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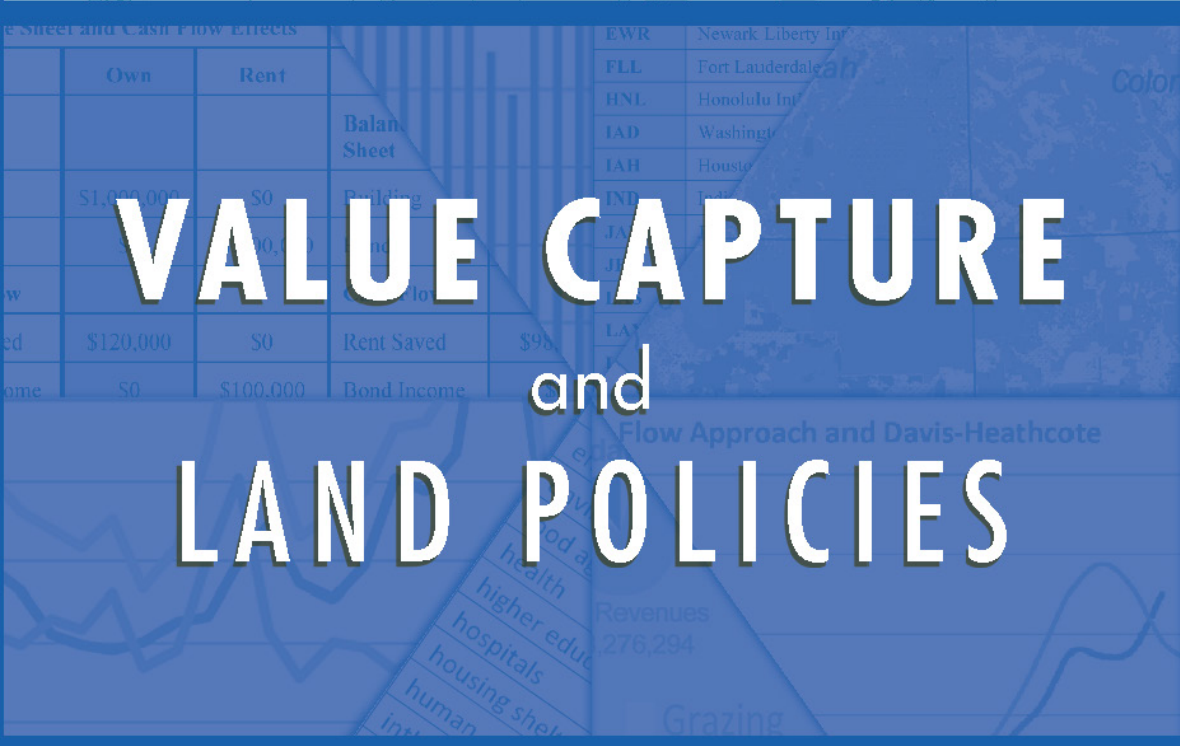
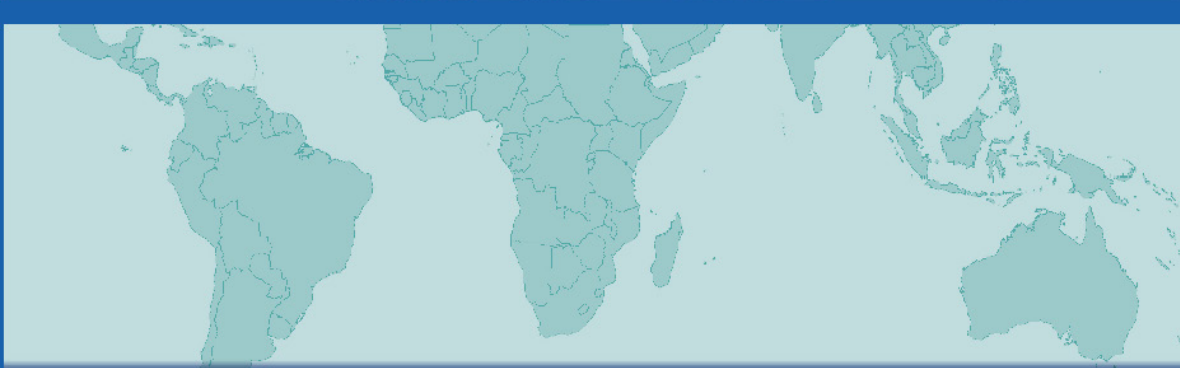
VALUE CAPTURE and LAND POLICIES





Edited by Gregory K. Ingram and Yu-Hung Hong

Value Capture and Land Policies

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Transit Value Capture: New Town Codevelopment Models and Land Market Updates in Tokyo and Hong Kong

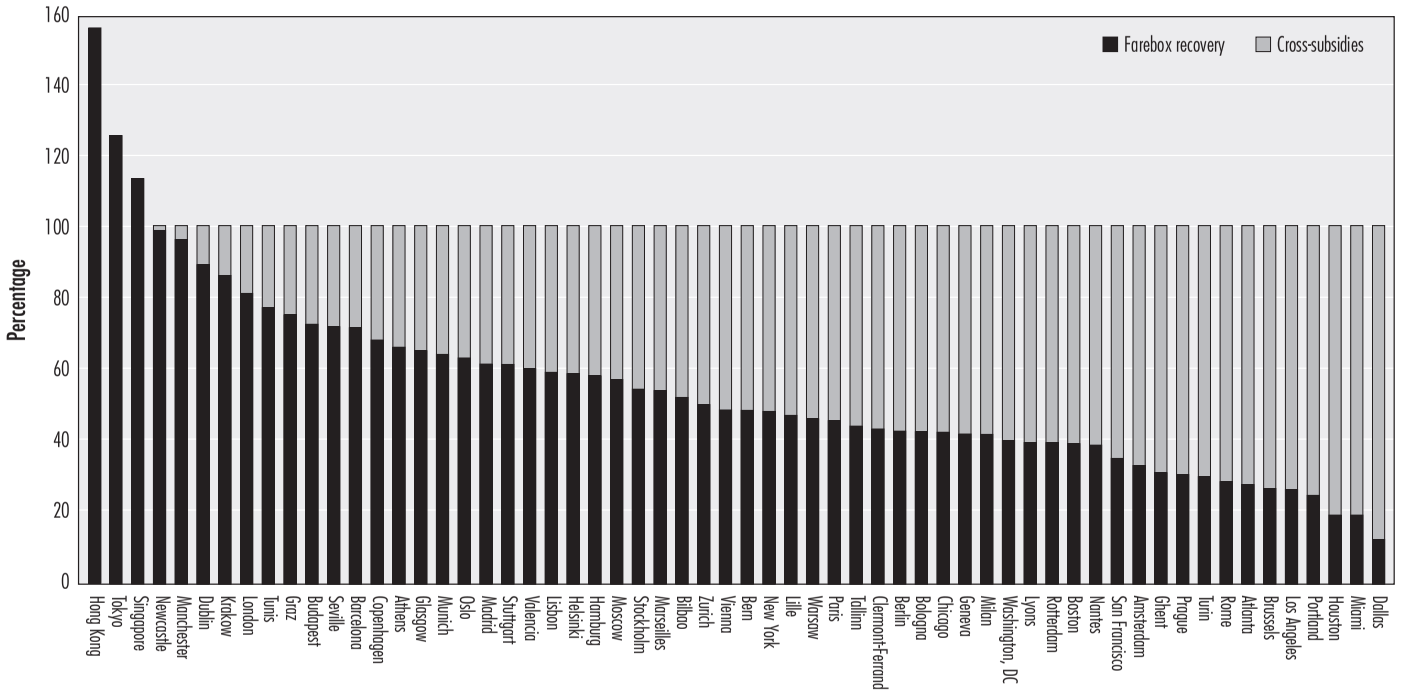
Jin Murakami

Over the past two decades, there has been an increased global focus on putting more public resources into rail transit systems. Doing so would reduce travel costs, guide urban forms, improve environmental conditions, and generate economic benefits (Altshuler and Luberoff 2003; Cervero 1998; Newman and Kenworthy 1999). There has also been a growing public concern about the fiscal crises of global cities caused by mega transit projects, for which policy makers tend to underestimate project costs and overestimate operating revenues (Flyvbjerg 2007; Flyvbjerg, Bruzelius, and Rothengatter 2003; Pickrell 1992; Wachs 1987). Indeed, public transit systems in 57 out of 60 selected global cities[1] have generated large operating deficits and required various cross-subsidies, whereas private railway companies in Hong Kong, Tokyo, and Singapore have made substantial profits without much financial assistance from their governments, as shown in figure 12.1.

The funding sources for cross-subsidies vary across the public and private sectors. Musgrave and Musgrave (1973) discussed that a variety of cross-sectorial financing schemes could be evaluated on the basis of economic efficiency, social

1. Data on public transportation systems in 49 selected global cities for 2001 were obtained from UITP (2006). FTA (2011) supplemented data on fixed-guideway transit systems in 10 major U.S. cities for 2008. Cervero and Murakami (2008) summarized data on 12 major railway companies in Greater Tokyo for 2006.

Figure 12.1
Transit Farebox Recovery and Cross-Subsidies Across 60 Selected Global Cities

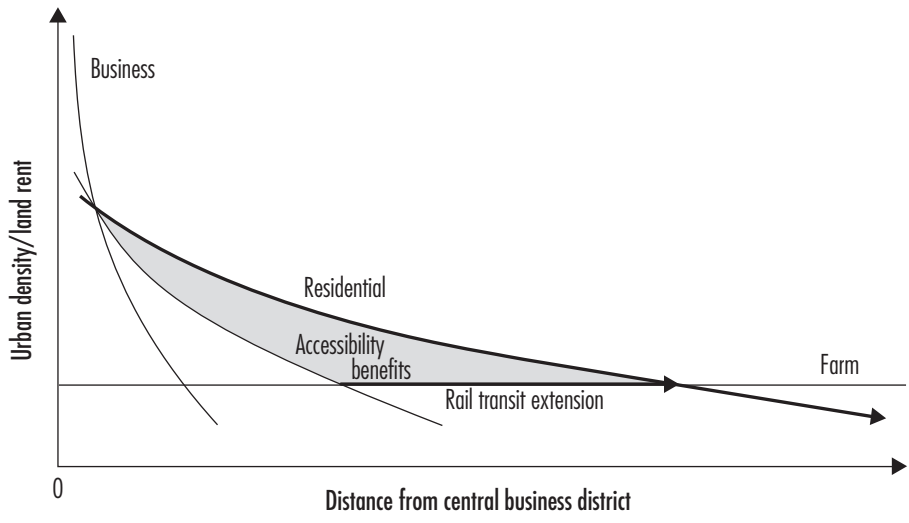


Sources: Data from Cervero and Murakami (2008); FTA (2011); UITP (2006).

equity, administrative feasibility, and political acceptability criteria. In the United States, for instance, the public funding arrangements for transportation capital investments have gradually shifted from federal and state fuel taxes to local sales taxes and general obligation bonds. This has been due in large part to the administrative feasibility and political acceptability of these nonuser sources, even though they are more inequitable than fuel taxes, transit fares, and bridge tolls (Taylor 2004; Wachs 2003). A range of value capture techniques (e.g., special assessment districts, property impact fees, development right sales, and land readjustment projects) have long proved to be relatively efficient, equitable, and feasible options to recoup the costs of rail transit projects from private landowners who receive "windfalls" (under the beneficiary principle) and to encourage high-density development along new rail lines (Callies 1979; Hagman and Misczynski 1978; Hayes 1977; Johnson and Hoel 1985; Landis, Cervero, and Hall 1991; Rybeck 2004; Stopher 1993).

According to classic location theories, rail transit investment in the monocentric city model reduces household commuting costs, encourages residential suburbanization effects, and tilts urban density/land rent curves outward, as figure 12.2 shows (Alcaly 1976; Alonso 1964; Mills 1972; Muth 1969). In the late nineteenth century, American entrepreneurs proactively packaged rail transit investment and housing property development to capture the accessibility benefits produced in the new suburban areas of major U.S. cities (Bernick and Cervero 1997; Fogelson 1967; Jackson 1985). They realized enormous capital gains from these projects. This classic business model was transferred to Japan in the early

Figure 12.2
Residential Accessibility Benefits of Rail Transit Investment in the Monocentric City Model



twentieth century and to Hong Kong late in the century (Cervero 1998; Dimitriou and Cook 1998).

One may argue that the capitalization impacts of rail transit investment on urban land markets have become weaker as automobile uses and telecommunication technologies have enabled both firms and households to move from very expensive and heavily congested city centers to low-cost and high-amenity locations beyond existing urban boundaries (Giuliano 2004; Graham and Marvin 1996; Muller 2004; Slabbert 2005). Indeed, many automobile-dependent cities in the United States have transformed from monocentric into polycentric or even edgeless mega city-regions in recent decades (Cervero and Wu 1997; Garreau 1991; Lang 2003; McMillen and McDonald 1998; RPA 2006). Yet empirical studies on major U.S. and European city-regions suggest that the development impacts of transit investment are likely to be redistributive within city-regions and localized in traditional city centers, especially where regional transportation networks are already well developed and urban economic activities are primarily knowledge-based, as figure 12.3 illustrates (Banister and Berechman 2000; Cervero and Landis 1997). Also, urban theories have recently emphasized the increasing importance of traditional city centers and new international airports, well served by world-class railway systems, in sustaining dense business clusters, amplifying local knowledge spillovers, and creating economic development benefits (Florida 2005; Glaeser 2011; Kasarda and Lindsay 2011; Porter 2008; Sassen 2001). Both the empirical findings and the conceptual inquiries derived from major U.S. and European city-regions give rise to the question of whether the new town codevelopment models that have long been practiced by entrepreneurial states in Asia can adequately guide contemporary land markets and yield enough downstream revenues to recover the expenses of mega transit projects in already well-developed and newly emerging global cities.

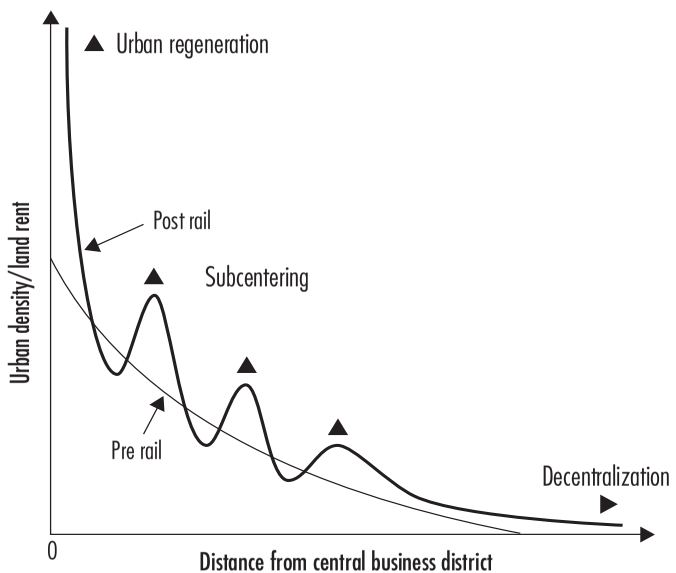
This chapter (1) examines the innovative value capture techniques implemented by major railway companies in Tokyo and Hong Kong; (2) highlights important characteristics of the new town codevelopment cases selected; (3) analyzes market location shifts and land value changes along the case corridors; and (4) draws key lessons from the Asian codevelopment models for other global city-regions to guide unconventional land markets and finance mega transit projects in the early twenty-first century.

Value Capture Practices in the Early Twenty-First Century

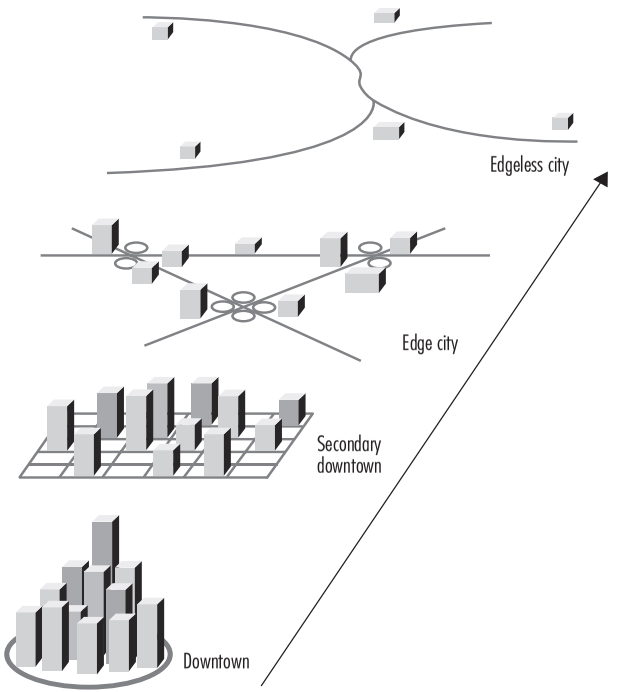
During the late twentieth century, rapid economic, population, and urban growth in Tokyo and Hong Kong enabled private railway companies not only to achieve high ridership levels and gain net fare profits, but also to capture substantial downstream benefits from nontransportation businesses, particularly large-scale housing codevelopment projects in outlying locations. Such massive growth is not projected by Asian capitalist city-states for the twenty-first century, however (HKSAR 2007a; TMG 2001). In the coming decades, the combination of

Figure 12.3
Accessibility Benefits of Rail Transit Investment

a. Polycentric City Model (Cervaro 1998)



b. Edgeless City Scenario (Lang 2003)



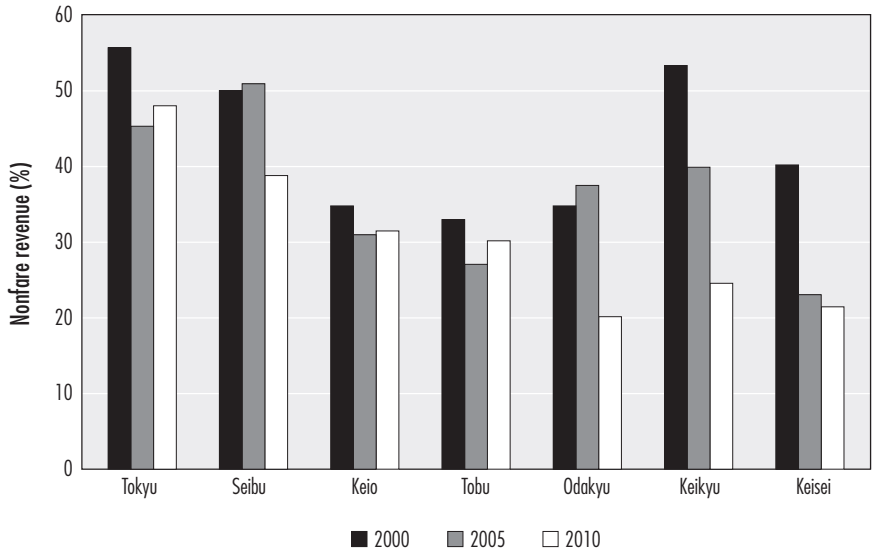
deindustrializing economies, aging populations, and shrinking footprints (as being currently experienced in Tokyo and Hong Kong) will largely characterize railway travel demands, fare revenue levels, and value capture techniques in many global cities. This section examines changes reflected in the financial figures reported by major railway companies in Tokyo and Hong Kong.

TOKYO

Greater Tokyo's railway network has been built, owned, and operated by several public, private, and quasi-private transit companies since the early twentieth century. While two privatized railway companies (Japanese National Railways and Teito Rapid Transit Authority) and one municipal transit agency (Tokyo Metropolitan Bureau of Transportation) are densely covering central Tokyo, seven major private railway companies (Tokyu, Seibu, Keio, Tobu, Odakyu, Keikyu, and Keisei) are widely serving suburban Tokyo and directly running into main terminuses and subway networks in central Tokyo. All seven private companies have relied on nonfare revenues, but Tokyu Corporation has shown the heaviest dependency on value capture from 2000 through 2010 (figure 12.4).

Tokyu has a long history of self-financing new town codevelopment. Its railway construction costs from the 1960s through the 1980s were financed half by

Figure 12.4
Percentage of Nonfare Revenue Across the Seven Major Railway Companies in Greater Tokyo, 2000, 2005, and 2010

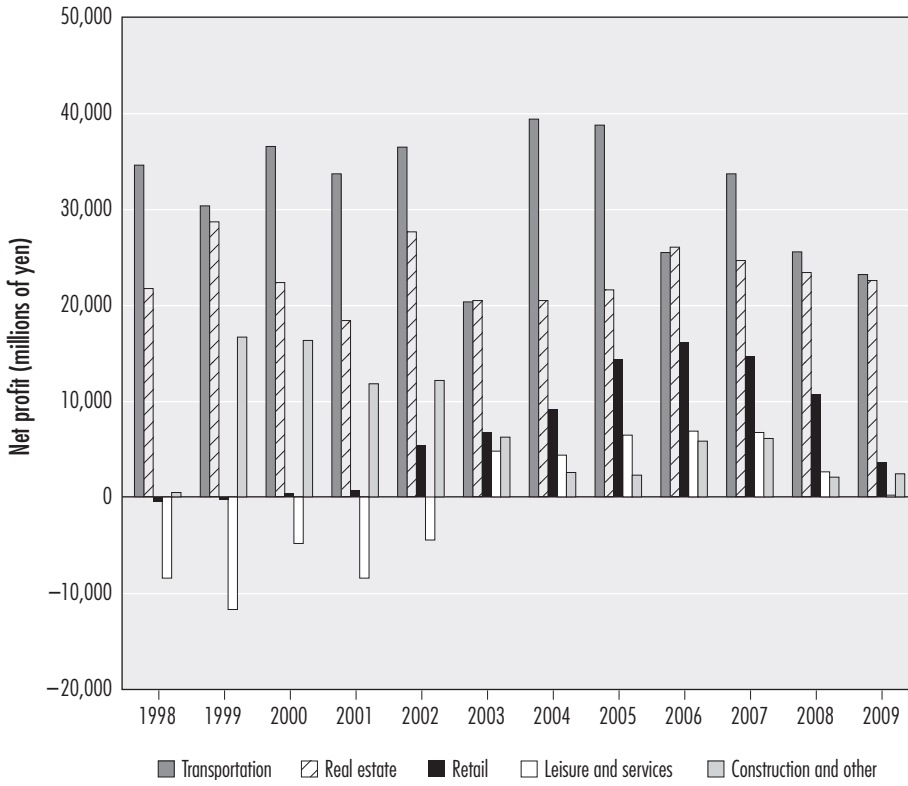


Source: Data from Mintetsu (2000, 2005, 2010).

commercial loans and half by the Development Bank of Japan, with proceeds from land sales used to pay off the loans. Gains in land values from the time those properties were in agricultural use to when they were served by rail lines generated the profits. Particularly important to Tokyu's codevelopment process has been the practice of "land readjustment." Under this system, landholders give up their property and in return receive parcels that are roughly half the size of their original parcels, but that enjoy full infrastructure services (e.g., railway stations, roads, water, and electricity). The remaining land is used for roads and public spaces such as parks and is also sold to cover railway development costs. Tokyu's codevelopment approach has been internationally viewed as the most successful example of transit value capture in the late twentieth century (Cervero 1998).

In recent years, Tokyu's business practices have gradually changed in the wake of stagnant population growth and a slowing of the economy. Figure 12.5

Figure 12.5
Net Profits Earned by Tokyu Corporation, Fiscal Years 1998–2009



Source: Data from Tokyu Corporation (2011).

shows that net profits from Tokyu's retail and leisure service activities were substantial from 2003 to 2008. During the same period, its transportation and real estate businesses consistently generated the largest share of the company's profits, and its construction and other businesses sharply declined. These financial figures suggest that Tokyu's codevelopment model in the early twenty-first century no longer has massive housing construction and middle-class suburbanization effects along with new railway extensions, but rather promotes high-quality property management and service provisions and value-added regeneration phenomena within the developed business territories (Tokyu Corporation 2006).

While Tokyu's new town codevelopment model has historically been practiced in the southwestern suburbs of Tokyo, the latest suburban commuter line, Tsukuba Express, lies in the opposite quadrant, in the northeast. Opened in 2005, the 58.3 km, 20-station corridor connects central Tokyo and Tsukuba. The Tsukuba Express project cost 949.4 billion yen (US$8.5 billion in 2005) to build and was financed as follows: 80 percent from no-interest government loans, 14 percent from local government contributions, and 6 percent from the Fiscal Investment and Loan Program (FILP). Land readjustment was used to assemble considerable rights-of-way to accommodate the Tsukuba Express Line. In contrast to private railway development in the past, Tsukuba Express's land readjustment projects have been implemented by several public entities (including the Urban Renaissance Agency, Tokyo Metropolitan Government, prefectures, and municipalities). These public entities assembled and consolidated land parcels, returning portions to the original owners and selling much of the remainder to the Japan Railway Construction Agency (JRCA) at prerailway prices. After the JRCA completed construction, ownership of the Tsukuba Express Line was transferred to a new railway company established by the public entities. One fundamental difference between this process and Tokyu's codevelopment model is that the newly established quasi-private railway company does not own the reassembled parcels or the property packages promoted by the public entities around the Tsukuba Express stations. This means that the railway company cannot directly capture nonfare revenues from private real estate development and management businesses.

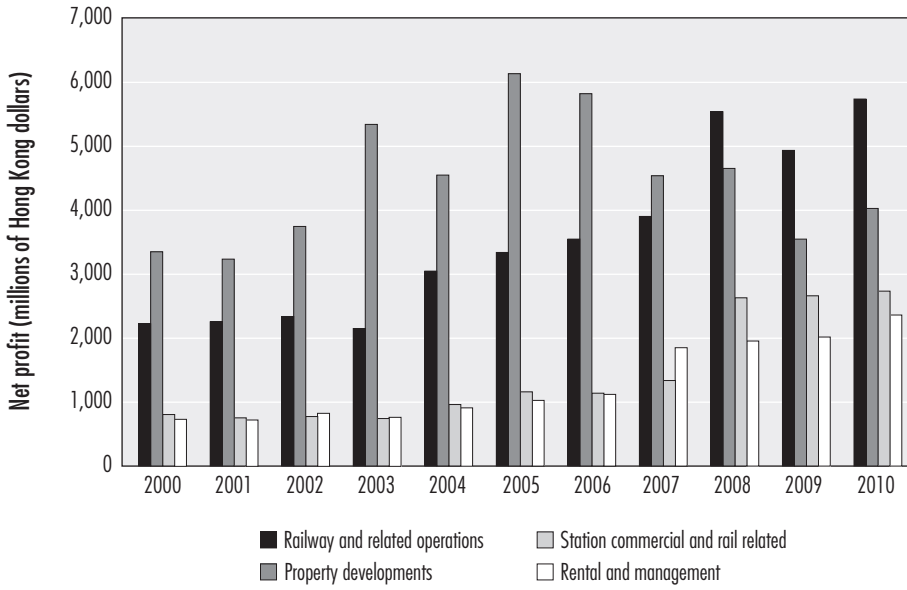
HONG KONG

Since the 1980s, Hong Kong's urban and suburban railway lines have been built, owned, and operated by one quasi-private transit company, the Mass Transit Railway (MTR) Corporation, along with another public transit agency, the Kowloon-Canton Railway (KCR) Corporation (Dimitriou and Cook 1998). Throughout the 1980s and 1990s, the Hong Kong Special Administrative Region (HKSAR) government was the sole owner of MTR, although MTR did not receive any cash subsidies from HKSAR to build railway infrastructure (Black 1985; Runnacles 1990; Strandberg 1989). HKSAR instead granted MTR exclusive development rights above and adjacent to the projected MTR stations based on prerail site values. Under the Hong Kong public leasehold system, MTR was entitled to

negotiate a share of future property development profits and/or a co-ownership position from the highest bidder. In this way, MTR could receive a "front-end" payment for land and a "back-end" share of revenues and assets in kind (Cervero and Murakami 2009; Hong and Lam 1998). This public grant technique relieved MTR from purchasing land on the open market with relatively low transaction costs and provided a business incentive for the company to maximize and internalize all the external benefits that would be enhanced by railway and property codevelopment (Hong 1998; Tang et al. 2004).

In the fall of 2000, about 23 percent of MTR's shares were offered to private investors on the Hong Kong stock exchange. The presence of private shareholders exerted a strong market discipline on MTR, prompting the company managers to become more entrepreneurial. In addition, to achieve fare reductions and better integration of the rail network in Hong Kong, MTR merged its rail operations with those of KCR Corporation in 2007. In the merger, MTR took over KCR's rail and related businesses under a concession arrangement and acquired a property portfolio (MTR Corporation 2008). Figure 12.6 summarizes MTR's portfolio composition and net profits from 2000 through 2010. For the period 2000–2007, property development produced more net profits than railway operations. However, for the period 2008–2010, it accounted for less than half of

Figure 12.6
Net Profits Earned by MTR Corporation, 2000–2010



Source: Data from MTR Corporation (2011b).

MTR's net profits. In light of this decrease in net profits from property development activities, MTR's 2008 annual report (MTR Corporation 2009) gave three reasons for the change: (1) with global credit market uncertainties, property sale prices for residential units declined, and commercial rents started to consolidate; (2) development profits for 2007 were exceptional; and (3) there was deferred income recognition along the MTR corridors.

New Town Codevelopment Cases

To gain insight into the impacts of the new town codevelopment models on intraregional land markets in the early twenty-first century, comparative case analyses were carried out at the railway corridor level in Tokyo and Hong Kong. To represent different development types, investment periods, railway ownership arrangements, fare and ridership levels, and financial performances, I selected three radial lines from Tokyo and two from Hong Kong. This section highlights key characteristics of the five railway lines that might be relevant to mega transit projects in other global cities.

TOKYO

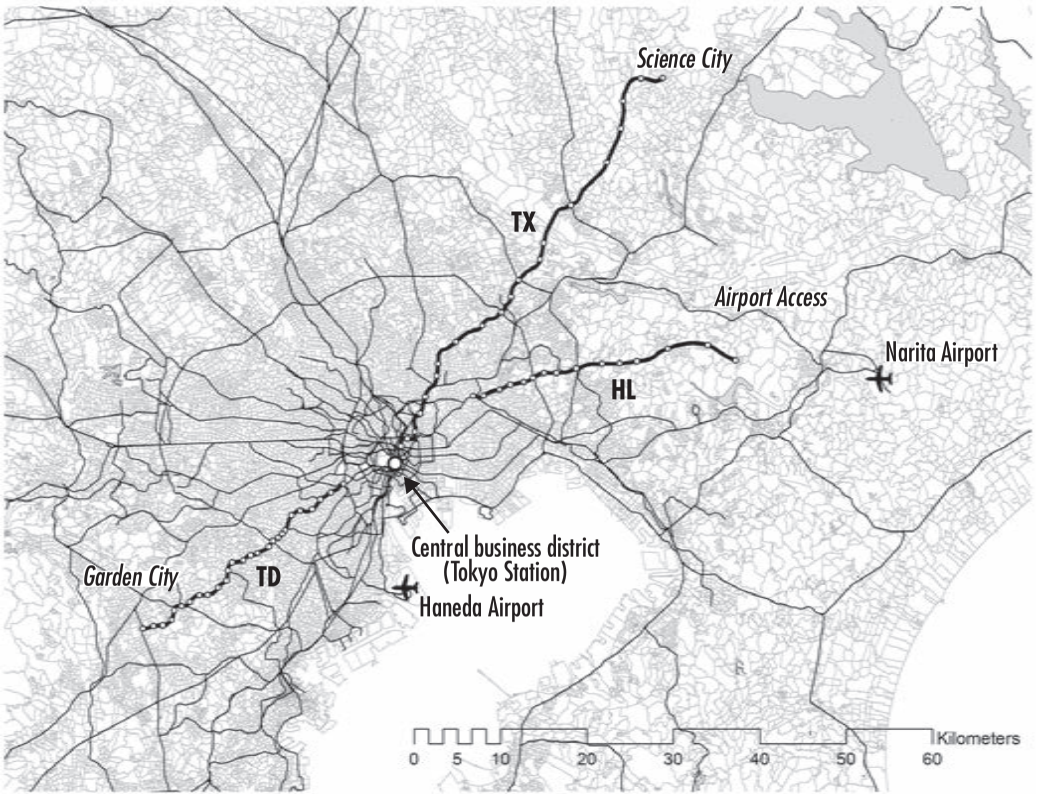
The three radial rail lines from Tokyo are Tokyu Denentoshi, Hokuso, and Tsukuba Express (see figure 12.7). Table 12.1 compares the three lines in terms of new town codevelopment model; railway company ownership; corridor length and number of stations; development period and growth rate; and fare, ridership, and farebox recovery levels.

One of the most successful codevelopment projects practiced by Tokyo's private railway companies is the Garden City model, along the Tokyu Denentoshi Line. Here, from the late 1960s through the early 1980s, Tokyu Corporation provided a large number of high-amenity housing units with bus feeder systems, retail businesses, and community services for a rapidly growing number of middle-income households. The nonfare revenues and transit-oriented communities along this line have enabled Tokyu to keep fares low and achieve high ridership levels in recent years.

In contrast, in the Airport Access codevelopment model, along the Hokuso Line, the land readjustment projects implemented by several public entities in the 1990s were not successful, primarily due to Tokyo's poor economic conditions, slowing population growth, and inadequate codevelopment coordination during that decade. The Hokuso Line now has to charge high fares because it experiences severe cost overruns and serves a small number of passengers.

The land readjustment projects in the Science City codevelopment model were more efficiently delivered through public-private partnerships in the early 2000s. As a consequence, the Tsukuba Express Line's quasi-private owner has been able to offer lower fares and gain more passengers than the Hokuso Line, even in its opening year (2005).

Figure 12.7
Locations of Three Corridor Cases in Greater Tokyo: Tokyu Denentoshi (TD), Hokuso (HL), and Tsukuba Express (TX) Lines



Sources: Data from GOJ (2011b, 2011d).

Table 12.1
Key Characteristics of Three Corridor Cases in Greater Tokyo

	Tokyu Denentoshi Line (TD)	Hokuso Line (HL)	Tsukuba Express Line (TX)
Codevelopment model	Garden City	Airport Access	Science City
Railway company	Private (Tokyu Corporation)	Quasi-private (Hokuso Railway Corporation)	Quasi-private (Metropolitan Intercity Railway Company)
Length (km)	31.5	32.3	58.3
Total number of stations	27	15	20
Number of urban stations	7	2	7
Number of suburban stations	20	13	13
Opening year(s)	1966–1984	1991–2000	2005
Average annual population growth rate around opening year (%)	+2.15 (1965–1985)	+0.51 (1990–2000)	+0.60 (2000–2010)
Minimum fare (yen), 2010	120	190	160
Average fare (yen/km), 2010	10.16 (Chuourinkan to Shibuya)	24.15 (Imba Nihonidai to Keisei Takasago)	19.73 (Tsukuba to Akihabara)
Average number of daily passengers, 2005	1,129,378	36,752	62,357
Farebox recovery (%), 2005	125.3 (Tokyu Corporation's entire network)	148.0	82.4

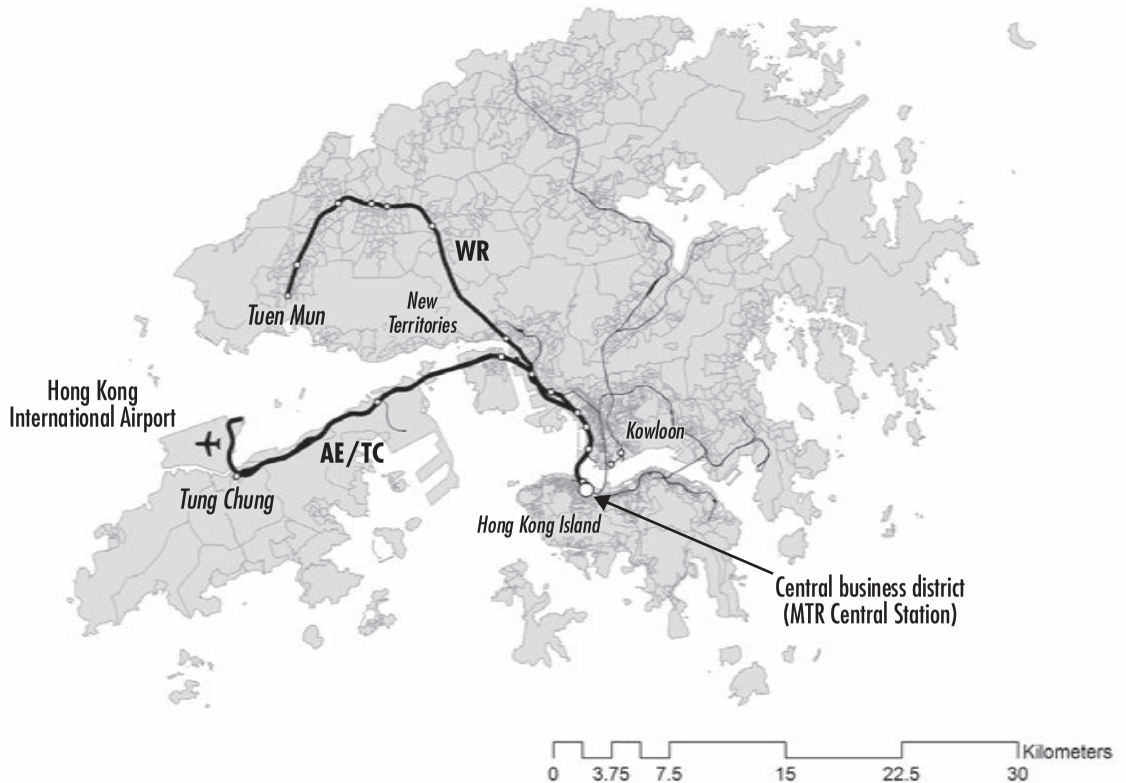
Sources: Data from GOJ (2011c); ITPS (2007a, 2007b); Tokyu Corporation (2006, 2011).

HONG KONG

The two corridor cases selected for Hong Kong are the Airport Express/Tung Chung Line and the West Rail Line (see figure 12.8). Table 12.2 compares the two rail lines with a focus on new town codevelopment model; railway company ownership; corridor length and number of stations; development period and growth rate; and fare, ridership, and farebox recovery levels.

The most progressive codevelopment model completed by MTR Corporation through the late 1990s was the Airport Express/Tung Chung Line, connecting Hong Kong's global financial center directly with Hong Kong International Airport and the New Territories, accompanied by large-scale, high-amenity, pedestrian-friendly, and mixed-use property packages (Cervero and Murakami 2009).

Figure 12.8
Locations of Two Corridor Cases in Hong Kong: Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines



Sources: Data from HKSAR and MTR Corporation's internal digital files (2002, 2007a).

Table 12.2
Key Characteristics of Two Corridor Cases in Hong Kong

	Airport Express/Tung Chung Line (AE/TC)	West Rail Line (WR)
Codevelopment model	Airport Access	Linear City
Railway company	Quasi-private (MTR Corporation)	Public (KCR Corporation)
Length (km)	35.3 (AE) 30.5 (TC)	34.3
Total number of stations	10	12
Number of urban stations	5	5
Number of suburban stations	5	7
Opening year(s)	1998	2003 (extended 2004, 2009)
Average annual population growth rate around opening year (%)	+1.32 (1995–2005)	+0.29 (2000–2010)
Minimum fare (HK$), 2010	4.0	4.0
Average fare (HK$/km), 2010	2.833 (Airport to Hong Kong) 0.689 (Tung Chung to Hong Kong)	0.539 (Tuen Mun to East Tsim Sha Tsui)
Average number of daily passengers, 2005	23,300 (AE only)	179,200
Farebox recovery (%), 2005	189.6 (MTR Corporation's entire network)	180.4 (KCR Corporation's entire network)

Sources: Data from HKSAR (2011); KCR Corporation (2011); MTR Corporation (2011a, 2011b).

A comparable corridor in terms of development period, corridor length, number of stations, and fare level is the West Rail Line. However, the property packages promoted by KCR Corporation along this line are different from those in the Airport Access codevelopment model. The Linear City concept includes mostly single-use property packages arranged on a grand linear scale (Tang et al. 2004; Yeung 2002, 2003).

Market Location Shifts

Modern theories and empirical analyses of major U.S. and European city-regions imply that the classic suburbanization model (see figure 12.1 earlier in the chap-

ter) does not appropriately explain the redistributive and localized accessibility benefits spawned by railway investment in well-developed Asian global cities. In response to the polycentric city-region model (see figure 12.2 earlier in the chapter), this section illustrates recent changes in job and worker locations along the five corridors in Tokyo and Hong Kong. The updated profiles help us understand the ability of the new town codevelopment models to reform unconventional land markets in already well-developed and newly emerging global cities.

TOKYO

The analysis in this section is based on census data regarding Tokyo's job and labor markets from the Japanese government (GOJ 2011a, 2011d). The census data, collected on a small district scale, were geographically matched up to 2 km circular buffers around the railway stations on the Tokyu Denentoshi, Hokuso, and Tsukuba Express Lines by using geographic information system (GIS) shapefiles (GOJ 2011b, 2011d). Numbers of jobs and workers in 2005–2006 were counted for each station catchment and plotted against distance from the central business district (CBD; Tokyo Station) (see figure 12.9). All three models show that Greater Tokyo still keeps a strong monocentric structure in 2005–2006. On the other hand, changes in numbers of jobs and workers and in location quotients[2] between 2000–2001 and 2005–2006, computed for each station area and illustrated against distance from the central business district, capture dynamic urban regeneration, polycentering, and cross-industrial redistribution processes along the three corridors.

Figure 12.10 shows that the Tokyu Denentoshi Line reshaped job centers in the urban area (within 10 km of the CBD) and the suburban area (between 20 and 25 km). Yet these gains might come from somewhere else in the same territory. In fact, the urban-suburban area (between 10 and 20 km) saw job losses. Within 20 km, changes in the number of workers were opposite those in the number of jobs. Outside 20 km, however, jobs and workers showed almost identical trends.

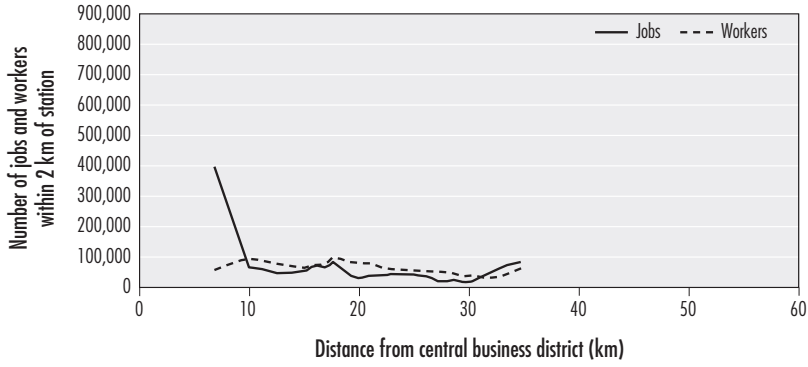
Similarly, the Hokuso Line experienced job increases in the urban area (around 15 km) and the suburban area (between 20 and 30 km) and decreases in the urban-suburban area (between 15 and 20 km). There were no significant changes in the number of jobs outside 30 km, but workers moved slightly outward along the corridor.

In a different way, the Tsukuba Express Line saw a moderate increase in jobs around the central terminal (within 2 km), in the urban-suburban area (between

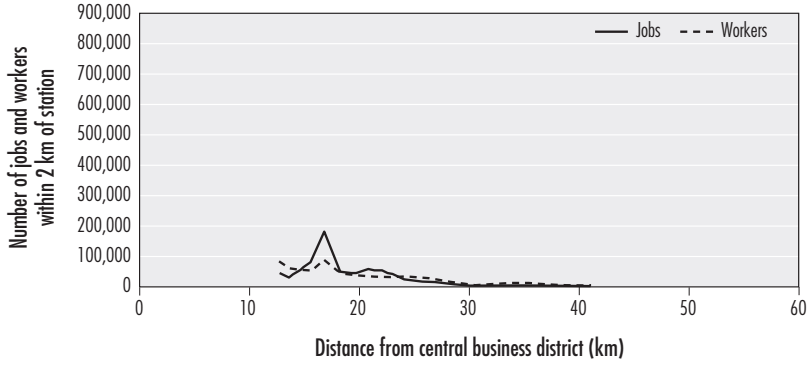
2. Job and worker location quotients (LQs) across the six workplace and seven occupational categories were computed for each station on the three rail lines: LQ_{ij} = ([number of jobs or workers in the workplace or occupational category j within 2 km of the station i]/[number of total jobs or workers within 2 km of the station i])/([number of jobs or workers in the workplace or occupational category j within Greater Tokyo]/[number of total jobs or workers within Greater Tokyo]).

Figure 12.9
Numbers of Jobs and Workers Along the Tokyu Denentoshi (TD), Hokuso (HL), and Tsukuba Express (TX) Lines, 2005–2006

a. Tokyu Denentoshi (TD)



b. Hokuso (HL)



c. Tsukuba Express (TX)

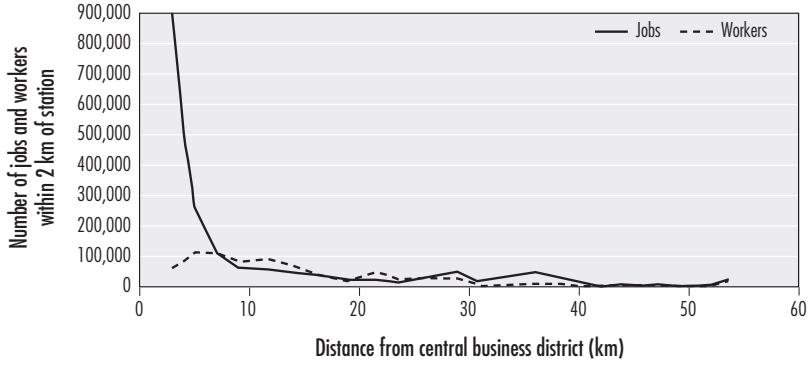
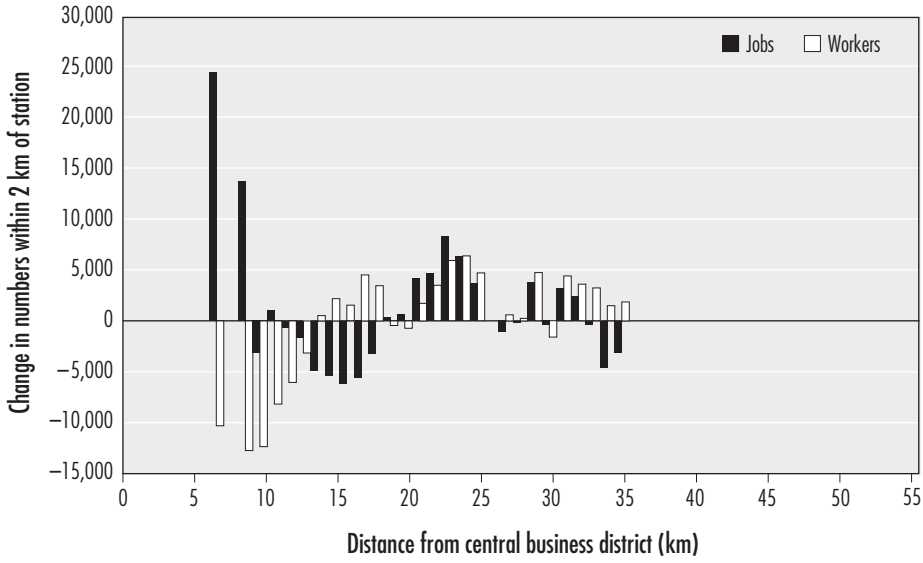


Figure 12.10
Changes in Job and Worker Numbers Along the Tokyu Denentoshi (TD), Hokuso (HL), and Tsukuba Express (TX) Lines Between 2000–2001 and 2005–2006

a. Tokyu Denentoshi (TD)



b. Hokuso (HL)

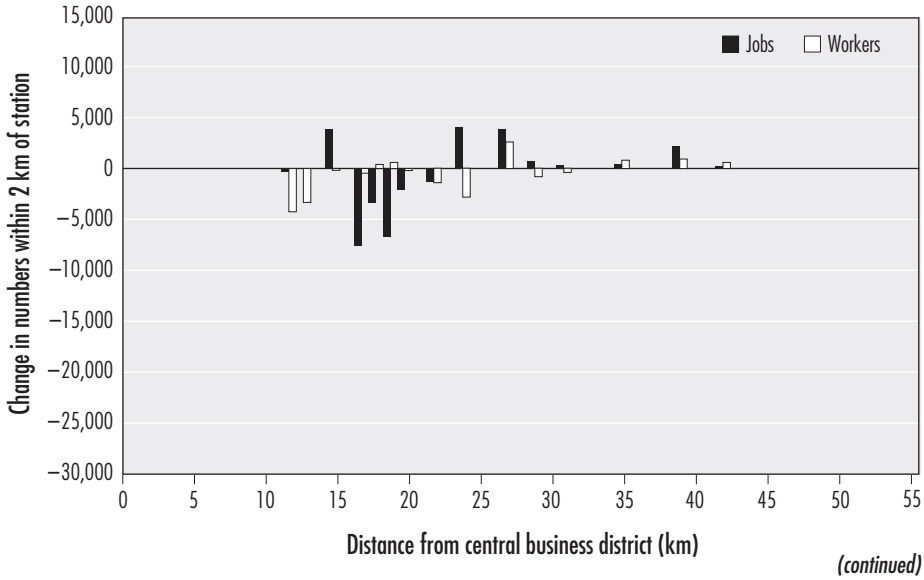


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Figure 12.10
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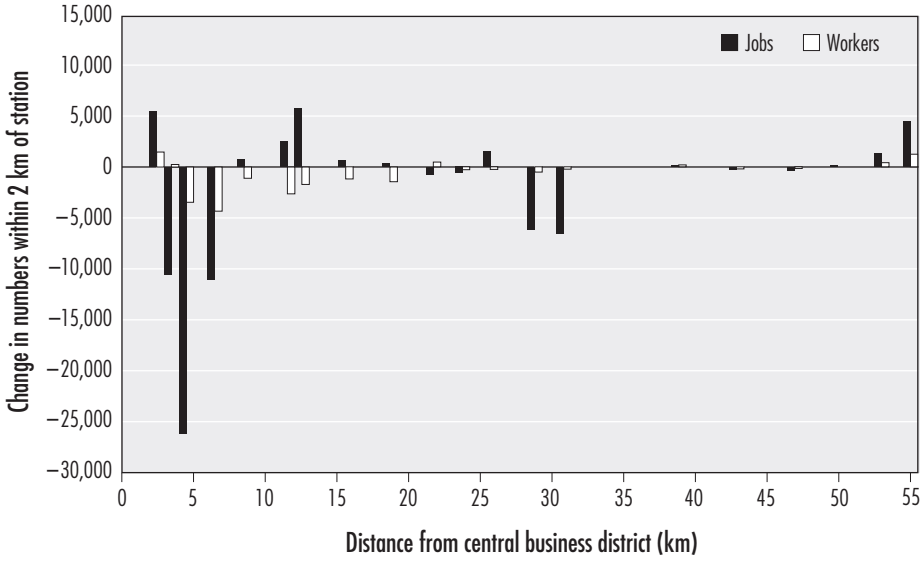
c. Tsukuba Express (TX)



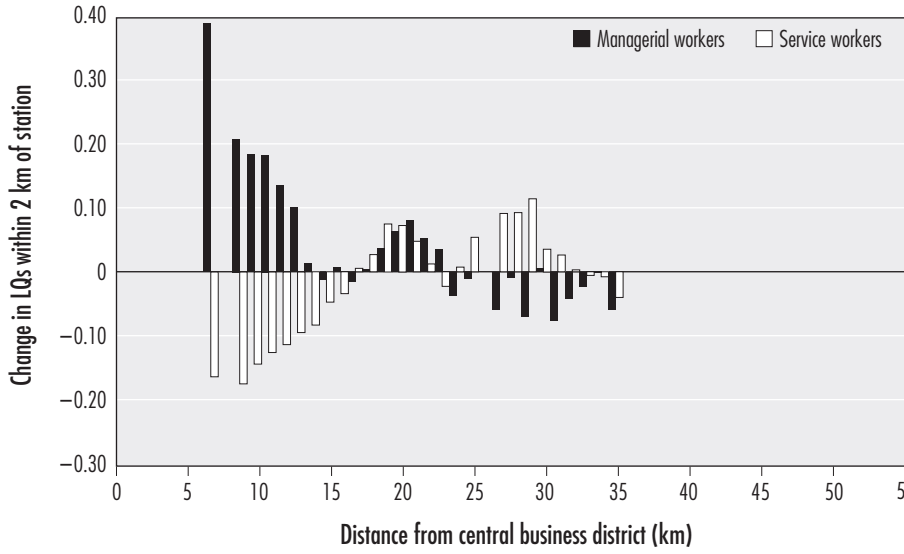
10 and 20 km), and around the end terminal (about 55 km). Jobs decreased sharply in the urban area (within 10 km) and the suburban area (between 25 and 35 km). Workers shifted slightly from the urban-suburban area (between 5 and 20 km) to the suburban area (outside 20 km).

Figure 12.11 summarizes noticeable changes in worker location quotients. On the Tokyu Denentoshi Line, managerial workers' residential locations were concentrated in the urban area (within 15 km) and the urban-suburban area (around 20 km) and less dedicated in the suburban area (outside 25 km). Service workers' residential locations clearly shifted from the urban area (within 15 km) to the urban-suburban area (around 20 km) and the suburban area (between 25 and 35 km). Along the Tsukuba Express Line, service worker markets modestly agglomerated in the urban-suburban area (between 10 and 30 km). Skilled professionals resided more intensively in the urban area (within 10 km), but service workers in that area were largely relocated.

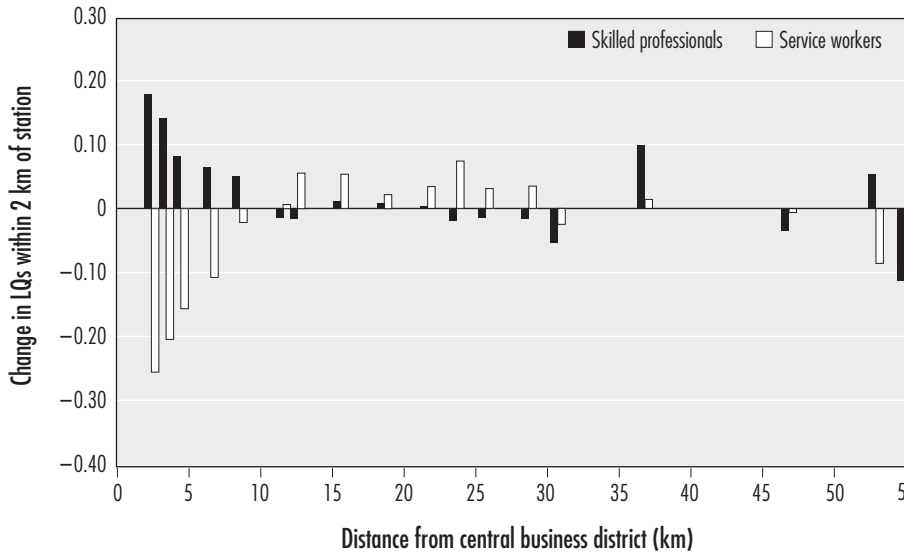
The key findings derived from Tokyo's market location profiles are as follows: (1) all three codevelopment models had redistributive effects between the urban and suburban areas; (2) the Garden City and Science City codevelopment models were strongly associated with business restructuring in the urban areas; (3) the Airport Access codevelopment model, inefficiently implemented by several public entities, did not effectively shape value-added business clusters in the

Figure 12.11
Changes in Worker Location Quotients Along the Tokyu Denentoshi (TD) and Tsukuba Express (TX) Lines Between 2000–2001 and 2005–2006

a. Tokyu Denentoshi (TD)



b. Tsukuba Express (TX)



urban and suburban areas; (4) the Science City codevelopment model, well-coordinated through public-private partnerships, moderately led to service-based job and labor markets in the outlying areas; and (5) the entrepreneurial Garden City codevelopment model experienced an upsurge in knowledge-based business clusters in the urban areas and sustained satellite job centers and service worker communities in the suburban areas.

HONG KONG

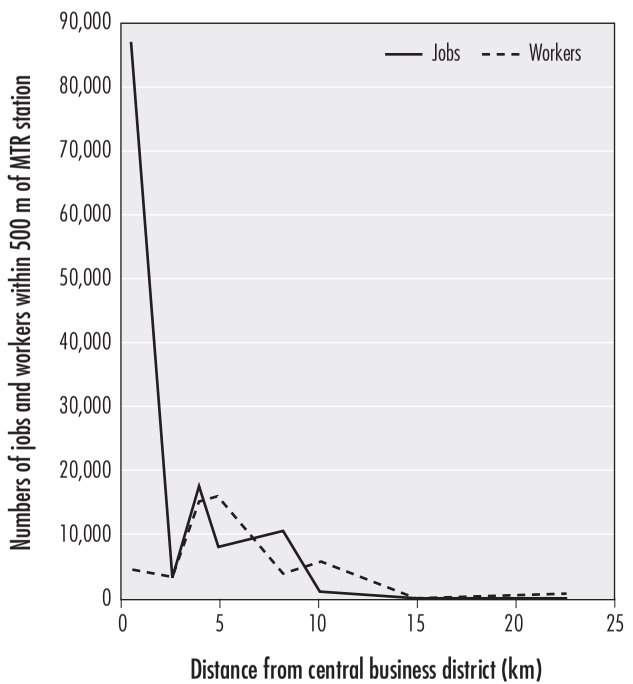
The analysis in this section is based on data regarding Hong Kong's job and labor markets in 2001 and 2006 obtained from the Hong Kong Special Administrative Region (HKSAR 2002, 2007b, 2007c). The relevant government databases were originally established on a specific geographic demarcation system: Tertiary Planning Units (TPUs). The 282 TPUs were spatially matched up to and clipped by 500 m circular buffers around the stations on the Airport Express/Tung Chung and West Rail Lines by using geographic information system (GIS) shapefiles. Job and worker densities in each of the 282 TPUs were proportionally assigned to the buffers, and the approximate numbers of jobs and workers were calculated for each station area. In 2006, numbers of jobs and workers along the two rail lines show that Hong Kong sustains a dominant central business district in the Island while having sub-clusters in Kowloon and the New Territories (see figure 12.12). Changes in numbers of jobs and workers and in location quotients[3] between 2001 and 2006, calculated for each station area and plotted against distance from the central business district (MTR Central Station), explain more details of urban gentrification, cross-industrial redistribution, and territorial division processes along the two corridors.

In figure 12.13, the Airport Express/Tung Chung Line shows that jobs significantly increased but workers dramatically decreased in Hong Kong Island and Kowloon (within 2 km and around 5 km). Also, workers slightly increased in the New Territories (outside 10 km). By comparison, the West Rail Line shows the polarization of jobs in Kowloon (between 5 and 10 km) and workers in the New Territories (between 20 and 25 km). Figure 12.14 highlights noticeable trends in location quotients. Along the Airport Express/Tung Chung Line, financial business jobs became more dominant in Kowloon (between 5 and 10 km), whereas social service jobs played a more important role in the New Territories. In response to the job markets along the Airport Express/Tung Chung Line, managerial workers' residential locations concentrated more in Hong Kong Island and Kowloon (within 10 km), and service workers' residential locations shifted to the New Territories (outside 10 km). Along the West Rail Line, financial

3. Job and worker location quotients (LQs) across the five industrial sectors and eight occupational categories were computed for each station on the two rail lines: LQ_{ij} = ([number of jobs or workers in the industrial sector or occupational category j within 500 m of the station i]/[number of total jobs or workers within 500 m of the station i])/([number of jobs or workers in the industrial sector or occupational category j within Hong Kong]/[number of total jobs or workers within Hong Kong]).

Figure 12.12
Numbers of Jobs and Workers Along the Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines in 2006

a. Airport Express/Tung Chung (AE/TC)



b. West Rail (WR)

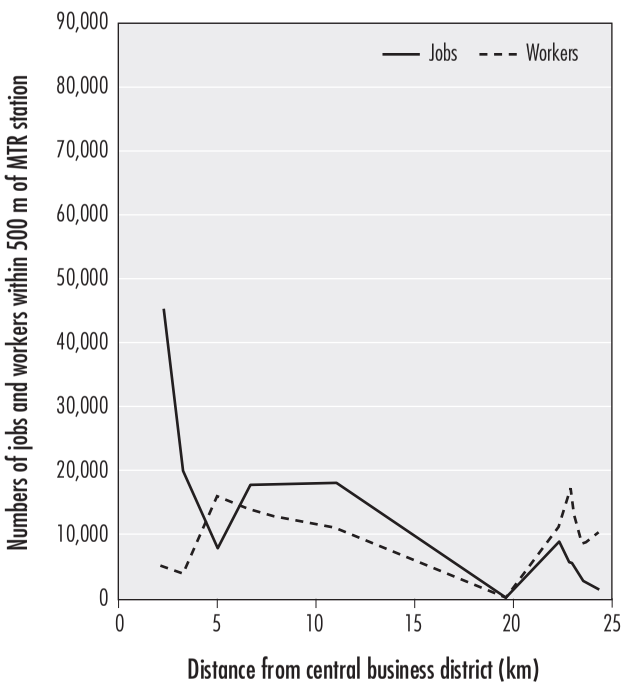
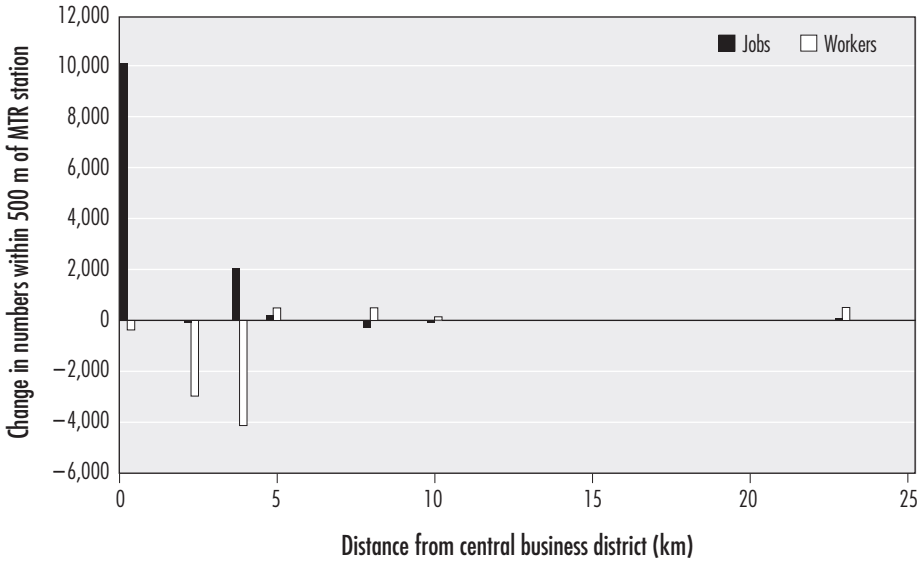


Figure 12.13
Changes in Job and Worker Numbers Along the Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines, 2001–2006

a. Airport Express/Tung Chung (AE/TC)



b. West Rail (WR)

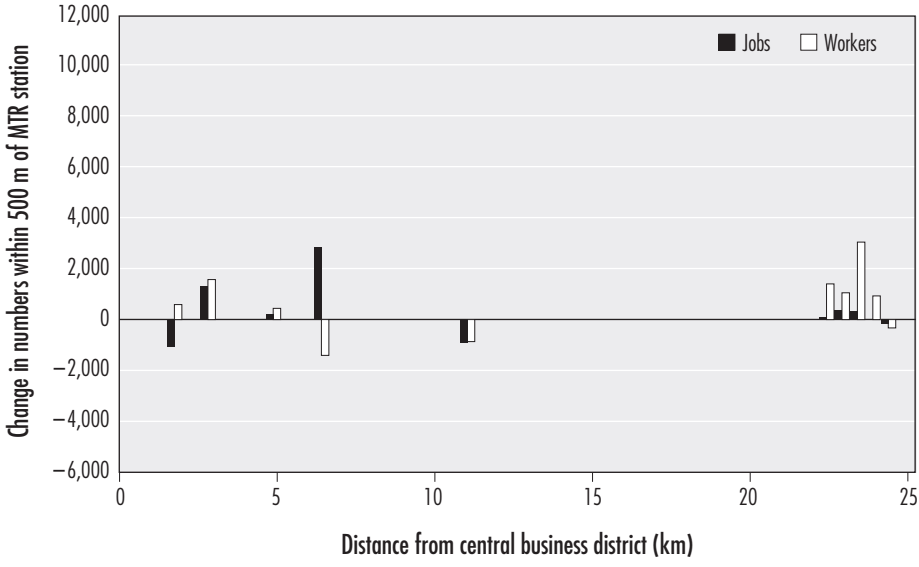
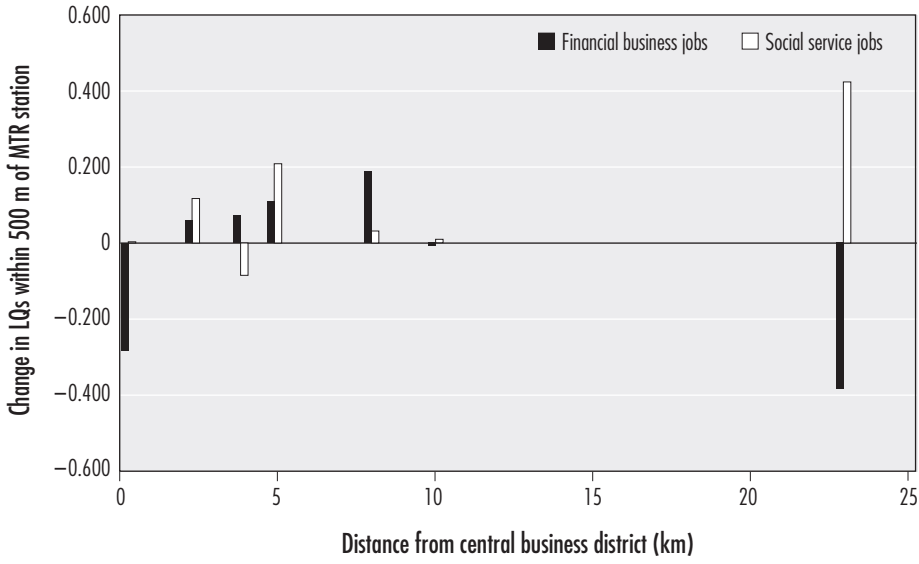
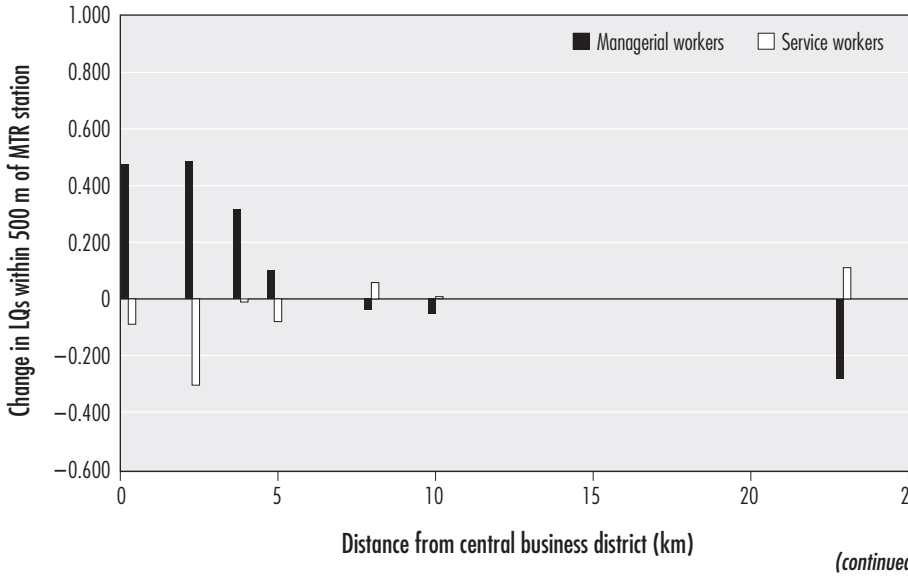


Figure 12.14
Changes in Job and Worker Location Quotients (LQs) Along the Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines, 2001–2006

a. Change in job LQs along the Airport Express/Tung Chung (AE/TC)



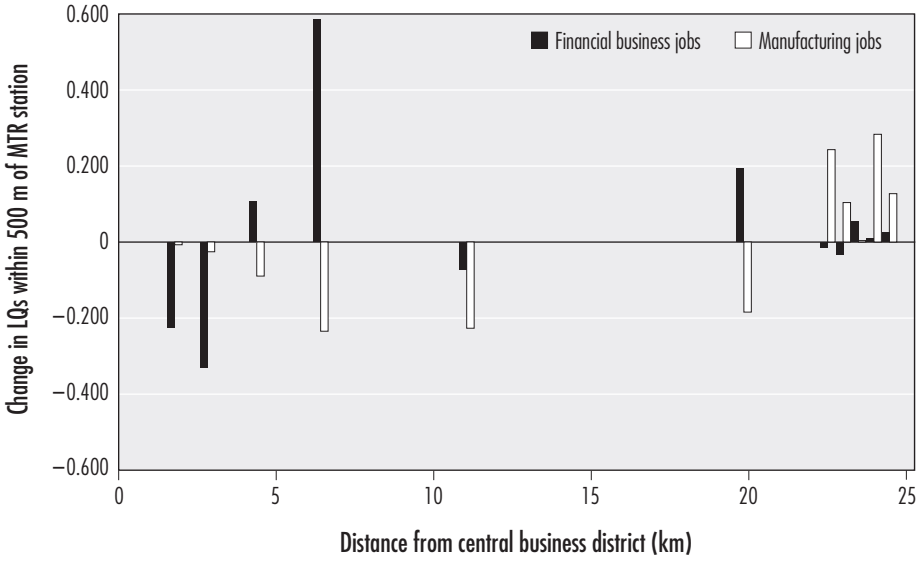
b. Change in worker LQs along the Airport Express/Tung Chung (AE/TC)



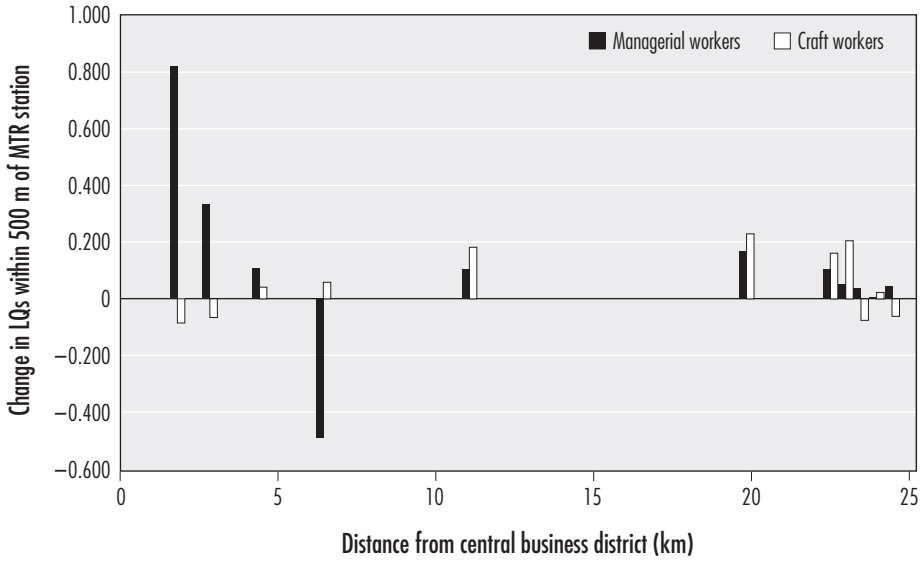
(continued)

Figure 12.14
(continued)

c. Change in job LQs along West Rail (WR)



d. Change in worker LQs along West Rail (WR)



business jobs increased in Kowloon (between 5 and 10 km) and manufacturing jobs moved out to the New Territories (between 15 and 25 km). Managerial workers increased in Hong Kong Island (within 5 km), but dropped within Kowloon (between 5 and 10 km); conversely, craft workers visibly declined in Hong Kong Island (within 5 km) and shifted toward Kowloon and the New Territories.

The key points drawn from Hong Kong's market location profiles for the period 2001–2006 are as follows: (1) both codevelopment models supported knowledge-based business clusters and replaced other industrial activities, particularly in Kowloon; (2) the Airport Access codevelopment model promoted by MTR Corporation (AE/TC) had weaker suburbanization effects on the job and labor markets toward Hong Kong International Airport and the New Territories; and (3) the Linear City codevelopment model promoted by KCR Corporation (WR) spurred economic divisions between Kowloon and the New Territories.

Land Value Changes

If households competitively bid for high-access locations in which to work and live within a city-region, the accessibility benefits received are capitalized into residential land values. This section analyzes recent changes in public assessment values and market transaction prices along the five railway lines. The uneven capitalization patterns observed in Greater Tokyo and Hong Kong demonstrate the potential of the new town codevelopment models to regenerate net downstream benefits and finance mega transit projects in well-developed and emerging global cities for the early twenty-first century.

TOKYO

Hedonic price theory assumes that consumer goods (e.g., land) comprise a bundle of attributes and that one transaction price (e.g., land value) can be decomposed into the component value of each attribute (Rosen 1974). In accordance with this theory, this study initially attempted to explain Tokyo's residential land values as a function of three attributes: site (e.g., site area, building coverage ratio, and floor area ratio); operation (e.g., rapid service dummy); and access (e.g., distances to the central business district and nearest railway station).

Panel data on Greater Tokyo's land values and site characteristics assessed by the national and prefectural governments were obtained from the Geographic Information Systems (GIS) download service provided by the Japanese National and Regional Planning Bureau (GOJ 2011b). In general, market transaction prices are more appropriate for hedonic price analysis than public assessment values. Nevertheless, due to data coverage incompleteness, data source fragmentation, and data access limitation with regard to market transaction prices, the only viable choice was to use public assessment values in this study. Assessed residential land values are relatively comprehensive and consistent, and they are updated on the basis of similar market transactions. The residential land points assessed in 2000, 2005, and 2010 were geographically matched up to 2 km

circular buffers around the railway stations on the Tokyu Denentoshi, Hokuso, and Tsukuba Express Lines. Straight distances to the CBD (Tokyo Station) and nearest railway station were computed, and operation variables (reported by the three railway companies) were related to each land point sampled along the three railway corridors.

Weighted least squares (WLS) regression was applied to estimate residential land values because ordinary least squares (OLS) regression could not overcome the problem of heteroskedasticity with the land data sets collected for Greater Tokyo. Also, hedonic price models were established in a log-log form to improve the fitness of regression analysis and examine the elasticity of access variables. The residential land values assessed in 2000 and 2005 were adjusted by Greater Tokyo's consumer price index (CPI) in 2010 to gain comparable parameters across the three assessment years.

Empirical results of the hedonic price models along the Tokyu Denentoshi, Hokuso, and Tsukuba Express Lines in 2000, 2005, and 2010 are comparatively presented in tables 12.3, 12.4, and 12.5. With an R^2 value of greater than 0.800, all the models estimated have a strong overall fit. Most of the variables included

Table 12.3
Weighted Least Squares Regression Results: Determinants of Residential Land Value (yen/sq m) Adjusted by CPI in 2010 Along Tokyu Denentoshi Line (log-log), 2000–2010

	2000		2005		2010	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Site						
Site area (sq m)	.109	8.407	.137	8.487	.177	9.243
Floor area ratio	–.082	–7.677	–.114	–7.399	–.115	–6.338
Operation						
Rapid service dummy (1/0)	.063	7.637	.094	8.084	.084	6.224
Access						
Distance to CBD (m)	–.633	–53.294	–.822	–52.048	–.896	–49.154
Distance to nearest station (m)	–.113	–16.574	–.137	–14.074	–.166	–14.324
Constant	19.516	106.890	21.381	85.303	22.162	76.620
Number of land assessment points	983		970		851	
R^2	.816		.826		.825	
Adjusted R^2	.815		.825		.824	

Note: All coefficients significant at 1 percent level.

Table 12.4
Weighted Least Squares Regression Results: Determinants of Residential Land Value (yen/sq m) Adjusted by CPI in 2010 Along Hokuso Line (log-log), 2000–2010

	2000		2005		2010	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Site						
Site area (sq m)	–.034	–1.388	–.217	–4.811	–.289[a]	–5.123
Building coverage ratio	–.004	–.756	–.504[c]	–1.923	–1.295[a]	–3.842
Floor area ratio	.111[a]	9.837	.329[a]	3.250	.457[a]	3.435
Operation						
Rapid service dummy (1/0)	.042[c]	1.781	.068[c]	1.771	.106[b]	2.203
Access						
Distance to CBD (m)	–.956[a]	–22.198	–1.295[a]	–17.929	–1.445[a]	–18.385
Distance to nearest station (m)	–.110[a]	–6.436	–.106[a]	–3.811	–.137[a]	–3.814
Constant	21.891[a]	49.624	26.680[a]	27.390	31.187[a]	25.960
Number of land assessment points	173		207		173	
R^2	.866		.801		.803	
Adjusted R^2	.862		.795		.796	

[a]Significant at 1 percent level.
[b]Significant at 5 percent level.
[c]Significant at 10 percent level.

in the hedonic price models show significant coefficients at the 1 percent level for 2010. However, some of the site and operation variables for the Hokuso and Tsukuba Express Lines that are significant at the 5 percent level for 2010 are insignificant for 2000 and 2005. This is because of the underdevelopment of land readjustment projects, the prematurity of suburban housing markets, and the weakness of satellite business centers during the early stages of the Airport Access and Science City codevelopment models. Figure 12.15 highlights the coefficient estimates for distances to the CBD and nearest station in 2000, 2005, and 2010, comparing changes in the elasticity of residential land values to access characteristics along the three railway corridors.

The key findings drawn from Tokyo's land value changes for the period 2000–2010 are as follows: (1) both the Garden City and Airport Access codevelopment models produced substantial downstream benefits through urban regeneration phenomena; (2) the Science City codevelopment model generated modest downstream benefits through residential suburbanization effects; and

Table 12.5
Weighted Least Squares Regression Results: Determinants of Residential Land Value (yen/sq m) Adjusted by CPI in 2010 Along Tsukuba Express Line (log-log), 2000–2010

	2000		2005		2010	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Site						
Site area (sq m)	–.025	–.642	–.066[c]	–1.688	–.219[a]	–5.312
Building coverage ratio	.008	1.032	–.210	–.996	–.511[b]	–2.112
Floor area ratio	.165[a]	7.707	.327[a]	3.698	.306[a]	3.031
Access						
Distance to CBD (m)	–.621[a]	–23.567	–.622[a]	–20.906	–.631[a]	–18.775
Distance to nearest station (m)	–.071[a]	–3.745	–.095[a]	–4.735	–.172[a]	–5.328
Constant	17.988[a]	53.963	18.195[a]	27.049	20.967[a]	23.999
Number of land assessment points	266		266		235	
R^2	.858		.889		.860	
Adjusted R^2	.855		.886		.857	

[a]Significant at 1 percent level.
[b]Significant at 5 percent level.
[c]Significant at 10 percent level.

(3) the Garden City and Science City codevelopment models realized higher residential premiums near the railway stations than the Airport Access codevelopment model.

HONG KONG

Panel data on property market transactions in Hong Kong can be obtained from a private database that records every transaction registered with the government (EPRC 2011). Yet Hong Kong's public leasehold system, high-density urban development pattern, and unique housing market structure make it hard to decompose the recorded transaction prices into the values of accessibility and other factors by controlling a variety of institutional, geographic, neighborhood, and architectural attributes in hedonic price models.

Instead of conducting a full hedonic price analysis, this study applied the repeat sales method developed by Bailey, Muth, and Nourse (1963) to find the capitalization effects of the new town codevelopment practices on aggregate housing prices within 500 m of the selected MTR stations where property transaction

Figure 12.15
Changes in Residential Value Elasticity to Distance from Central Business District (Tokyo Station) and the Nearest Station Along the Tokyu Denentoshi (TD), Hokuso (HL), and Tsukuba Express (TX) Lines, 2000, 2005, and 2010

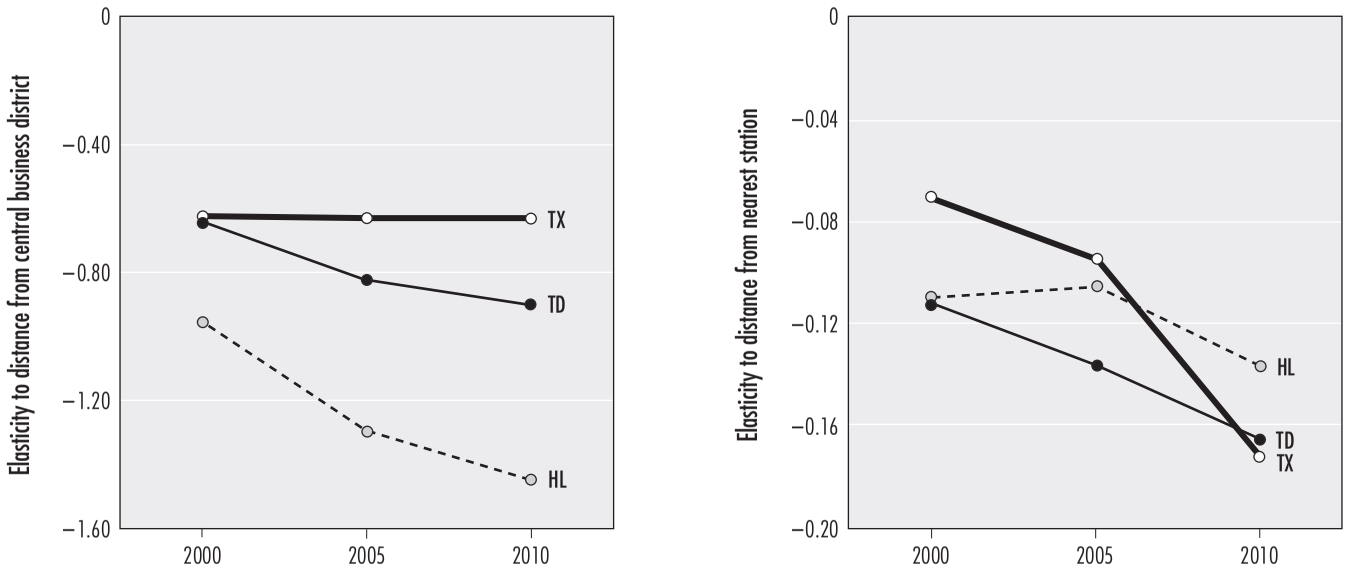
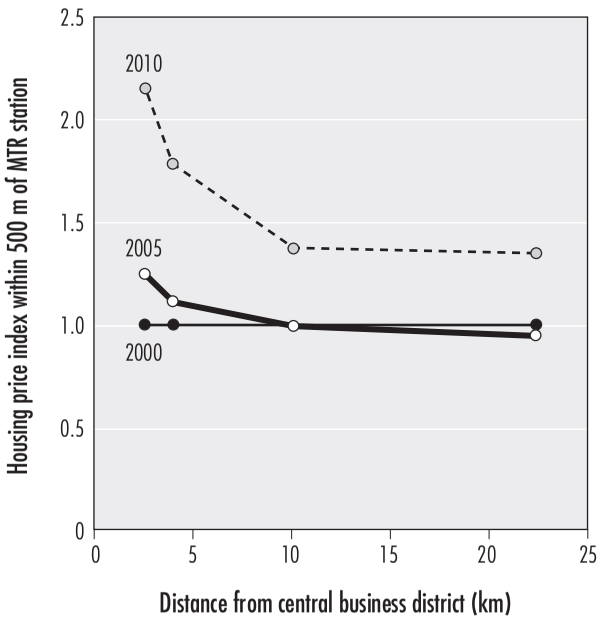
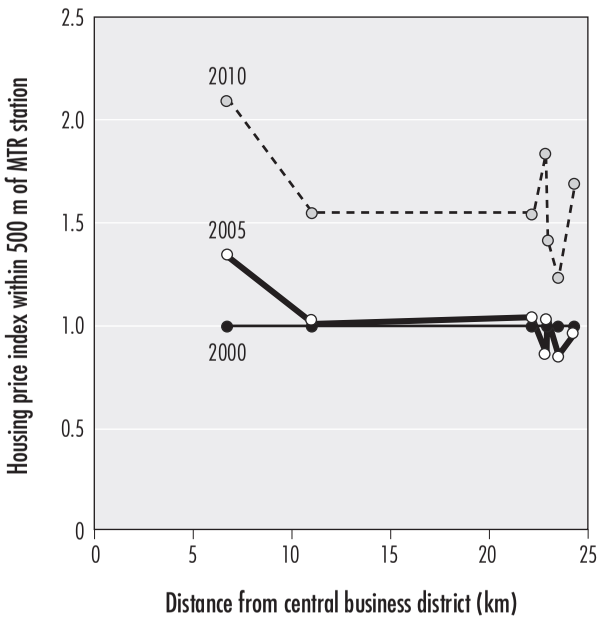


Figure 12.16
Changes in Housing Price Indexes Along the Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines, 2000, 2005, and 2010

a. Airport Express/Tung Chung (AE/TC)



b. West Rail (WR)



data are available.[4] Figure 12.16 presents changes in the housing price indexes computed for each of the station catchment areas that have compiled sufficient numbers of property transaction records on the Airport Express/Tung Chung (AE/TC) and West Rail (WR) Lines over the past decade.[5] Adjusted based on the third quarter of 2000 (=1.00), the housing price indexes along the two railway corridors progressively reached much greater than 1.00 for the third quarters of 2005 and 2010 within 10 km of the CBD (MTR Central Station). Between 20 and 25 km, the housing price indexes along the WR Line unevenly fluctuated for the third quarter of 2005 and 2010, but those along the AE/TC Line showed relatively small changes for the same period.

The key findings from the uneven price shifts in Hong Kong's housing property market for the period 2000–2010 are as follows: (1) both the Airport Access and Linear City codevelopment models spawned substantial downstream benefits through urban regeneration phenomena in Kowloon; (2) the Airport Access codevelopment model had a modest capitalization impact on housing property prices in the New Territories; and (3) the Linear City codevelopment model had drastic redistribution effects on housing property prices in the New Territories.

Conclusions

Facing the dilemma of economic growth versus public debt generated by mega transit projects, policy makers in many global cities call for various kinds of public-private funding arrangements, including land value capture. From a financial standpoint, Tokyo and Hong Kong are regarded as two of the most progressive city-regions. In both, entrepreneurial transit agencies proactively packaged railway investment and housing development businesses and successfully captured the substantial accessibility benefits resulting from the rapid economic, population, and urban growth of the late twentieth century. This chapter questions

4. Hong Kong's high transaction frequency makes the repeat sales method more advantageous (Chau 2006; Chau et al. 2005). Assuming that both property characteristics and their implicit prices remain the same between sales, the percentage price change of a housing unit (ΔlnP_i) can be attributed to a common time trend (α_t) and an unexplained component (ε_i). The common time trend is flexibly captured by a set of time dummies (D_t): the dummy representing the time of the initial sale equals –1; the dummy representing the time of the second sale equals 1; all other dummies equal 0. The repeat sales equation can be written as follows:

$$\Delta lnP_i = \alpha_t D_t + \varepsilon_i$$

One general criticism of repeat sales indexes is that the renovation or rehabilitation of houses is not recorded, which biases the index upward. Compared to single-family homes in the United States or Europe, however, renovations of high-rise apartments in Hong Kong are limited.

5. The stations included in figure 12.16 are Kowloon, Olympic, Tsing Yi, and Tung Chung on the Airport Express/Tung Chung Line, and Mei Foo, Tsuen Wan West, Yuen Long, Long Ping, Tin Shui Wai, Siu Hong, and Tuen Mun on the West Rail Line.

the ability of such massive codevelopment models to reinforce sufficient suburbanization effects and recover the costs of mega transit projects in already well-developed and newly emerging global cities, especially as deindustrializing economies, aging populations, and shrinking footprints have become central issues in the early twenty-first century.

The recent financial reports and land profiles of these two progressive Asian city-regions reveal two facts: (1) corporate net profits in property management and retail service businesses have been increasing during the recent global economic recession, whereas profits in railway extension and property development projects have been dwindling or fluctuating; and (2) entrepreneurial codevelopment practices have been regenerating greater land values from knowledge production in urban business clusters than from service consumption in suburban communities over the past decade. Based on these trends, some may simply conclude that the Asian new town codevelopment models used in the late twentieth century are unproductive in the current context. Yet the results of this study indicate that policy makers can apply these entrepreneurial codevelopment models to other well-developed and emerging global cities if they consider three things: railway investment timing, long-term property stewardship, and updated spatial strategy.

RAILWAY INVESTMENT TIMING

During the period of rapid growth, private entities in Tokyo and Hong Kong aggressively embarked on railway extension projects, formed transit-oriented housing markets, and successfully capitalized greater accessibility benefits into the suburban areas of these cities. During the period of slow growth, however, public entities in Tokyo played a central role in delivering mega transit projects, inefficiently coordinated land development projects, and persistently struggled with low ridership in outlying areas. These contrasting circumstances suggest the need to find the best time in the growth curve of each global city to increase private investment opportunities.

LONG-TERM PROPERTY STEWARDSHIP

During the period of slow growth, private railway companies in Tokyo and Hong Kong continuously stayed committed to managing transit-supportive property packages and gradually enlarged net profits on commercial and retail service businesses along the rail lines that were extended largely during the period of rapid growth. The income streams of private railway companies for the past decade demonstrate the importance of not only sharing up-front land premiums, but also certifying life-span property stewardship in entrepreneurial codevelopment projects. The responsibility for the long-term care of property packages around railway stations incentivizes private railway companies to analyze market profiles, update development strategies, and provide value-added services in a spatial manner.

UPDATED SPATIAL STRATEGY

During the period of rapid growth, private railway companies in Tokyo and Hong Kong capitalized considerable accessibility benefits into large-scale property packages in the suburban areas of the cities. However, such quantitative growth gave way to more qualitative development during the period of deindustrializing economies, aging populations, and shrinking footprints. In fact, mega transit projects have been synergistically associated with central business districts, satellite university campuses, and international airport terminals across many global cities. The current spatial strategies are expected to encourage value-added business interactions and regenerate greater land premiums around the major terminals served by world-class railway systems, yet policy makers must cautiously address unintended consequences of entrepreneurial codevelopment (e.g., increased gentrification within global business districts and negative externalities from international airport facilities) when updating their spatial strategy for the coming decades.

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