Mega-urban regions in Asia: growth dynamics

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Comparative international studies on city growth

Two important studies of the world's cities with a comparative focus have recently been published - one by UN Habitat (2009), and one by the World Bank (2009). Their focus differs from the staple fare of demographers working on international urban comparisons – the United Nations Population Division's bi-annual *World Urbanization Prospects*. The UN Habitat report includes small cities that are not included in *World Urbanization Prospects*, and also confines its study to "city proper" statistics, rather than those for urban agglomerations or metropolitan areas. Since so much of urban growth takes place outside city boundaries, it is not surprising that this study finds that 40 per cent of cities in the developed world experienced negative population growth in the 1990s (in Japan, 25 per cent of cities decreased in size), or even that in the developing world, where overall levels of urbanization rose rapidly, 10 percent of cities nevertheless experienced net population loss (UN Habitat, 2009: 16). Most of the developing world cities losing population were in Asia – in China in particular, but cities such as Seoul and Jakarta were also on the list.

As noted in the UN Habitat report (p. 42),

> knowing which cities, parts of cities, metropolitan areas, and even regions are not growing – or are experiencing population loss – is essential for policymakers and urban planners, who need accurate data to anticipate trends, design recovery policies and rethink strategies for bringing opportunities to cities and preventing excessive out-migration.

Unfortunately, data in statistical reports such as censuses and surveys are rarely presented in a way that facilitates such knowledge. Moreover, compilations of data that purport to show urban agglomerations sometimes serve to obfuscate rather than illuminate, as discussed below.

The UN Habitat report presents a preliminary analysis of 143 cities with declining populations in the developing world, grouping the causes of declines into four types: suburbanization and the growth of polycentric urban clusters; economic decline, perhaps due to the decline of particular industries on which the city depended heavily and the consequent loss of employment; decline linked to local conflict or the city's loss of political importance; and re-drawing of boundaries that cause the city's area to shrink. The first and last of these do not necessarily reflect any real loss of dynamism in the city region focused on the city in question. The first one is the well-known "doughnut effect"

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– "a phenomenon in which the inner core of a city grows more slowly than the areas around it". (UN Habitat, 2009: 14). This serves to illustrate the need to analyze mega-urban regions (MURs) that capture the full extent of a city's expansion outside arbitrarily imposed boundaries, and the extent of economic integration in this broader region.

Urban concentration and economic development

The World Bank's *World Development Report 2009, Reshaping Economic Geography*, throws out important challenges to some of the accepted wisdom concerning urbanization in the Third World. The processes by which income growth affects urbanization, acting through Engel's Law and technological change, had been much discussed (e.g. Kelley and Williamson, 1984). But the World Bank's report focuses more on the other direction of causation – by which urbanization fosters economic growth. It argues that spatial concentration of economic activity rises with development, and that governments should not resist it by seeking to target investment and policy attention to the lagging areas of their countries. Instead they should adopt a neutral stance on the location of development activities, but make judicious investments in transport and communications which will enable disadvantaged areas to become connected to the centres of growth. "The challenge for government is to allow – even encourage – "unbalanced" economic growth, and yet to ensure inclusive development" (p. 20) through a "well-calibrated blend of institutions, infrastructure and interventions" (p. 6).

Montgomery (2009), in a review of the World Bank study, makes the point that the World Bank report may be overly optimistic about some of the benefits of spatial concentration. He argues that in poor countries, inadequate urban management and governance may prevent firms from reaping scale economies of metropolitan location when the public sector cannot provide them with adequate and reliable supplies of electricity and water, and when the urban transport system is ill-managed, congested and chaotic. His point is well taken, but more in relation to the poorest countries than to East and Southeast Asian countries experiencing rapid and sustained economic growth. It can be argued that the role of spatial concentrations of economic activity in fostering rapid national economic growth is well illustrated by countries such as South Korea, China, Malaysia, Thailand, and Indonesia.

Urban agglomerations – data issues

The definition and delimitation of urban agglomerations is a fraught issue. Inappropriately defined urban agglomerations can distort the overall picture of urbanization in a given country, its level of urban primacy and its city size hierarchy. In the current paper I will adopt the term mega-urban region (MUR) to refer to the broader region comprising the officially defined metropolitan area and zones outside it that are functionally linked to it as extensions of its built-up area (termed the inner zone) or in the early stages of experiencing transformation of employment, infrastructure, industrial and commercial development tied to the metropolis. This concept originated in earlier seminal work by Vining (1986) and McGee and Robinson (1995).

The unsatisfactory state of comparative data on urban agglomerations in many countries is well illustrated by the example of Malaysia, and its primate city, Kuala Lumpur. Kuala Lumpur cannot really be discussed without reference to its great rival, Singapore, formerly part of Malaysia, but since 43 years ago an independent neighbouring country. Looking back four decades or so, Singapore was a much larger city than Kuala Lumpur, but with political events which led to the splitting off of Singapore from Malaysia to become a separate nation in 1965, Singapore to some degree lost its hinterland in Malaysia. Thus its growth has not been as rapid as that of Kuala Lumpur, though this growth has accelerated more recently as a result of considerable net immigration, both permanent and temporary. Also, to be consistent in terms of mega-urban region analysis, Singapore's 4.8 million population (2008) needs to be supplemented by more than one million living in two neighbouring countries – Malaysia and Indonesia. Johor Bahru in Malaysia and parts of the province of Kepulauan Riau in Indonesia are closely linked to Singapore economically, and their rapid population growth has been based on this. Many people commute daily from Johor Bahru to work in Singapore, likewise smaller numbers from Batam in Indonesia. So Singapore MUR – a truly international MUR - has more than 6 million population.

Kuala Lumpur's growth has been very rapid indeed, as it draws migrants from all over Malaysia as well as overseas, particularly Indonesia. The mega-urban region centred on Kuala Lumpur today has a population of approximately 5 million, most of it residing in the adjoining state of Selangor.

What do the official figures show? Singapore's population figures do not show the population living in the Malaysian and Indonesian parts of its MUR. But much more serious is the underestimation of Kuala Lumpur's population resulting from use of its official boundary to delineate its urban agglomeration, as is still done by the United Nations Population Division in its 2007 *World Urbanization Prospects* and its 2007 Urban Agglomerations wall chart. Kuala Lumpur is a dramatically under-bounded city. Driving into Selangor state from Kuala Lumpur is simply a matter of moving from one part of the suburban area of the city into another. Indeed, the Selangor State government tried to bring greater awareness of the fact that motorists were entering its territory by building a major archway across the highway at the point of entry – the only sign of discontinuity in the suburban (inner suburban, for that matter) landscape the motorist is traversing. Thus, the United Nations figure for Kuala Lumpur urban agglomeration in 2007 is 1.4 million, compared to the reality of about 5 million.

The United Nations Population Division continues to accept the population of the Federal Territory of Kuala Lumpur as representing the urban agglomeration of Kuala Lumpur. The United Nations cannot be held totally responsible for this distortion of reality, as the monograph on urbanization in the Malaysian Department of Statistics' Census Monograph Series lists Kuala Lumpur's population in 2000 as 1.3 million, and contains no analysis at all of the broader mega-urban region focused on the city. Nevertheless, the Department of Statistics publication makes no claim that Kuala Lumpur represents an "urban agglomeration" population, and the acceptance of the population of such an

under-bounded city as an urban agglomeration in a United Nations publication often used for international comparisons is unfortunate.

As noted above, one reason the distortion in megacity populations matters is that it can mislead scientific analysis. For example, the World Bank (2009: Figure 1.6) presents data on the relationship between the percent of the nation's primary city population to the national population, at different levels of economic development. The two striking exceptions to the general pattern – whereby this percentage rises steeply, and then levels off at higher levels of GDP per capita - are Warsaw from 1850 to 2000, and Kuala Lumpur from 1900 to 2000. I do not know the explanation in the case of Warsaw, but in the case of Kuala Lumpur the reason is solely the use in the World Bank study of the misleading official figures for Kuala Lumpur, showing Kuala Lumpur holding about seven per cent of Malaysia's population, whereas the actual figure – approximately 20 per cent – is much more in line with most of the countries in the figure at similar levels of economic development.[2]

Another example of misleading analysis is with regard to the country's urban hierarchy. The World Bank study (World Bank 2009: 51-57) makes much of Zipf's rank-size rule as "almost a law" based on the analysis of the "portfolio of settlements of different sizes" found universally. In Malaysia, the hierarchy of urban places is frequently listed, but used in a way that misinterprets reality. Of the 10 largest metropolitan towns in Malaysia, Kuala Lumpur is the largest, and five of the others lie within 30 kilometers of downtown Kuala Lumpur. They are simply suburban sprawl in two cases and pre-existing towns that have become linked to Kuala Lumpur through a continuously built-up belt, in three cases. When these populations are added to the official Kuala Lumpur population, the 3-city primacy index for Malaysia rises from 1.03 to 2.95.[3]

Such misinterpretation in scientific analysis will inevitably have policy implications. Planners who are aware that Kuala Lumpur's extended metropolitan population is an increasing share of both the nation's total and urban population will no doubt treat its needs differently from those who are convinced that both shares are steadily declining, as the unadjusted analysis shows. Of course, Malaysian planners are well aware of the reality, and the Federal Department of Town and Country Planning in its National Physical Plan, published in 2005, has projections for the three largest conurbations reaching substantial populations in 2020: 8.46 million in the case of Kuala Lumpur, 2.42 million in the case of Penang, and 1.84 million in the case of Johor Bahru. Nevertheless, it should not be left to this Department to correct public misconceptions about the urban hierarchy that might arise from the publications of the Department of Statistics.

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[2] It might be noted in passing that the World Bank does not note that its Figure 1.6 does not include vast nations such as China, India or the United States, in all of which the largest city, not surprisingly, is unable to dominate the nation's population to the extent possible in smaller countries (see Jones and Visaria, eds, 1997: 6-8). In this sense, its analysis is misleading.

[3] This near-trebling may be slightly exaggerated, as the population of the next two largest towns – Johor Bahru and Ipoh – may also need to be increased somewhat to show their true metropolitan populations. Indeed, Penang would replace Ipoh as the third largest city if a true metropolitan population were used for Penang. But this effect would be far smaller than in the case of Kuala Lumpur.

Study on growth dynamics of Asian mega-urban regions

An attempt to analyze in a more realistic way the dynamics of population and employment change in six major mega-urban regions (MURs) of East and Southeast Asia is reported on in detail in Jones and Douglass (2008).[4] This study identified core, inner and outer zones for six major MURs in Pacific Asia (Jakarta, Bangkok, Manila, Ho Chi Minh City, Taipei and Shanghai), based on criteria other than purely administrative boundaries. In most cases, the core approximated the officially designated metropolitan area (the boundaries of which had been widened over time in an attempt – not totally successful – to take account of metropolitan expansion), and inner and outer zones beyond the core were identified using criteria of population density and the proportion of employment in agriculture. The map at the end of the paper shows the areas included in the core and the zones for these MURs, in comparative perspective.

The influence of the earlier-noted "doughnut effect" on measured growth rates of metropolitan regions will depend on the boundaries used for these regions. A situation found historically in many cities is that at some point in time, as the city grows, a decision is made to widen its boundary considerably to encompass areas that are likely to be absorbed by the city as it expands. But in time, particularly as the expansion of the transportation network makes commuting over longer distances practicable, even this expanded boundary is found to be too narrow to capture the ongoing growth.

The point is very simply made in Figure 1, which shows what happens when metropolitan growth, first, simply fills out a broad boundary for the metropolis, thus capturing both slow inner city growth and rapid suburban growth; and second, expands beyond this boundary, meaning that growth in the official metropolis understates real growth. This is precisely what happened in both of the two largest MURs in Southeast Asia - Jakarta and Manila. They both enlarged their official boundaries (for Jakarta, in 1961, for Manila, in 1975) to encompass what at the time included the city population and a zone available for expansion. Thus for a time, urban sprawl was captured within the official metropolitan boundary, and the recorded growth rate of the city was rapid. But after a time, the official metropolitan area was almost fully built up, and high land prices, urban unrest and expansion of transportation facilities led to a flight of industry and population to the suburbs. This action was no longer captured by population figures for the metropolitan area, which showed a sharp contraction in growth.

This is why the dynamics of population change over a broader mega-urban region (MUR) need to be studied. In the Jones-Douglass study, population and employment dynamics over the inter-censal period 1990-2000 were studied, utilizing unpublished census data in all cases. The findings of this study are that these mega-urban regions continued to increase their share of national populations, and zones immediately beyond the official

[4] The collaborators in this study, and authors of individual chapters on the six MURs were: for Bangkok – Jarunun Sutiprapa, Preeya Mithranon, Paranee Watana and Chanpen Taesrikul; for Jakarta – Si Gde Made Mamas and Rizky Komalasari; for Manila – Rachel Racelis and Paula Monina G. Collado; for Ho Chi Minh City – Dang Nguyen Anh; for Taipei – Li-ling Huang; and for Shanghai – Yu Zhu.

metropolitan boundaries are where the most dramatic changes are occurring. Table 1 shows the basic results.

Particular interest attaches to the population growth rates in the core, which in most cases is defined to include the official metropolitan area. The cores are very substantial in area, exceeding 600 sq. km. for four of these cities – Jakarta, Bangkok, Manila and Shanghai. There is considerable variation in growth rates within this substantial core. In Taipei, Jakarta and Bangkok, the increase is very slow, indeed negative in the case of Taipei. Bangkok and Taipei have very low fertility rates (Jones and Douglass, 2008: Table 2.1), and Jakarta and Taipei experience considerable net outmigration from the core. However, the population growth rate remains quite high in Manila, HCMC and Shanghai, in each of which it is above the rate of population increase for the country as a whole. The reasons differ – in Manila, fertility rates remain quite high, and are supplemented by in-migration, whereas in Shanghai, growth would be negative but for the impact of in-migration.

Within the cores, there was a tendency for a significant redistribution of population from the overcrowded central urban districts to the outer part of the core. Even in Manila and Shanghai, where the populations of the core grew substantially, the populations of some central districts in the core shrank: in Manila's core, Pasay City shrank slightly and San Juan had risen and then fallen again since 1980; in Shanghai's core, the population of the three central districts fell by 36 per cent over the 1990s.

Table 1 also indicates that in the case of four of the cities – Jakarta, Bangkok, Manila and Shanghai – the key population growth was in the inner zone, not the core. Table 2 shows that over the 1990-2000 period, essentially the entire growth of the Jakarta and Taipei MURs took place outside the core. The inner zones of these MURs gained population both from net migration from the core (essentially a re-location of people – mostly families rather than individuals, industry and institutions from the core to the inner zone), and net migration from other parts of the country – more the traditional movement to the metropolis, but settling in the inner zone instead of the core. Population density in the inner zone ranged from 1,248 per sq. km. in Bangkok to 5,532 in Taipei. The high density in Taipei's inner zone reflects the small area of its core, so that its inner zone shares some of the characteristics of the core in the other MURs. But even in Jakarta's widespread inner zone, population density averaged 3,975 per sq. km. In all cases, these year 2000 inner zone densities will have increased greatly by now.

Table 3 indicates that the share of each of the MURs in the national population increased over the period. This is very important, as utilization of data for the core alone (i.e. in most cases the official metropolitan area) indicates a **decline** in its share of the national population. (As noted above, the same is true of Kuala Lumpur, not included in this study). The increasing share of the MUR in total population reflects the continued accumulation of population in these MURs. Indicators of accumulation of power, wealth and economic activity tend to show even stronger concentration in the MURs (Jones and Douglass (eds), 2009, Table 2.3), consistent with the analysis in World Bank (2009).

On the other hand, the MUR growth rate has not been as rapid as that of the urban population as a whole. (Table 4). This is the case whether the MUR growth is considered to be that of the core alone, or the core plus inner zone, or the core plus inner and outer zones. Further analysis is needed of which categories of urban areas in these countries are growing most rapidly.

"Urban agglomeration" estimates based on this study

According to the way the core, inner zone and outer zones were defined, the sum of the core and inner zone populations is likely to give the best estimate of the urban agglomeration. This yields the following populations for 2000:

Jakarta – 17.782 million
Manila – 16.245 million
Shanghai – 13.226 million
Bangkok - 8.256 million

While some observers might be surprised that Bangkok MUR has only half the population of Jakarta or Manila, it is clear that Bangkok is indeed a smaller MUR. Alternative ways of adjusting its boundaries could add up to a few million to its population, but certainly not enough to reach the populations of the Jakarta or Manila MURs.

The role of migration

In the past, study of migration was crucial in assessing the growth dynamics of MURs because it contributed significantly to their growth through natural increase. The situation has now changed. Given the very low fertility rates now reached in the core of all the MURs studied except Manila, their further growth will at some stage (a stage already reached in Shanghai) be **totally** dependant on an influx of migrants. Shanghai has one of the lowest fertility rates of any city in the world, with a total fertility rate (TFR) of 0.7 in 2000. Bangkok and Taipei, though substantially higher, were still among the world's lowest TFRs at 1.16 and 1.21 respectively.

The contribution of migration to the growth of the MURs and of their component zones in the 1990-2000 period is shown in Table 5. In general, there is a close association between the rate of population growth in the zone and the percentage contribution of migration to this growth, with migration playing a major role in the more rapidly growing cities and zones. Thus, for example, it is clear that the inner zone of Jakarta gained a large share of its population growth through migration, whereas both the core and the outer zone were losing population through migration.[5] Both the inner and outer zones of Bangkok gained population massively through migration, whereas migration had almost no impact on population growth in the core, implying that in-migration and out-migration

[5] Actually, the loss of population in Jakarta's outer zone appears to have been caused, at least in part and probably totally, by a boundary adjustment which shifted part of the outer zone population of Bogor into the inner zone.

almost balanced out for the core. Manila was like a modified version of Bangkok, with migration contributing about half of the growth of both inner and outer zones, but much less for the core. The core of Taipei lost population through migration, whereas both the inner and outer zones gained through migration.

But important as the particular patterns of migration were, the implications of Table 5 go far beyond this, and have to do with the capacity of different MURs to maintain or increase their populations through natural increase. From the wide range in their fertility rates for the cores of these MURs shown in Table 6, we can infer that some of the cities would be better able to do this than others.[6]

The enormous difference in the role of natural increase in the growth of the different cities is evident in the comparison between Manila and Shanghai. The growth rates of their core and inner zones were almost identical over the 1990-2000 period (see Table 1), and yet the contribution of migration to this growth differed dramatically. In the case of Manila, the continuing relatively high fertility rates in Metro Manila and the inner zone were sufficient to sustain considerable population growth, and the relative contribution of migration was modest (though as high as 54 per cent in the case of the inner zone). By contrast, more or less the entire population increase in the core and inner zone of Shanghai resulted from in-migration. Fertility there had sunk so low that it was no longer able to generate any growth of population, even though the age-sex structure had been made more favourable to population growth through the in-migration of people in the peak childbearing ages. Most importantly, the Shanghai MUR *as a whole* no longer has the capacity to maintain its population through natural increase, so low has its fertility rate fallen. Taipei and Bangkok are likely to be the next of the MURs studied to follow suit. Further growth in the population of these MURs will be totally dependant on a net inflow of migrants. Whether migrants will continue to come in large enough numbers to maintain positive growth rates of population will depend mainly on the attractiveness of employment prospects in these MURs.

While the inner zone was clearly the area where net in-migration made a consistent contribution to population growth in each of the MURs, it was not just the numerical contribution of migration to growth that mattered, but also its contribution in changing the age-sex structure and the educational composition of the population. On the whole, the migrant proportion of the population in the cores of these MURs peaked at ages 15-24, and more broadly at 15-34, whereas in the zones the peak migration range was typically wider – 15-34, and in many cases (for example, in Manila and Jakarta), not very much lower at ages 35-44, reflecting considerable family migration from the core to the zones. Females predominated in the migration streams to all the MURs except Shanghai, and this female predominance was most marked in migration to the core. It was also most marked among young migrants (aged 15-24), especially in the core. Manila is particularly

[6] Jakarta is a particularly interesting case, in that there is a sharp upward gradation in fertility, moving out from the core to the outer zone. In the 1995-2000 period, TFR in the core was 1.78, in the inner zone 2.49 and in the outer zone 3.35. The figures were higher in the preceding 5-year period (as high as 4.34 in the outer zone). Therefore in the 1990s at least, the inner and outer zone populations were still growing substantially through natural increase.

striking in this regard. Among young migrants (aged 15-24) in 1990 there were two females for every male among recent migrants to the core. Females predominated, though to a lesser extent, among ages 25-34, and there was a male majority among migrants aged 35-44. A similar pattern held in 2000. Bangkok's patterns of sex ratios among migrants resembled those of Manila, though to a less marked degree.

Contribution of migration to educational change

In 1990, there was a gradation in the educational attainment of the population between the core and the zones in all of these MURs (very sharp in the cases of Jakarta and Shanghai), with the outer zone in particular displaying its much more rural characteristics through its lower levels of educational attainment. However, the MUR populations were becoming increasingly well educated over the 1990s, mainly because of rising educational levels generally in these countries. The effect of migration on the educational attainment of the MUR populations differed by zones, reflecting the different nature of migration streams to the zones. In Jakarta, young migrants to the core (aged 15-24 years) had lower average levels of education than non-migrants at the same ages, but migrant-non migrant differentials at ages 25-44 were very slight. By contrast, in the inner and outer zones, migrants at all ages had much higher levels of education than non-migrants, reflecting both the low levels of education of non-migrants in these zones and the relatively high levels of education of many of the migrants, both those moving out from the core and those coming from further afield. Overall, for the Jakarta MUR, migration tended to raise the average levels of education of the population, but mainly because the migrants were predominantly young, and the young have higher levels of education, on average. When the comparison is restricted to those aged 15-34, there was not much difference between the educational level of migrants and residents.

The Shanghai and Ho Chi Minh City MURs mirrored the Jakarta situation: migration tended to raise the average educational levels of the population (although this picture may be distorted to some extent by the many migrants missed in the census count, many of whom would have had low levels of education). In Manila and Bangkok, overall migration tended to lower the average educational attainment of the population, particularly in relation to the proportion with tertiary education.

There is not space in this paper to show in detail the changes in employment structure in the different zones of these MURs, or the contribution of migration to these trends. One point that might be noted is that, not surprisingly, the importance of the A sector (primary industries) tends to increase with distance from the core. Thus in 1990 the core-inner zone-outer zone percentage of A sector employment in Bangkok was 2, 13 and 31 respectively, and the Manila, Jakarta and Shanghai percentages were similar, except that in Jakarta's and Shanghai's inner zones, the percentages were lower and higher respectively. The other consistent tendency is for the share of A sector employment in each zone to decline over time – except in the core of some cities, where the share was very tiny anyway. Thus in the inner zone of Manila, the A sector's share fell from 13 per cent in 1990 to 9 per cent in 2000, and in the outer zone, if fell from 33 per cent to 26 per cent. The outer zone declines were sharper in Jakarta and Bangkok – in Jakarta, from 37

per cent to 26 per cent and in Bangkok, from 31 per cent to 18 per cent. As for M sector employment (basically, manufacturing and construction industries), its share in the inner zone was higher than in the core, in all the MURs, in both 1990 and 2000, and over the decade there was a tendency for M sector employment to move out from the core, not only to the inner zone but also to the outer zone.[7]

Phases of MUR growth

Jones and Douglass (2009) present a table (Table 11.12) showing five phases of MUR growth among zones. In the first two phases, development focuses on the core. In phase three, population in the core stabilizes, with significant suburban housing development and thickening of corridor development. In phase four, population in the core is displaced by mega-projects, suburbanization proceeds apace, and large-scale industry is pushed further out. In the fifth phase a complex urban field develops

> in which many of the distinctions among zones disappear into a matrix of interaction using multiple modes of transportation that traverse the MUR as a network rather than a dendritic transportation tree focused only on movement into and out of the core. The core retains its role in hosting higher order national and global functions, but elements of these functions are also relocated to inner and even outer zone locations (Jones and Douglass, 2009: 346).

It is important to note that in the decade of the 1990s under review each MUR was in a different phase or combination of phases. Taipei was the most advanced, and about to enter the fifth phase of MUR morphology. Bangkok, Jakarta and Manila were traversing from the third to the fourth phases, while Ho Chi Minh City and Shanghai were experiencing the second phase of accelerated population growth still focused on the core (although in many ways their belated take-off has compressed elements of all phases into one, as can be clearly seen in Shanghai in the first decade of the 21st century).

Are internationally comparative population-based MUR studies feasible?

What are some of the lessons from the Jones-Douglass study for the estimation of better internationally comparative urban agglomeration populations? One would like to think that internationally comparative studies of MUR development could be conducted based on the 2010 round of censuses, to examine developments over the first decade of the 21st century. It is hard, though, to be optimistic about the prospect for such studies. At present, local and national statistical systems are giving inadequate attention to the collection, let alone promoting the utilization, of the spatially disaggregated data needed to investigate MUR development. (A similar point in relation to many aspects of urbanization has been made in National Research Council, 2003, Chapter 10). In order to arrange for comparative data for MURs to be produced by national statistics offices, the criteria to be followed would have to be agreed on by these offices. Someone or some

[7] Employment, of course, is recorded by place of residence, not by place of work, so many residents of the inner zone in particular work in the core.

organization – such as the United Nations Population Division – would have to coordinate the effort. One problem faced in the study of six MURs in Asia reported on in this paper was the change between the 1990 and 2000 censuses in the kind of data collected, particularly on employment,[8] and in definitions, making comparison of migration and employment change difficult in some cases.

Nevertheless, the objective is worth pursuing. With the increasing power of GIS systems, the linking of census population and housing data, economic data and other data in a more spatially meaningful way is technically feasible. It is really only the organizational aspects that provide the main barrier to such studies being accomplished.

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[8] National statistics offices often argue that as more detailed and reliable employment data are collected in labour force surveys, there is no need for detailed 2 or 3-digit data on occupation, for example, to be collected in the census. While the cost of collecting such detailed data in a census certainly has to be considered, it must also be kept in mind that because of the relatively small sample in most labour force surveys, employment data from these surveys are not available for small areas.

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Zones of six Asian mega-urban regions

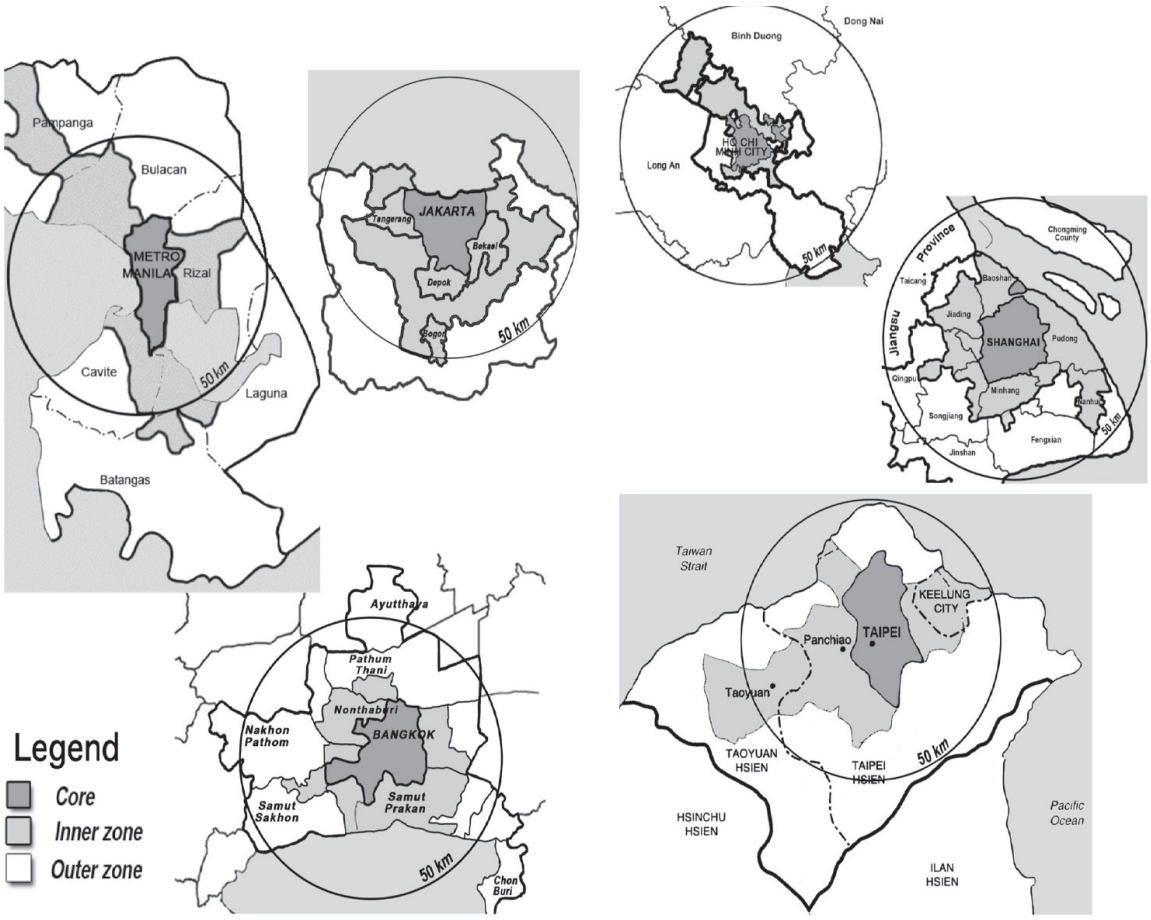

FIGURE 1. PHASES OF METROPOLITAN EXPANSION

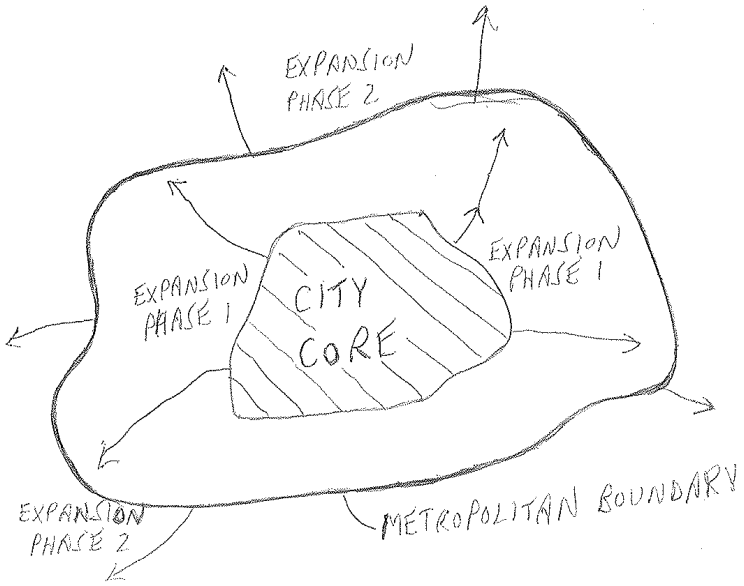

Table 1. Basic data on the Asian mega-urban regions, 1990 and 2000

	Area (sq. km)	Population		Density (per sq. km.)		Population growth rate (av. ann.) 1990-2000
		1990	2000	1990	2000	
JAKARTA						
Core	662	8,223	8,347	12,421	12,610	0.2
Inner zone	2,374	5,434	9,435	2,289	3,975	5.7
Outer zone	3,139	3,442	3,407	1,097	1,085	-0.1
Total	**6,175**	**17,098**	**21,190**	**2,769**	**3,432**	**2.1**
Indonesia						**1.5**
BANGKOK						
Core	876	5,445	5,876	6,215	6,709	0.8
Inner zone	1,907	1,596	2,380	837	1,248	4.1
Outer zone	4,465	1,593	2,163	348	472	3.1
Total	**7,248**	**8,634**	**10,419**	**1,172**	**1,414**	**1.9**
Thailand						**1.4**
MANILA						
Core	633	7,907	9,880	12,551	15,642	2.3
Inner zone	3,105	4,183	6,365	1,345	2,047	4.3
Outer zone	8,323	3,819	5,368	461	648	3.5
Total	**12,061**	**15,909**	**21,613**	**1,324**	**1,641**	**3.1**
Philippines						**2.1**
HO CHI MINH						
Core	170	2,320	3,203	13,647	18,841	3.8
Inner zone	617	904	1,078	1,465	1,747	1.9
Outer zone	1,308	700	756	535	578	0.8
Total	**2,095**	**3,924**	**5,037**	**1,873**	**2,404**	**2.8**
Vietnam						**1.7**
SHANGHAI						
Core	605	8,027	9,934	13,267	16,415	2.1
Inner zone	1,753	2,207	3,292	1,259	1,871	4.0
Outer zone	3,944	3,108	3,182	788	808	0.2
Total	**6,302**	**13,342**	**16,408**	**2,117**	**2,603**	**2.0**
Mainland China						**1.1**
TAIPEI						
Core	272	2,730	2,624	10,047	9,655	-0.4
Inner zone	890	3,993	4,923	4,486	5,532	1.9
Outer zone	2,516	733	995	291	395	2.6
Total	**3, 678**	**7,456**	**8,542**	**2,027**	**2,322**	**1.3**
Taiwan						**0.9**

Note: Ho Chi Minh City populations are for 1989 and 1999.
Source: Jones and Douglass (eds), 2008, Table 3.1.

Table 2. Non-core regions of the MUR: share of MUR population 1990 and 2000 and share of MUR population growth 1990-2000

	Jakarta	Bangkok	Manila	HCMC	Shanghai	Taipei
% outside core 1990	51.9	36.9	50.3	40.9	39.8	63.4
% growth outside core 1990-2000	97.0	75.9	65.4	20.7	37.8	109.8
% outside core 2000	60.6	43.6	54.3	36.4	39.5	69.3

Source: Jones and Douglass (eds), 2008, Table 3.2

Table 3. Share of MURs in national populations (%)

	Jakarta	Bangkok	Manila	HCMC	Shanghai	Taipei
1990	9.4	15.8	26.1	5.9	1.2	37.5
2000	10.0	16.6	28.6	6.4	1.3	39.1

Source: Jones and Douglass, 2008, Table 3.3.

Table 4. Population growth rate in the MUR, compared with country or region population growth rate and urban population growth rate

	Population – core plus inner zone		Growth rate (av. ann. -%)			
City	**1990**	**2000**	**Core plus inner zone**	**Total Mega Urban Region**	**Whole Country**	**Urban ***
Jakarta	13,657	17,782	2.7	2.1	1.5	4.2
Bangkok	7,041	8,256	1.6	1.9	1.4	2.5
Manila	12,090	16,245	3.0	3.1	2.1	2.5
HCMC	3,224	4,281	3.0	2.8	1.7	4.1
Shanghai	10,234	13,226	2.5	2.0	1.1	4.3
Taipei	6,723	7,547	1.2	1.3	0.9	

* Including non-urban parts of the MUR
Source: Jones and Douglass, 2008, Table 3.4

Table 5. Contribution of net migration to population change, 1990-2000 (%)

	Jakarta	Bangkok	Manila	HCMC	Shanghai	Taipei
Core	Negative	3	19	n.a.	11.4	Negative
Inner zone	60.9	71	54	n.a.	94.7	31.9
Outer zone	Negative	62	42	n.a.	62.4	40.7
Mega urban region	16.2	52	38	46.3	104.4	n.a.

Source: Jones and Douglass, 2008, Table 3.5

Table 6. Total fertility rates, metropolitan areas compared with rest of the country.

City	Year	TFR of the Metropolitan Area	TFR of whole country
Jakarta	1991	2.18	3.22
	2000	1.78	2.34
Bangkok	1991	1.41	2.41
	2000	1.16	1.81
Manila	1993	2.76	4.09
	2000	2.80	3.50
Ho Chi Minh City	1999	1.40	2.50
Taipei	1991	1.37	1.72
	1996	1.45	1.77
	2001	1.21	1.40
Shanghai	1990	1.29	2.00
	2000	0.70	1.60

Source: Jones and Douglass, 2008, Table 2.1. See that table for detailed sources