p. Thus the Erdös-Renyi model essentially takes all vertices and edges to be identical, at least in a probabilistic sense. But, as observed by Watts and Strogatz [109] edges and vertices in "real world" networks exhibit a lot of diversity. This also is the case for the HCW contact networks that we generate.

Since the work of Watts and Strogatz [109], research on modeling social networks has taken off, initially spurred by the growth of the web and now by the widespread use of online social networking sites such as Facebook, LinkedIn, MySpace, Wikipedia, digg, del.icio.us, and even YouTube, and Flickr. This line of research has focused on a number of structural features of social networks. We focus on three features that seem most relevant from an epidemiological point of view: (i) *degree distribution*, (ii) *small world property*, and (iii) *community structure*. Figure 2.11 shows statistics pertaining to these features for three representative HCW contact networks.

2.3.1 Degree Distributions

It is well-known that the degree distribution of the Erdös-Renyi random graph $G(n, p)$ is binomial (Poisson, in an asymptotic sense). The binomial distribution is sharply concentrated about its mean yielding a small standard deviation. In all three cases ($sparse_1$, $moderate_1$, and $dense_1$), the standard deviation of the degree distribution of the login contact graphs is much larger than that of the Erdös-Renyi graphs (see rows corresponding to σ and σ_{rand}), indicating a degree distribution that is much more dispersed than the binomial distribution. Also, the fraction of people