effective labour market size rather than its total size that has a direct relationship with a region's labour and other productivity dimensions. Prud'homme and Lee tested this hypothesis on a sample of 22 French cities. Figure 4.1 shows their conceptual framework and the elasticities (*e*) they found.

Such results have provoked a wealth of reactions. It has, for instance, been commented (see, for example, Geurs and Ritsema van Eck, 2001) that Prud'homme and Lee's sample was too small to make generalizations for other geographical contexts, and that extrapolation into the future of the relationships found could not be taken for granted. Even Prud'homme and Lee themselves urge caution. Nevertheless, the essence of their analysis appears to be quite robust, particularly regarding the direction of the relationships. Recent research by Cervero (2001) in the USA has confirmed Prud'homme and Lee's findings in general terms, albeit with rather lower elasticity figures.

However, a further comment needs to be made about these studies. Both Prud'homme and Lee (1999) and Cervero (2001) examine speed and spread as independent variables. But to what extent is this actually the case? Historical developments and research into human behaviour seem to point in another direction. Mobility appears to be constrained by travel time, rather than travel distance (see *inter alia* Zahavi, 1974; Hupkes, 1982; Downes and Emmerson, 1985; Schafer and Victor, 1997; WBCSD, 2001). The implication is that, when higher speeds give access to more attractive locations at a constant travel time and all else is equal, people and businesses will tend to move

there, rather than to travel less. An increase in the average speed will be thus generally accompanied by an increase in the geographical spread. Conversely, spatial concentration often correlates with a decline in speed, caused by such factors as increased congestion. In other words, there seems to exist a certain trade-off between the two variables. The next section discusses this crucial relationship in more detail.

Key characteristics of the urban system

The dataset constructed by Kenworthy and Laube (1999) provides a useful framework for further discussion of the relationship between the speed and spread of urban spatial systems. Kenworthy and Laube collated, standardized and compared the characteristics of 46 cities in various parts of the world (see Table 4.1).

Table 4.1 shows a clear distinction between three types of cities in the industrialized world. In American cities, commuting speeds are on average higher, the distances travelled greater, and the land use densities lower. Wealthy Asian cities represent the other extreme: average travel speed is relatively low, distances are smaller and land uses are far more concentrated. These differences are matched by two distinctive modal split patterns: a car-dominated America and a public transport dominated Wealthy Asia. European cities are somewhere in between, with a relatively balanced modal split in travel between home and work.

What is important for this discussion is that these data show, as expected, a strong inverse relationship between, speed, on the one hand, and distances, on the other, and densities. As far as economic performance is concerned, no clear, direct relationship appears to exist between either speed or distance/density and gross regional product (GRP). Furthermore, while the American and European samples vary considerably in city size, there appears to be no significant link between size and other variables such as economic ones. However, other relationships seem much clearer. For example, Table 4.1 shows that how higher average speeds are consistently matched by a higher percentage of GRP being spent on transport (speed is relatively expensive), and higher transport-related carbon dioxide (CO_2) emissions per person (speed is relatively polluting).

This overview appears to confirm the existence of a trade-off between transport speed and land use concentration. It appears