

Editorial

Optimal cities, ideal cities

The notion that we can define the best or optimal size, configuration, and quality of life for towns and cities has been with us since classical times at least. Yet this debate has been much more muted in the last 40 years as society has grown more comfortable with the idea that cities can grow ever bigger without the seeming disadvantages of pollution, overcrowding, and disease that plagued the growth of towns in the 19th and early 20th centuries. Recently, as followers of the science of cities will know, the idea that as cities grow, they become proportionately more wealthy has given added impetus to the fact that economies of urban agglomeration now seem to be outweighing those diseconomies that come with bigger cities, although the evidence is still mixed, far from clear and somewhat controversial. In fact, much of this argument also flies in the face of repeated surveys of urban populations with respect to the quality of life that they encounter in different sizes of city, with small, non-industrial towns – market towns being the classic English example – taking pride of place over much bigger metropolitan areas.

The indicator that is used to define the optimal or ideal town is its size, usually in terms of its population. Historically, small towns tend to be regarded as engendering a better quality of life than large towns based on the premise that the smaller the place, the more likely you are to know and interact with its citizens, simply due to constraints imposed by the town's geometry. Indeed, Lewis Mumford (1961) paraphrasing Plato said that the ideal size was “the number of citizens who might be addressed by a single voice” which Plato gave form to as a population of 5040 citizens using a somewhat tortuous argument from demography and geometry (Charbit, 2002). At the other extreme, in the late 19th century, Samuel Barnett (1893), one of the great grass roots pioneers of city improvement, accepted that the contemporary city would be much bigger when he said:

“My object is to put before you a pattern, an ideal city, which is not beyond your reach.

The ideal city will be large, with a quarter or half a million citizens. There will thus be room for a great variety of life and pursuits. The citizens will find at their own doors the interest that comes from the clash of many thoughts and many experiences.

His view contains ideas similar to those of Jane Jacobs (1961) more than 60 years later and those that are now being pursued by the advocates of ever bigger cities.

Historically, the advocate for the largest optimal city size was Le Corbusier (1929, 1987) who in his plan for *The City of Tomorrow* suggested that 3 million would be an ideal size for a city of 60 storey tower blocks centred in wide open parkland surrounded by residential blocks of some six storeys high. In 1929, this fictional proposal was of the same order of magnitude as the largest cities in existence (New York had 8 million persons, London 7) and it is tempting to think that had cities been even bigger such as now when places like Shanghai-Suzhou have reached 40 million, Le Corbusier would have proposed an even bigger number. A more compact but equally fictitious proposal based on compressing activities horizontally and to some extent vertically was developed some 50 years later by Dantzig and Saaty (1973). Their *Compact City* was designed to start at around 250,000 people and then grow in modular fashion up to a maximum of some 2 million. They developed their argument geometrically in much the same way that Plato argued his case for an optimal town of 5040 persons but using up-to-date technologies. Yet in all such cases, these proposals could only ever be realised if there was strong central control exercised from the top down. Moreover, these large city size proposals contrast markedly with the other ideal towns proposed to counter rapid urban growth in the late 19th century. Ebenezer Howard (1898, 2009), for example, suggested that

the ideal garden city should have a population of some 30,000 which became the model for the British New Towns in the mid 20th century.

All these proposals ranging across the entire spectrum of city size are based on what their adherents intuitively defined as pertaining to the best qualities of life that their citizens would gain. In stark contrast, there has been another movement largely inspired by economists that has sought to define the optimal city both theoretically and empirically in terms of the monetary gains that accrue to cities of different sizes. This approach became popular in the 1970s starting with Alonso's (1971) paper "The Economics of Urban Size" where he postulated that as cities grew, the costs of locating in them could be compared to the benefits received, this difference being taken as being an index of their optimality or performance. The difference between benefits and costs could thus be used to define an optimum, on the assumption that this difference was positive. The simple argument was that as cities got bigger, the functions defining their costs and benefits differed in shape, costs following a U-shaped curve, while benefits would increase linearly. Optimum points could thus be defined where total benefits exceeded total costs by the greatest amount or where marginal costs equalled marginal benefits. In typical economic parlance, many variations on these optima could then be defined. Indeed, Richardson (1973) suggested that there might be a function that could generate this optimum analytically such as a quadratic where the difference of benefits minus costs S might be modelled from the relation $S = P^\alpha - \beta P$ where P is population and α and β are parameters. Notwithstanding this attractive idea, Richardson himself dismissed it largely because of the difficulties of defining the functions pertaining to the economies and diseconomies associated with the benefits and the costs.

Some economists have explored this kind of approach empirically but the evidence is ambiguous, despite the implication that cities of some 250,000 appear to generate higher benefit–cost ratios or differences than those which are smaller or larger. A good review of this area of work is provided by Camagni et al. (2013). In a similar but more theoretical tradition, in the heyday of the new urban economics which began when von Thunen's model was restructured using standard micro-economic theory in the 1960s and 1970s, there were several attempts at adding a welfare function to the monocentric urban rent model. These extensions could generate configurations which implied an optimal population size for a town but once again, also suggested that much depended on local conditions, which in the case of these models, related to local parameter values. Conclusive results were hard to draw with respect to the optimum size but there were some intriguing attempts. A typical example is that by Mirrlees (1972).

The biggest problem with all these attempts to define an optimal size is that cities cannot be constructed all at once to reach this size, even if there was any agreement as to what it was. Cities grow from the bottom up as complexity theory has forcefully taught us this last 25 years. To be a big city, you must be a small city first and thus on the way to any optimal size, any city takes on different sizes. More particularly, this might suggest that in the search for an optimal size, the argument should be broadened to find an optimal trajectory which would ensure that the city were optimal at every stage of its growth. As far as I am aware, no one has speculated as to how this might be possible, although it is consistent with the argument that economists have developed that many different sizes of town appear optimal under different conditions. To generate such temporal optimality, one would have to identify an ideal trajectory composed of various functions that would generate optimal conditions at different levels of population size. The outcomes from the trajectory would have to be commensurate so that optimality could be compared across time which would be related to size. Although such an exercise might have good therapeutic value in thinking about town form, I am not suggesting one embarks on this quest for what I have implied so far in this editorial is that the search of an optimal size, indeed for an ideal town in this sense, is, in many senses, illusory.

The fact that the optimal size question is not currently as popular as it was has nothing to do with these theoretical limitations but is due to the fact that the current conventional wisdom appears to be in favour of ever larger cities, indeed the biggest cities. Moreover, in my last editorial (Batty, 2015) when I wrote about what cities might be like in an entirely globalised world, I suggested that the proportion of the biggest cities would perhaps be somewhat smaller than they are at present, with the distribution of city sizes from the smallest to the largest changing little as the world becomes entirely urban. In fact, it would appear that the rank-size distribution is becoming a little flatter, suggesting that although the biggest cities are indeed getting bigger, they are becoming slightly less significant, notwithstanding the hype that continues to be generated about their ability to incubate the world's most successful work activities. One senses that this obsession with size will pass as the 'small is beautiful' movement once again begins to reassert itself.

To sum up then, our brief foray into the world of the optimal city and its size suggests that the quest is largely wrong-headed. But it is not without its advantages, for it enables us to explore the space of possibilities and identify the highly diverse, heterogeneous, perhaps idiosyncratic nature of any particular town and city, as well as the limits to which we might generalise about them. One might have thought that a subject area such as urban planning would have focussed much more on what the ideal city should be like and although ideas about this continue to pervade the field reflecting many different perspectives, it is still worth thinking about how one might construct an argument to show that as cities get bigger they do hit certain limits and these limits differ with respect to what phenomenon of size one is measuring. I would like to see some research into how qualitative change which occurs as cities grow changes for the worse as well as the better. This would redress the balance that big is better for it is clear from my short review here that opinions on this are quite sharply divided when it comes to city size. Perhaps, it is not size any longer that is the key focus but inequality which clearly also changes with city size. In future editorials, I will have a go at saying something about this

Michael Batty

References

- Alonso W, 1971, "The economics of urban size" *Papers and Proceedings of the Regional Science Association* **26** 67–83
- Batty M, 2015, "Cities in a completely urbanised world" *Environment and Planning B* **42** 381–383
- Barnett S A, 1893, 1979, "The ideal city" in *The Ideal City* Ed H E Mellor (Leicester University Press, Unwin, Old Woking, Surrey, UK) pp 55–66
- Camagni R, Capello R, Caragliu A, 2013, "One or infinite optimal city sizes? In search of an equilibrium size for cities" *Annals of Regional Science* **51**(2) 309–341
- Charbit Y, 2002, "The Platonic city: history and utopia" *Population* **57**(2) 207–235
- Dantzig G B, Saaty, T L, 1973, *Compact City: A Plan for a Liveable Urban Environment* (W H Freeman and Company, San Francisco, CA)
- Howard E, 1898, 2009, *To-morrow: A Peaceful Path to Real Reform* (Routledge, London).
- Jacobs J, 1961, *The Death and Life of Great American Cities* (Random House, New York)
- Le Corbusier, 1929, 1987 *The City of Tomorrow and Its Planning* (Dover Publications, New York)
- Mirrlees J A, 1972, "The optimum town" *The Swedish Journal of Economics* **74**(1) 114–135
- Mumford L, 1961, *The City In History: Its Origins, Its Transformations, and Its Prospects* (Harcourt, Brace & World, Inc., New York)
- Richardson H W, 1973, *The Economics of Urban Size* (Saxon House, Lexington Books, Farnborough, Hants, UK)