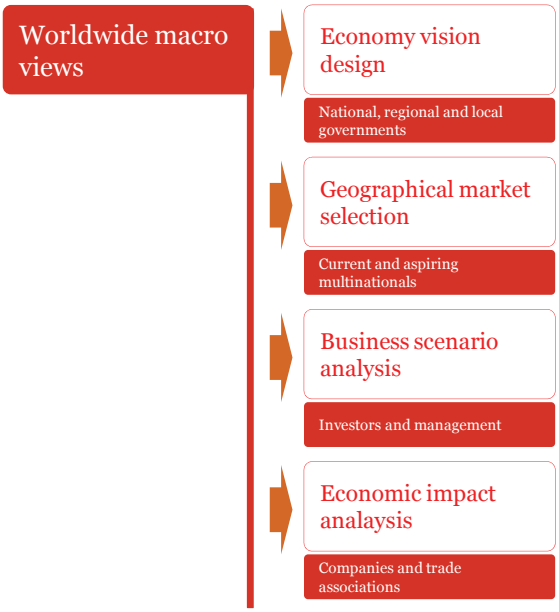
Summary and conclusions

In a growing and increasingly globalised world economy we see a major role for industry clusters. They will continue to provide advantages of scale, specialisation and knowledge spillovers – and so delivering enhanced productivity. Many of the world's existing clusters are likely to continue to grow, new clusters are also projected to form and grow – especially in high growth economies.

Two key themes emerge from our analysis of global industry clusters. The first is that we expect to see a general shift of the world's largest clusters from developed to emerging and developing nations as the global economic gravity continues to shift towards Asia and South America. We do not expect this to be uniform across the five industries we consider. For automotive assembly this shift is already well underway and set to continue apace. For pharmaceuticals, asset management and filmed entertainment, Asian clusters in particular are rising – but we expect developed economy clusters to remain top. For industries such as tertiary education, we expect clusters in today's developed economies to remain significantly ahead of those in developing economies in the medium to long term.

The second key theme we observe is the battle for regional dominance in Asia. By 2040, China and India are likely to account for a far larger share of the world economy so the dominant cluster within the region in some cases will become the world's leading cluster. Some industries are suited to have one dominant regional cluster owing to large economies of scale. Considering the battles we may see for regional dominance in Asia, we expect that for filmed entertainment Mumbai may beat Shanghai. For asset management we expect Singapore to beat Hong Kong and for pharmaceuticals we expect to see Shanghai emerging as the regional centre. The automotive sector tends to be somewhat more dispersed than the others – but we expect to see the Nanjing/Shanghai area developed as the main Chinese hub in the medium term.

PwC Macro Consulting Services



Economic Views reports are produced by PwC's Macro Consulting team. The team's consulting services help clients link the prospects for the global economy with the implications for their business and industry, using economic tools and combining strategic analysis with strong quantitative skills. Building on its on-going forecasts of key economic variables, the team offers services across four broad streams, all of which are founded in our view of the world economy:

Worldwide macro views

Macro Consulting maintains in-house models of over 40 economies which together account for 90% of global GDP. This provides us with the essential understanding of the economic outlook around the world. To this we add systematic and in-depth exploration and analysis of prevailing and emerging trends – economic and otherwise.

Economy Vision Design

We work with cities, regions and countries to create or update their economic vision blueprints and strategies. Our analysis takes into consideration our worldwide macro views and leverages our proprietary data on demand and supply trends in different regions and sectors. Using a mix of primary and secondary research, modelling, forecasting and benchmarking and gap analysis, we answer the following questions for our government clients:

- What economic goals are realistic?
- What locations are our main competitors?
- How we compare against the competition?
- What should we do to improve our global standing?

Geographical market selection

We assist growing multinational companies to assess opportunities in new geographical markets. This is done through bespoke econometric analysis using in-house models that project demand and supply dynamics. Typically we forecast demand in potential new markets as measured by revenue. To this we can add projections of costs and other risks that affect market attractiveness.

Business scenario analysis

We use our knowledge of macro trends and our econometric toolkit to help companies understand the risks and opportunities in their business through the following techniques:

- Revenue forecasting, using econometric models that link our economic forecasts and industry indicators to revenue;
- Stress-testing key business metrics by creating and applying upside and downside macroeconomic risk scenarios; and
- Price elasticity analysis, pointing at a product's optimal price in a given market and estimating its impact on key business metrics.

Economic impact analysis

We assist clients in demonstrating the value they bring to their host economies in the context of wider economic trends. Our findings are typically used for media profile-raising or lobbying, and comprise estimates of a company or industry's impact on GDP, employment and long-term productivity growth.