Growing socio-spatial inequality in neo-liberal times? Comparing Beijing and London

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Highlights:
- . Three aspects of socio-spatial inequalities are described by ternary plot, segregation index, and tile maps
- Socio-spatial inequalities are found to have increased in Beijing but decreased in London from 2000 to 2010
- The speed of development is found to have contributed to Beijing's drop in socio-spatial inequalities
- The contingency of the strong link of socio-spatial inequalities, service economy, neoliberalism is revealed
- A wider set of urban comparisons is shown to be powerful and effective in generating new urban knowledge

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Abstract: Growing socio-spatial inequality has become the topic that most excites social, economic and urban geographers most recently. Contrary to the general expectation, this paper finds a failure of this growth to be more applicable globally. Although escalated in London, socio-spatial inequality became less acute in Beijing over the same 2000-2010 period. This failure of replicability challenges our traditional understanding of the causes for the problem, as the two commonly accused shifts, one towards service economy and the other towards neoliberalism, are both evident in both cities. What makes the two cities different is the recent speed of change. The fast-developing Beijing has compressed de-agriculturalisation, de-industrialisation and tertiarisation into a just few decades, which were changes seen within London successively over many more decades. Beijing's current explosive urban expansion was seen by London around a century ago. Hence the link between growing socio-spatial inequality and the shifts towards service economy and neoliberalism is not universal but depends on a fully-industrialised, slow-changing urban condition. This is a condition that is not ubiquitous but is largely restricted to now economically slowing down Western societies. These results highlight not only how important is the speed of change in theorising socio-spatial inequality, but also how great is the potential of a wider set of urban comparisons in advancing a more global research agenda.

Keywords: Socio-spatial inequality; Urban condition; Comparative study; Beijing; London

Introduction

In 1845, '*The Condition of the Working Class in England*', a book revealing the injustice of rising capitalism, was released. Over 170 years later, the themes of the book not only continue to haunt British society but also seem to resonate around the world. Rumours have been circulating that most cities have followed, or will soon follow, the footsteps of the British capital, or its US counterparts, to record growing socio-spatial inequality. Comparisons between these cities and many well-developed European cities have then ensued, with suggestions of a similar surge in inequality (Cassiers & Kesteloot, 2012; Musterd et al., 2017). However, equivalent efforts to compare these cities and rapidly developing ones are surprisingly limited, even though the latter *per se* has recently attracted enormous scholarly attention (Lin & Zhang, 2017; Liu et al., 2019; Liu & Wong, 2018). The sweeping idea that the socio-spatial inequality in the rising urban stars would grow in a similar way to that in cities like London may thus just come from a bias held by advanced societies, ones that have already seen this fate befall them.

The recent surge in socio-spatial inequality has traditionally been linked with the concurrent changes in the economic and political environment. Since the late 1970s, cities showing a relentless rise in this inequality have been reported to also see a rapid growth of their service economy (Sassen, 2011; Walks, 2001). Operations of this new economy, as suggested by Sassen (1991), require a larger supply of both high-skilled and low-skilled workers than were required before. An

ever more bi-polar social structure should thus emerge, and so should growing socio-spatial inequality. What has also been reported for these re-segregated cities is some form of a neoliberal turn in their political economies (Brenner & Theodore, 2002a; Peck & Tickell, 2002). As argued by many Marxist scholars, this turn is essentially a political project to 'restore or sustain elite power' (Harvey, 2007). Through neoliberal policies like deregulation and privatisation, wealth becomes increasingly concentrated in the hands of a few who become ever wealthier, who are obsessed to express their superiority by living differently from the rest of the society. Hence the socio-spatial inequality should also grow with the ascendency of neoliberalism. But delving deeper into these ideas, one can find that they are actually largely inspired, and then verified, by the experience of only a few urban superstars, ones that had fully industrialised and expanded long before the arrival of the current era. For them, restructuring, rather than growth, was the keyword over the past half century. What remains unknown is whether these ideas are still applicable to cities experiencing both structural changes and urban growth. In other words, is the link between growing socio-spatial inequality and the shifts towards service economy and neoliberalism universal? Or is it actually contingent on a highly-developed urban condition?

The objectives of this paper are twofold. Firstly to compare changes in socio-spatial inequality between Beijing and London. Albeit different in many ways, both cities were once the biggest in the world. One is the capital of the country

that ruled over a quarter of the world's population before the US achieved hegemony; the other is the capital of a country that is on trend to soon be the most influential in the world. A comparison between them is now both significant and fascinating (Shi, 2019). This comparison may also help demystify the socio-spatial changes in rapidly developing cities. These cities are gaining global prominence but are often bypassed by those too enchanted by the past glory of advanced societies. The second objective of this paper is to examine whether an expanding urban condition can spoil the abovementioned link, which was originally built on the experience of cities without that condition. This investigation may not only challenge the hegemonic understandings of growing socio-spatial inequality, but may also reveal the importance of that condition in existing urban theories. More generally, the revelation may advance comparative urbanism by providing a new entry point for comparing cities and revising theories.

The remainder of the paper is organised as follows. The next section presents a review of socio-spatial inequality and identifies the gaps to be filled. The contexts of London and Beijing are then introduced. This is followed by a description of our methodology and then by results, then discussion and conclusion.

Revisiting socio-spatial inequalities: the service economy and neoliberalism

The issue of socio-spatial inequality is at the heart of many contemporary debates on social space and the city (Cassiers & Kesteloot, 2012; Glasmeier, 2014; Smith,

2005). For the past few decades, most major advanced capitalist cities have seen an intensification of this inequality, and attempts to explain the change have proliferated (Musterd et al., 2017; Panori et al., 2018). The story of how a post-industrial transition increases intra-city income inequality and occupational social distance has been tirelessly and repeatedly told and retold (Chen et al., 2018; Pratschke & Morlicchio, 2012; Sassen, 1991). The suggestion that higher social inequality implies larger intra-urban spatial disparity and additional inter-group separateness has also been frequently made (Jargowsky, 1996; Reardon & Bischoff, 2011). Under these propositions, it appears all too likely that cities now transforming the most quickly into a service economy are also those which should expect to record socio-spatial inequalities to be a relentless rise (Friedmann & Wolff, 1982; Sassen, 2011).

Another frequently mentioned contributor to rising socio-spatial inequalities is some form of the 'emphatic turn towards neoliberalism in political-economic practices' (Ballas et al., 2017; Harvey, 2007; Randolph & Tice, 2017; Van Kempen & Murie, 2009). This turn can make a contribution at least in three main ways. First, although a post-industrial shift towards services might be a major contributor, its realisation is argued to be contingent on a policy trend moving rapidly towards ever greater market deregulation (Brenner & Theodore, 2002a; Derudder, 2018). Second, it is suggested that cuts in welfare provisions, another common neoliberal practice, can effectively force many people who become

unemployed, or who have left school or university and never worked, to accept lower-paid, lower-skilled jobs. What follows then is a rise in the social inequality indices that are measured by occupation (Hamnett, 1996, 2003; Musterd & Ostendorf, 2013; Shi et al., 2017). Third, and more directly, the erosion of social housing and the privatisation of the housing market are often considered as key factors in producing spatial inequality. These policies provide the affluent with more leverage to move into desirable locations, which then become even more desirable, and to then further distance themselves from the rest of the society (Marcińczak et al., 2015; Paccoud, 2017). It thus follows that there is likely to be an upswing in socio-spatial inequalities when policies are reformed to 'extend market discipline, competition, and commodification throughout all sectors of society' (Brenner & Theodore, 2002a).

What should be noticed about the two inferences is the contexts from which they are established. They were first drawn from the experience of the top world cities when the resurgence of socio-spatial inequalities was observed there in the early 1980s (Dorling, 2018; Nijman, 2015; Sassen, 1991). Later, opportunities emerged for these ideas to be applied, tested, and evaluated in other places, when the observed transformations were no longer limited to cities at the very top of the global urban hierarchy, but were extended into the capitalist world more generally (Alderson & Nielsen, 2002; Musterd & Ostendorf, 2013). Studies in this vein often found that these inferences, albeit usually not as robust as in the places of origin,

were still largely valid and reliable, suggesting a possibility for generalisation (Consoli & Sánchez Barrioluengo, 2019; Hochstenbach & Musterd, 2018). Yet with a closer look, one should notice that the contexts in which these studies were conducted are actually far from diverse. They share a key similarity. In almost all cases what are being compared are highly urbanised, industrialised cities with a modest rate in both their current population growth and their recent spatial expansion. This thus raises the question of whether the contributions of the post-industrial shift towards services and political-economic practices of neoliberalism to growing socio-spatial inequalities are still significant if this similarity is absent. Do other parts of the world experiencing rapid growth also see a similar rise of the newly re-segregated city?

The recent evolution of many fast-developing cities, ones that have only recently obtained a place in the global league table (or re-entered that league table after having been labelled as under-developed) but have so far been largely ignored in these contemporary debates, may provide an opportunity to erase the question mark. Recently, they have followed in the footsteps of established world cities to see a rapid rise of the service sector and a penetration of *laissez-faire* market dogma (Chen et al., 2018; Ma & Timberlake, 2012). But unlike their predecessors, the newly rapidly growing cities were usually not fully industrialised when their economies shifted towards services. Nor have they often yet slowed down in population growth and spatial expansion (Jones, 2002; McGee & Robinson, 2011).

A comparison between the two types of cities can thus help answer our two research questions. First, whether socio-spatial inequalities have also increased in cities where a dramatic slowdown has yet to come, and second whether the dominant currently accepted explanations for growing socio-spatial inequalities are still satisfying in a rapidly expanding urban condition?

Setting the scene: from London to Beijing

London

London may be the first city that comes to mind when thinking of the service economy and neoliberalism. Its specialisation in finance and business services started early and has continued to date. In 2018 and 2019, despite growing Brexit uncertainty, London still retained its crown as both Europe's largest financial centre and world's most connected city in business services (GaWC, 2019). The capital has also taken a strong lead in neoliberal transformations. The 1986 'Big Bang' of the Stock Exchange in London is often cast as a prelude to the worldwide 'competition in laxity' of financial services and an iconic moment of neoliberal deregulation (Dutta, 2018). The cutbacks in social welfare spending initiated during the Thatcher administration and continuing to the present are not only far earlier but also more dramatic than similar practices in many other developed countries (Häusermann, 2010). The 'Right-to-Buy' scheme, which is still in use in Britain, is often marked as 'the first wave of housing privatisation in Europe' and

'the most characteristic example of privatisation' (Aalbers & Holm, 2008).

Meanwhile, London is also a pioneer in the recent worldwide resurgence of socio-spatial inequalities. In explaining this phenomenon, some scholars have stressed the necessitating role of the service economy in the rise of the 'new middle class', the geography of which has inspired a British sociologist to coin the term 'gentrification' in 1964 (Butler et al., 2008; Reades et al., 2019). Others have unpacked the resurgence within a neoliberal framework of urban governance (Davidson & Wyly, 2012). For example, the 'Right-to-Buy' scheme, an important neoliberal policy, is seen to have made the housing in London being more allocated by market pricing than by rights or needs (Fenton et al., 2013). This then has allowed the space of the city to become more separated by wealth, hence being more unequal. Bringing the views together and considering London's leading role in the service economy and neoliberal practices, the observed growing socio-spatial inequalities seem justifiable.

When the service economy and neoliberalism started to rise in London, the city had already become a highly-industrialised metropolis, with its age of expansion having ended a few decades before. In 1979, the year Thatcher became Prime Minster, agriculture was almost entirely absent in London, occupying less than 0.2 per cent of the workforce. Physical expansion was nearly absent as well. In fact, the built-up area of the present-day London comes mostly from the explosive population growth and rapid suburbanisation that occurred before 1945 (Mogridge

& Parr, 1997). In the 1944 Abercrombie Plan, a Green Belt and new towns were outlined to tackle London's problems of uncontrolled urban sprawl and congestion. Seven years later, in 1951, the first drop in London's population since census taking began was documented, followed by a four-decade-long decline. Growth, both in space and population, has since no longer been the main theme of the London story. In this sense, the service economy and neoliberalism actually emerged, consolidated and strengthened in a fully industrialised London where rapid urban expansion and strong population growth were just fond memories. This context, which is too often shared by cities attracting most scholarly attention, is usually considered too 'normal' and 'widespread' to be considered.

Beijing

Beijing has recently seen rapid growth of a service economy and some form of neoliberal transformations, even though both are grounded on and articulated through its own particular political contexts (Zhang & Ong, 2008). During the past two decades, Beijing has raised the share of people working in service employment by over 30 percentage points, a speed that is the highest not only in its own (very long) history but also in the world over that period. Its speciality in business services has also been highly strengthened, and its ascendency in the global urban hierarchy was rocketing upwards (Derudder et al., 2010). Meanwhile, the socialist capital has experienced continuous market penetration into an ever wider range of

domains. For example, the housing sector has undergone widespread commodification since 1998, and the financial sector has been enormously deregulated since 2001 (Lin & Zhang, 2017; Wu, 2015). Despite firm state controls still in certain key domains, these pro-market policies certainly elicit a growing interweaving between neoliberal logic and socialist sovereignty in the capital city (Ong, 2007). Rather than completely erasing the pre-existing regulatory landscapes, the market disciplines are increasingly aligned with, or mutually reshaping, them, leading to what Brenner & Theodore (2002b) term 'actual existing neoliberalism'. Hence, Beijing, regarding both economic and political changes, can be said to be reminiscent of London, where the service economy and neoliberalism have also been on a rise.

For those being familiar with the London story, it seems logical to conclude that socio-spatial inequalities should have grown in Beijing in a similar way as in London. As will be shown later, professionals have expanded in Beijing, and economic restructuring is a major force. These professionals have been considered equivalent to the 'new middle class' mentioned earlier, a social group contributing to London's growing socio-spatial inequalities (Gu & Shen, 2003; Shi et al., 2017). Parallels between the two cities have also been drawn in many policies (Wu, 2010). For example, the housing reform in China has been acknowledged as promoting homeownership, as has been the case for the 'Right-to-Buy' scheme in the UK. The spread of homeownership, as stated earlier, has increased the socio-spatial

inequalities in London, which makes it tempting to predict a similar increase for Beijing under the recent reforms. Hence if only considering the economic and political factors that are conventionally considered, one may easily assume a similarity between the two cities in socio-spatial changes. This presumption, we argue, requires close evaluation.

Beijing was not fully industrialised and was still in the process of rapid expansion when the service economy and neoliberal practices began to take hold. In 2001, the year Beijing was about to accelerate the growth of service sector under globalisation, the city still had 11per cent of its workforce engaging in agriculture. Then in the following decade, not only has industrial sector shrunk to make room for service sector, as was the case in London, but the agricultural sector has also shrunk. For Beijing, the successive processes of de-agriculturalisation, de-industrialisation and tertiarisation that had shaped London over centuries, are actually compressed into a few decades (Nijman, 2019). Along with this rapid restructuring, population growth and urban expansion have also speeded up in Beijing. Between 2000 and 2010, the population increased by 6 million, or 44 per cent; the build-up area expanded by 401 km^2, or 48 per cent. All these rates were about twice those in the 1990s. What could most easily be seen was the successive completion of the fourth (in 2001), fifth (in 2003) and the 187-kilometor-long sixth ring road (in 2009), facilitating the city to sprawl ever outwards. Therefore, Beijing in this period was the scene of a conjunction of rapid structural change and

accelerated urban expansion. This conjunction, which is generally shared by the poorer world but not by the richer one, may provide the ground for rethinking, re-evaluating, and even revising urban theories generated in the richer world.

Methodology

Data sources

We use data from the population census in 2000 and 2010 for Beijing and 2001 and 2011 for London. They are chosen mainly for two reasons. First, income and occupation are the typical variables used to indicate a person's position in the social structure (Galobardes et al., 2006). Although the spatial data on both variables can be found in several surveys in London, in Beijing those on income are not yet available and those on occupation are only provided by the census. Second, the census is, to date, the only endeavour in both cities to collect data for the entire population. It is not only the most complete source of information about the population, but also the least likely to suffer from sampling error[1]. For this reason, the census is usually favoured over other sources if they provide similar information, which is also the case for this study (Dorling & Rees, 2003; Hamnett, 2015).

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[1] Admittedly, only 10 per cent of the population in Beijing were asked about their occupation by the census. The sampling error is nevertheless very small because the sampling frame is based on the information collected for the total population. Furthermore, some people are always worried about how complete is the census of London. Who is missed? But again the error is small as 'capture-recapture' methodology is applied to input the missing.

Socioeconomic groups

Positioning people into different socioeconomic strata is necessary for most socio-spatial analyses and is not always easy. This work becomes more complicated when cities using different occupational classifications are compared. Arguably, the occupational data should be processed by using income, as income is perhaps the best single indicator of material living standards and is the key determinant of residential locations (Galobardes et al., 2006). But the data on income of different occupations are regrettably unavailable in Beijing. Hence we first aggregate the occupations in London into three broad groups based on their gross hourly pay in London and then fit the occupations in Beijing into the same three groups. The first step is shown in Table 1, in which nine major occupations are collapsed into the 'better-off', 'middle' and 'worse-off' groups. The 'better off' are those with hourly pay above the city median/average, and the boundary between the 'middle' and 'worse off' is drawn where the drop in pay is the largest[2]. The way in which the sub-major occupations in Beijing fit into the three groups is shown in Appendix A.

Table 1. Three broad groups and their occupational groups in London

Broad group	Occupational group	Gross hourly pay in London		Ratio to that of all employees	
		Median	Mean	Median	Mean
/	All employees	17.15	22.49	1.00	1.00
Better off	Managers, directors and senior officials	30.68	37.70	1.79	1.68
	Professional occupations	23.35	26.46	1.36	1.18
	Associate professional and technical occupations	18.50	22.66	1.08	1.01

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[2] It should be noted that there are three major reclassifications of occupations at the minor and unit levels in the UK between 2001 and 2011 (Elias & Birch, 2010). However, these changes are mainly occurred between and within three major groups (managers, professionals and associate professionals), which are aggregated together into the 'better off' category. Hence the reclassifications should have little influence on our following analyses.

Middle	Administrative and secretarial occupations	14.08	16.32	0.82	0.73
	Skilled trades occupations	12.56	14.62	0.73	0.65
	Process, plant and machine operatives	13.30	14.65	0.78	0.65
Worse off	Caring, leisure and other service occupations	10.21	11.09	0.60	0.49
	Sales and customer service occupations	9.84	11.98	0.57	0.53
	Elementary occupations	8.86	10.22	0.52	0.45

Source: ASHE Table 3: Earnings and hours worked, region by occupation by two-digit SOC (2018 provisional), Office for National Statistics.

Described by the three groups, the social structures of the two cities were in a similar process of 'polarisation' over the study period, even though after the process they were still very different (Table 2). In both cities, the shares of the better-off and worse-off groups both grew, and the growth mainly came from the rising proportions of professionals and those serving them. This reflects an expansion of the service economy and the effects of that expansion on social polarisation. But occupations showing dropped shares were different between the two cities. The share of skilled trades and machine operatives in the middle group fell dramatically in Beijing but not in London. Elementary occupations, to which agricultural workers belong, reduced their share in the worse-off group much more in Beijing than in London. These differences lend support to our earlier suggestion: the growth of the service economy was in tandem with de-industrialisation and de-agriculturalisation in Beijing but not in London. Such characteristics also affect other compositions, as some occupations are associated with certain types of people. For example, the worse-off group in both cities had an ever higher share of migrants, which may relate to the low-skilled jobs in the service economy (migrants in Beijing are almost all from elsewhere in China). Beijing had a far

larger share of men in the middle group than did London, which reflects Beijing's stronger manufacturing industry due to its unfinished de-industrialisation. These compositions tell us once again that the two cities share a similar expansion of the service economy but differ in how the expansion is achieved.

Table 2. Shares and compositions of the three socioeconomic groups in Beijing and London

Socioeconomic groups: their shares and compositions		Beijing		London	
		2000	2010	2001	2011
Better-off group		26.02	26.19	50.35	50.35
(of which) working in	Managers, directors and senior officials	21.85	11.36	34.91	23.06
	Professional, associate professional and technical occupations	78.15	88.64	65.09	76.94
(of which) migrants		8.79	26.96	27.98	38.11
(of which) male		49.44	54.24	57.49	55.93
Middle group		33.66	32.27	28.09	24.71
(of which) working in	Administrative and secretarial occupations	21.49	37.98	55.05	47.20
	Skilled trades, process, plant and machine operatives occupations	78.51	62.02	44.95	52.80
(of which) migrants		24.94	49.80	27.03	41.30
(of which) male		72.01	70.35	54.23	59.67
Worse-off group		40.32	41.54	21.56	24.94
(of which) working in	Sales and customer service occupations	32.77	45.94	31.09	30.00
	Caring, leisure and other service occupations	11.50	19.05	27.34	31.49
	Elementary occupations	55.73	35.01	41.57	38.51
(of which) migrants		22.79	54.74	42.18	51.69
(of which) male		58.57	50.83	43.13	33.71

Notes: in Beijing census, migrants are defined as those without the local household registration. Although in London census several variables can be adopted to define migrants, we follow the most widely used definition: migrants are those not born in the UK.

Areal units

Of great importance in socio-spatial analyses is the areal division (the outer boundary of the area in analysis) and the unit of observation within that area. In line with previous studies, Greater London, which is divided into 32 boroughs and the City of London, is used here (Butler et al., 2008; Reades et al., 2019). This area forms the administrative boundaries of London, the area for which most statistics are reported and strategic plans are made. Accordingly, the administrative area of

Beijing is chosen for comparison, which used to have 18 districts before four of them were merged into two. Within these areas, districts (boroughs) are chosen as the basic areal unit, which are delineated administratively. They are the principle local authorities being responsible for local services, policies, and projects. They are also the finest resolution in the occupational data provided by the Beijing census. Hence the choice here comes not only from the data limitation but also from the hope that the results can be valuable for policy making.

The areal units in Beijing are generally larger in size than those in London. In 2010, their median area was 928 km^2 and their median population was 0.65 million. These numbers for London were 38 km^2 and 0.25 million respectively (Figure 1). The huge difference here is understandable, as the land area is over ten times, the population is over twice, and the number of areal units is only about half in Beijing as in London. But it is undeniable that the difference may bring the scale problem: the sensitivity of socio-spatial indices to the size of units (Simpson, 2007; Wong, 2009). This is a fundamental methodological problem that is endemic to areal data and there is no perfect solution to it (Kwan, 2012; Openshaw, 1984). Rather than being deterred by the problem, geographers keep it in mind for research design and interpretation (Musterd, 2006; Musterd & Ostendorf, 2013). This is also the case for our study. Instead of comparing the *level* of socio-spatial inequality between the two cities which is very troubled by the size of units, we compare the *trend* which is much less effected by scale issue. Then for each city, we use the

same geographical scale over time to ensure the rigor of the results. In addition,

we are much more interested in comparing the *direction* than the *magnitude* of the

trend, the latter of which may be felt differently by the two cities, as people are

more geographically proximate and more likely to meet in more densely populated

London (Figure 1). Hence under this interest, the inter-city scale difference should

have negligible, if not no, effects on the results of this specific comparison.
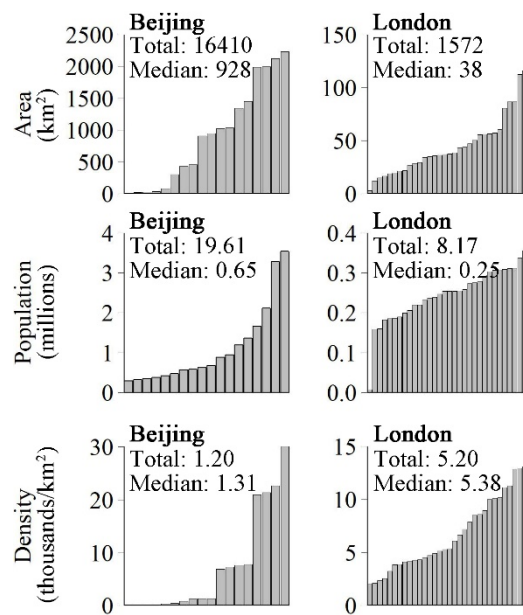

Figure 1. Basic information on the spatial units in Beijing (2010) and London (2011)

Both cities show great variations in the size and density of their districts (Figure

1). Hence for an observed change in their overall socio-spatial inequalities, the

actual social impacts can be very different depending on which districts contribute

the most. A movement of people into a district does not necessarily have huge

impact on the residents there, which is the case for sparsely populated areas. Nor

does it necessarily mean more socio-spatial mix *within* the district. It is fully

possible for different social groups to adjust their proportions to match the city's average, and simultaneously, to become more spatially away from each other, especially when the district is sizable. Hence a reported change at the city level neither means the same thing for different areal units, nor can predict the spatial changes *within* them.

Having clarified the above point, it is worth stressing that this paper compares the dynamics of inequality between Beijing and London, not their districts. But the contributions of the latter to the city-level changes are important, and caution is taken when issues *within* districts are discussed. This concern motivates us to use tile maps to present districts. As stated earlier, for a similar contribution, the actual social impacts can vary across areal units, and hence population should be used to rescale them. But the extent of geographical distortion should be limited, as locations of the contributors are equally important. Hence the areas can neither be completely rescaled by the size of land, as in a conventional map, nor by that of population, as in a cartogram. Instead a compromise should be made, which leads to what Harris et al. (2017) describe as a 'balanced cartogram': each basic unit is represented by a tile of the same shape and size, on which complex data can be shown in a consistent manner (Figure 2).
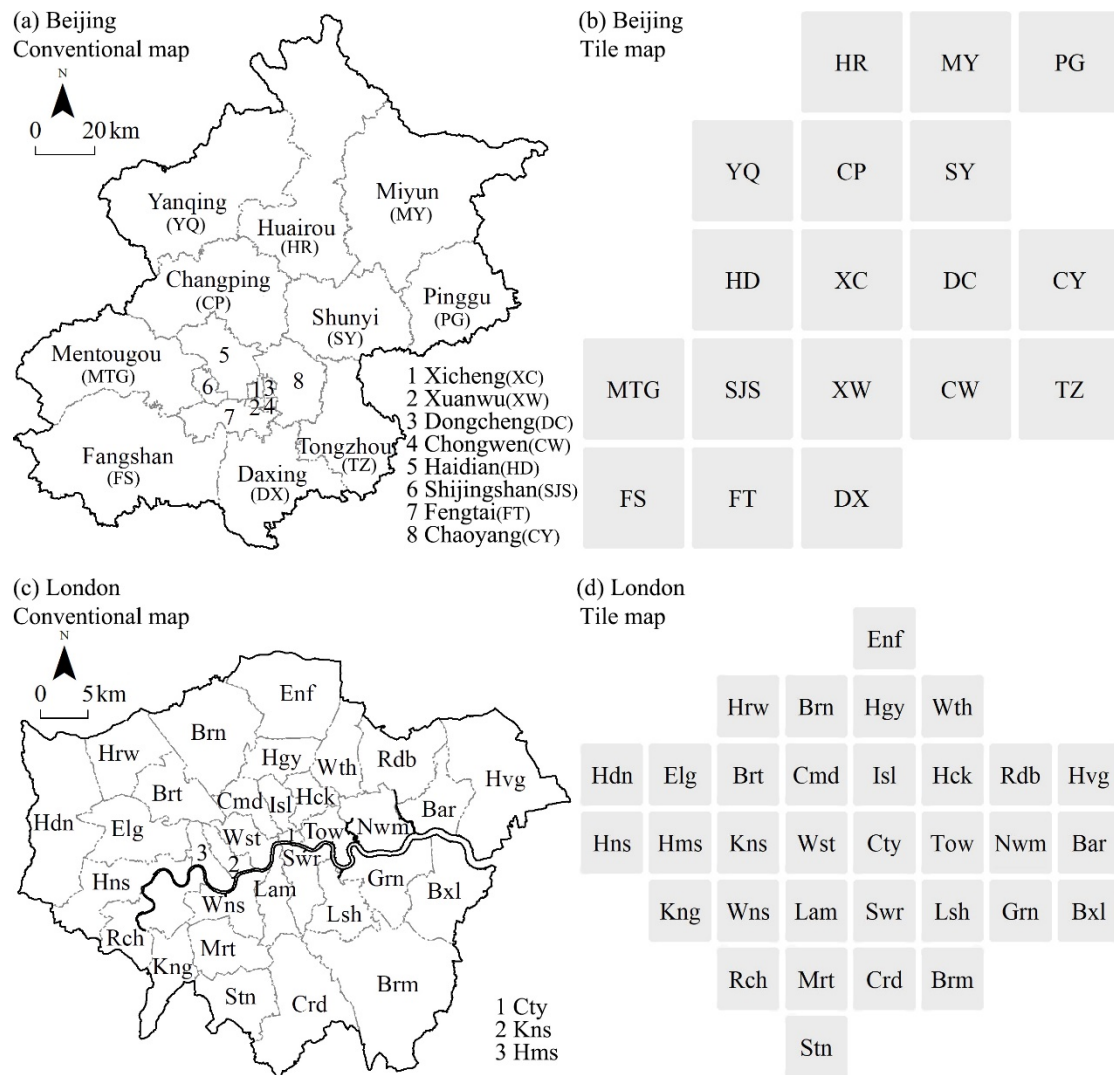
(a) Beijing Conventional map

N

0　20 km

Yanqing (YQ)

Miyun (MY)

Huairou (HR)

Changping (CP)

Pinggu (PG)

Shunyi (SY)

Mentougou (MTG)

5

6

13

8

7

24

Tongzhou (TZ)

Daxing (DX)

Fangshan (FS)

1 Xicheng(XC)
2 Xuanwu(XW)
3 Dongcheng(DC)
4 Chongwen(CW)
5 Haidian(HD)
6 Shijingshan(SJS)
7 Fengtai(FT)
8 Chaoyang(CY)

(b) Beijing Tile map

	HR	MY	PG
YQ	CP	SY	
HD	XC	DC	CY
MTG	SJS	XW	CW	TZ
FS	FT	DX	

(c) London Conventional map

N

0　5 km

Enf

Brn

Hrw

Hgy

Wth

Rdb

Brt

Cmd

Isl

Hck

Hvg

Hdn

Elg

Wst

Tow

Nwm

Bar

3

2

Swr

Hns

Lam

Grn

Bxl

Wns

Lsh

Rch

Mrt

Kng

Stn

Crd

Brm

1 Cty
2 Kns
3 Hms

(d) London Tile map

			Enf				
	Hrw	Brn	Hgy	Wth			
Hdn	Elg	Brt	Cmd	Isl	Hck	Rdb	Hvg
Hns	Hms	Kns	Wst	Cty	Tow	Nwm	Bar
	Kng	Wns	Lam	Swr	Lsh	Grn	Bxl
	Rch	Mrt	Crd	Brm			
	Stn						

Figure 2. Maps of Beijing and London

Notes: (a) abbreviations are in bracket; for full names of London boroughs, see Appendix B.

Methods

Socio-spatial inequalities can be expressed in many ways, and they can be conceptually classified into three dimensions (Massey & Denton, 1988; Morrill, 1991; Simpson, 2007). The first one is the variations between spatial units in terms of socioeconomic profiles and is often called 'spatial disparity' (Chakravorty, 1996; Walks, 2001). The second dimension compares the residential patterns between

different socioeconomic groups and is widely known as 'residential segregation' (Duncan & Duncan, 1955; Simpson, 2007). The third dimension, with the name of 'spatial clustering', is the spatial distribution of parcels – the extent to which similar units adjoin one another (Echenique & Fryer Jr, 2005). Each dimension corresponds to a different aspect of socio-spatial inequalities and is somewhat independent (Morrill, 1991; White, 1983). Hence the investigation of all three aspects instead of only one, as is common in most previous work, is necessary if a complete picture of socio-spatial inequalities is to be accurately depicted.

Changes in spatial disparity between Beijing and London are compared by using ternary plot. An illustration is given by Figure 3. In this plot, every point represents an areal unit, and the position shows its ratios of the three socioeconomic groups. Moreover, in dividing the plot into three zones, the group taking the largest share in each unit can be discerned. The total distance from a hypothetical average point to each unit is also computed, and hence the overall spatial disparity in a city, at a given time, can be more precisely measured, and then the change over time and across cities can be more effectively compared.
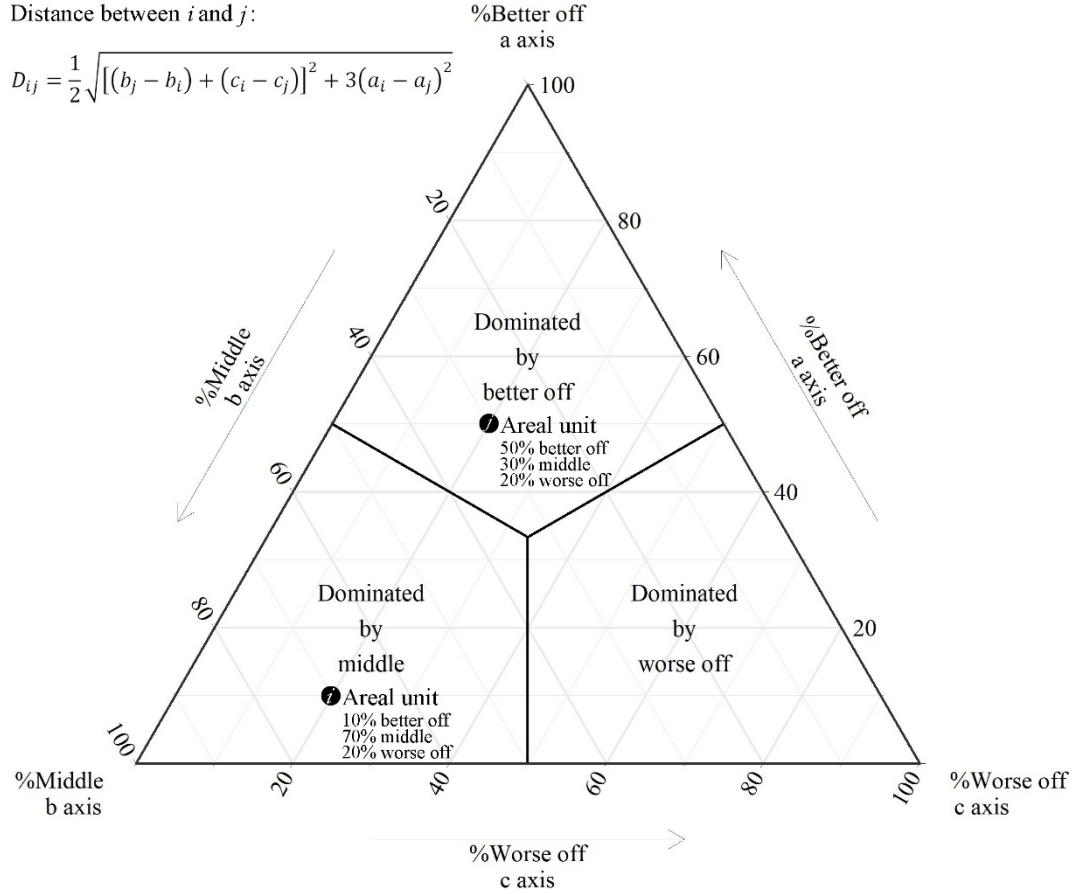
Distance between i and j:

$$D_{ij} = \frac{1}{2}\sqrt{[(b_j - b_i) + (c_i - c_j)]^2 + 3(a_i - a_j)^2}$$

Figure 3. An illustration of the ternary plot

The level of residential segregation is measured in this study by the most commonly used indicator, the index of segregation (IS):

$$IS_j = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{x_{ij}}{X_j} - \frac{t_i - x_{ij}}{T - X_j}\right|$$

where x_{ij} = the number of individuals from group j in the ith areal unit; t_i = the total number of individuals in the ith areal unit; n = the total number of areal units; $X_j = \sum_{i=1}^{n} x_{ij}$; $T = \sum_{i=1}^{n} t_i$. This index represents the proportion of one socioeconomic group that would need to be redistributed in order to make their distribution identical with that of the rest of the population. Hence the higher the number, the more segregated is the group.

Clustering patterns and their changes are mapped by using the location quotient (LQ):

$$LQ_{ij} = (x_{ij}/t_i)/(X_j/T)$$

where x_{ij} and t_i are the same as those in *IS*; X_j and T are the population of group j and the total population in the study area. This index advantages others such as simple proportions in mapping as it removes the effect of unequal population of socioeconomic groups and shows the pure concentration of a group in a particular place (Liu et al., 2019). It ranges from 0 to infinity, with a value above 1 indicating the existence of the concentration.

Results

Spatial disparity

In the first decade of this century, the overall spatial disparity significantly decreased in Beijing and slightly increased in London. This can be seen in Figure 4a, in which districts for both cities in both years are plotted with contours representing the 90% confidence interval. It is obvious that the contours for Beijing became smaller over the study period, indicating less variation between the districts than before, whereas the opposite was the case for London in this same recent time period. Table 3 shows this contrast more clearly, in which the total distance from each point to a hypothetical average one declined for Beijing but grew for London. Hence the positive correlation between the rise of the service

economy and neoliberal practices and that of socio-spatial inequality measured by spatial disparity seems to be present in London but absent in Beijing.
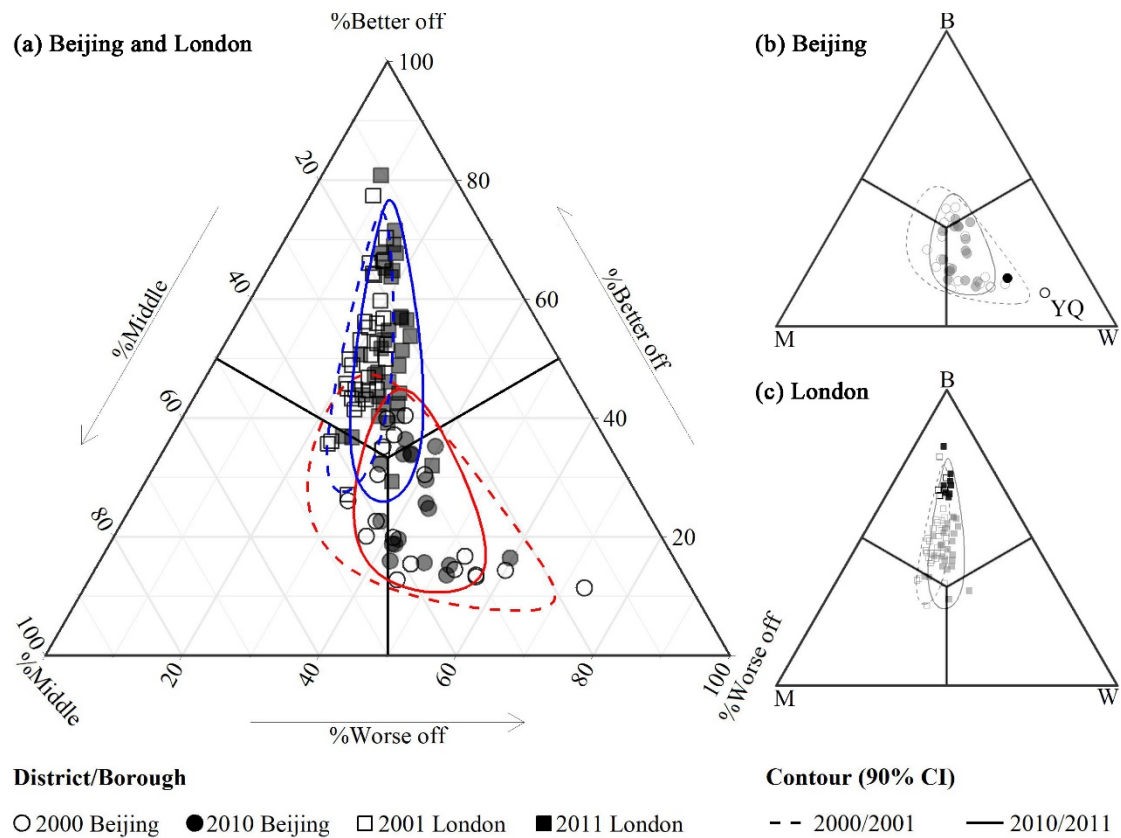

Figure 4. Changes in spatial disparity in Beijing and London

A closer look at the changes in the distribution of the points in Beijing reveals an extraordinary contribution made by one specific district in reducing the spatial disparity. This district is Yanqing, which is located in the northwest edge of the city and is highlighted in Figure 4b. It used to distinguish itself by having a share of the worse-off group that was far greater than that of others. But in the study period, it reduced this share remarkably, moved much closer to its peers, and contributed to 16 per cent of the total cut in the distance to the average position (Table 3). By contrast, a handful of very prosperous boroughs were more

responsible for the change in London. As highlighted in Figure 4c, these boroughs had already stood apart from others in 2001 with a very high occupancy (above 60 per cent) of the better-off group. They then enjoyed ever greater prosperity and became even more detached from the majority in the following decade. The increase in their distance to the average position accounted for 42 per cent of the total growth in London (Table 3). These results are echoed in the depiction of London made by Cunningham and Savage (2017), who labelled it as 'intensifying and elite'.

Table 3. Changes in the distance to the hypothetical average position

| Categories of districts | Beijing | | | London | | |
	Distance changed	Contribution (%)	# of districts	Distance changed	Contribution (%)	# of boroughs
Total	-0.64	100	18	0.27	100	33
Better-off	-0.19	30.12	4	0.30	109.44	30
(of which) ≥60%	0	0	0	0.12	42.43	8
Middle	-0.16	24.70	4	-0.03	-9.44	3
Worse-off	-0.29	45.18	10	0	0	0
(of which) ≥70%	-0.10	16.03	1	0	0	0

Notes: Districts/boroughs are categorised according to which group took the largest share in 2000/2001

A fast-paced economic revolution in Yanqing has got the district out of being an outlier in the socioeconomic profile. A detailed investigation into the occupational composition shows that in 2000 two thirds of people there still worked in crop farming. But this share dropped enormously by 31 percentage points in the next decade. Meanwhile, off-farm jobs, either created by or creating the drop, were proliferated. Most of the new jobs were not in manufacturing but in public and personal services, partly due to the de-industrialisation across the city. Hence Yanqing, a mountainous district planning to be Beijing's 'back garden', attempted

to leapfrog from an agricultural economy to a service one in a mere decade. This huge jump, which is extremely rare in developed cities like London, allows districts lagging much behind to catch up quickly with their peers, to become more similar to them in socioeconomic profiles[3], and thus to contribute considerably to lowering the overall spatial disparity.

Residential segregation

For all three socioeconomic groups, the tendency of 'like to live nearby like' has decreased in Beijing but increased in London during the decade (Figure 5)[4]. Two contrasting city images emerge here. The one for Beijing is rather optimistic. It shows that, between 2000 and 2010, more people from the worse-off group chose to live closely with the better-off group than with the other two groups, *and vice versa*. Their spatial distribution then became much more identical to that of the remainder of the population, and the degree of segregation at the city level was then decreased. The image for London, however, is more pessimistic. Figure 5 implies an ever greater tendency for Londoners at both extremes of the socioeconomic spectrum to live with their peers and to wall (or be walled) against

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[3] A more mixed social composition for Yanqing does not necessarily mean a more mixed spatial distribution of different groups within it. Given a huge size of nearly 2,000 km^2, it is very likely that the worse-off group live on one side and the better-off group live on the other side of the district. Also given a very low population density at 160 persons per km^2 in 2010, the likelihood of meeting those living in the same district might also be very low. Hence the effects of social mixing at the district level on individuals within it might be rather limited, and this is another story that can be told in a future paper.

[4] Although it is the trend not the level of segregation that we compare, it is worth noting that the levels reported here for both cities are much lower than those found in other studies using smaller-scale units (Liu et al., 2019; Tammaru et al., 2015). This observation confirms the existence of the scale problem in studies of segregation level, a problem that can largely be avoided if only the direction of change is studied (see the methodology section of this paper for details).

the rest of the society. The huge contrast here may indicate that not all places with a rise of the service economy and neoliberal practices would see a rising extent of residential segregation at the city level.
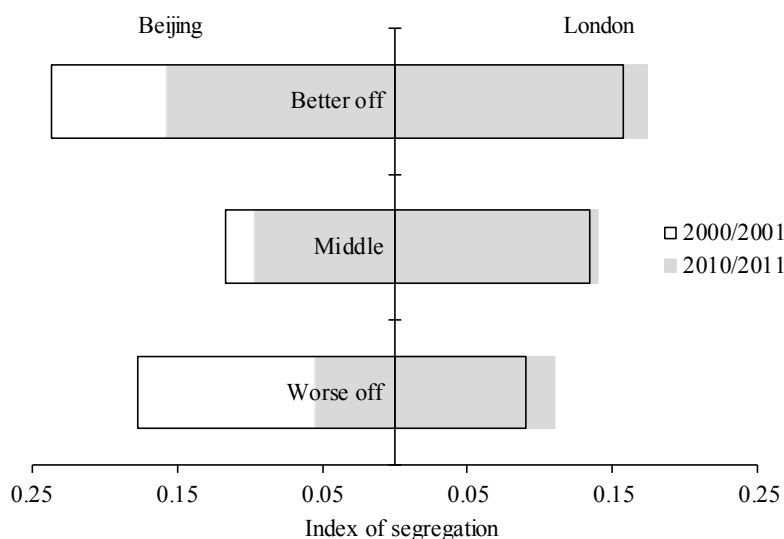

Figure 5. Changes in residential segregation in Beijing and London

An ever more segregated city image is very familiar to anyone studying the contemporary urban geography of London (Cunningham & Savage, 2017; Manley et al., 2016; Perera, 2019). On the one hand, the new century has seen a rapid growth of 'wealthy elite', 'super-gentrifiers' and 'global super-rich' (Butler & Lees, 2006; Fernandez et al., 2016). Many of them came to London for the lucrative jobs in financial services, the growth of which had only just begun to slow down within the year after the 2008 financial crash, and did not really slow down until the 2016 Brexit vote (after which London housing prices began to fall). With wealth in hand and exclusion in mind, they bought overpriced properties and built up their enclaves in already gentrified places (Atkinson & Bridge, 2004; Burrows et al.,

2017; Butler & Lees, 2006). On the other hand, due both to a more flexible economy and to the New Labour's welfare-to-work policies, the size of the working poor is now larger than a decade ago (Tinson et al., 2017). Many of them used to live in council estates, which were politicised in the New Labour's era of urban renaissance as a potential source of poverty that should be demolished (Lees, 2014). Large-scale regeneration was then carried out there, with a eulogistic name of 'positive gentrification' and a blunt one of 'social cleansing' (Perera, 2019). Council housing residents were then removed out of these areas and became even more concentrated in the dilapidated ones. Taken both sides together, it seems reasonable to view the growing segregation in London over the study period as a symphony of the deepening financialisation and advancing neoliberalisation.

A de-segregated city image might be inconsistent with the dominant understanding of Beijing (Feng et al., 2008; Gu & Shen, 2003). People always talk about the dismantling of the socially mixed work-unit compounds, the rise of so-called affluent 'gated communities', and the emergence of the migrant-filled 'urban villages'. Growing segregation, which was once annihilated in the socialist capital, is now claimed to be brought back by the newly emerged residential forms (Liu & Wong, 2018; Wu & Webber, 2004). This deduction may need a second thought. Commodity housing in gated communities are actually more socially mixed than planned. By analysing the microdata of the 2010 Beijing census, it is found that 35 per cent of the residents who owned a property were from the middle group. A

recent study also shows that many renters, especially those in the basements, are actually low-income migrant workers (Huang & Yi, 2015). Admittedly, as argued by Valentine (2008), these different groups may hardly have any valuable interactions and still live in parallel lives despite sharing the same space (the English, with their famous class system, are very good at not interacting with people they may share the same physical space with). Their physical proximity nevertheless highlights a possible overestimation of Beijing's recent residential segregation by those only seeing the different residential forms. Moreover, these forms are not spatially separated along districts. Urban villages are mostly located in the suburban districts, as are gated communities (Wang & Li, 2004; Zheng et al., 2009). The same goes for the inner city, where both dilapidated quarters and gentrified estates can be found (Yu, 2017). Hence even if the space might become more socially homogenous within residential units, as argued by others; it actually becomes more heterogeneous when we zoom out and see a district as a single areal unit, as is the case here. Segregation can happen at different scales, and in Beijing different groups at least become more likely to live in the same district, if not in the same residential unit.

Spatial clustering

The grey-shaded tile maps in Figure 6 show the changes in clustering patterns of the two cities. Each tile is divided into lower and upper halves, each half stands

for one of the two time points, and the shading is determined by which socioeconomic group has the highest location quotient at that time. In both cities, the better-off districts were packed together, occupying the central areas for both years; adjacent to it were districts/boroughs that were most subject to changes over the study period. Thus it seems that the two cities share a similar spatial dynamic in which the competition for space between different groups is most evident around the central cluster. The extent and result of this competition, however, were different between the two cities. Whereas in Beijing nearly one third of districts changed their dominant group, this proportion in London was only 12 per cent. Of these districts in Beijing, two ended up with the worse-off group, another two with the middle, and only one with the better-off group. Yet half of these boroughs in London upgraded from the worse-off ones straight-away into the better-off ones. Hence although both cities had a central better-off cluster whose outskirt was most subject to socioeconomic changes, the changes in Beijing were more widespread over space and more mixed in results than those in London.

For districts whose dominant group remained unchanged, circles in Figure 6 show whether or not that group has become more concentrated over that period. The answer is no for Beijing but yes for London. In the prosperous central cluster, the better-off concentration was reduced in five out of the six districts in Beijing, but increased in nine out of the 13 boroughs in London. The same goes for the less successful peripheries. The worse-off concentration in most districts there dropped

in Beijing but rose in London. Hence in the study period, London continued reinforcing its clustering patterns; Beijing took the opposite road; even though both became more service-dominated and market-oriented.
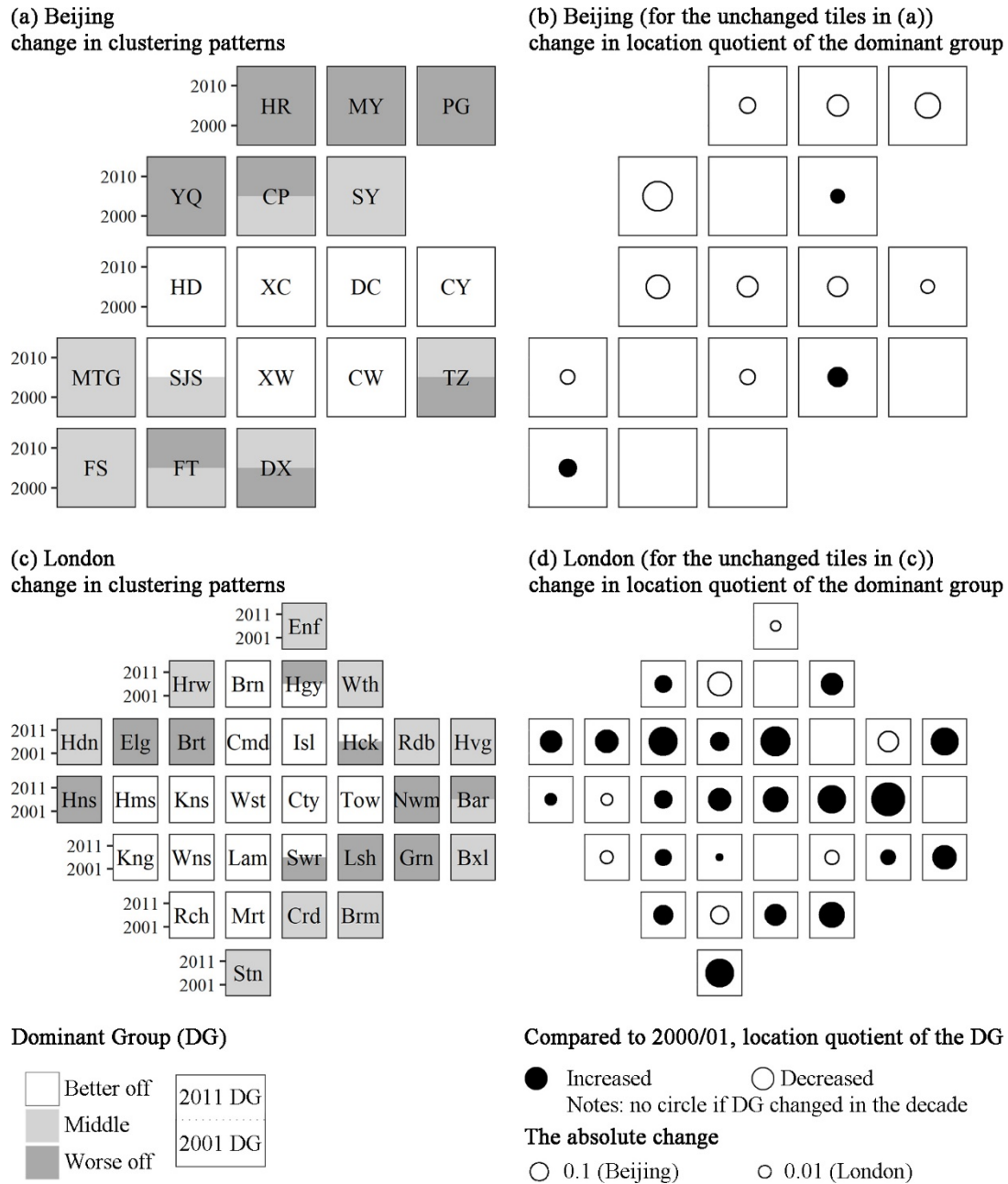

Figure 6. Changes in spatial clustering in Beijing and London

The speed of urban development should be the main factor contributing to the

observed opposite trend. With limited growth in both population and space, London's spatial change is very similar to what the 'Chicago School' describes as 'ecological succession': one group re/displaces the other in an already fully-occupied area. But the explosive population growth in Beijing means that groups there cannot just re/displace each other but have to go elsewhere, and the fast spatial expansion favours the latter than the former. In the study period, suburban areas in Beijing, once very rural, have become a hotspot for new, and often high quality, residential construction. This helped deconcentrate the better-off from the inner city, where congestion was too extreme to accommodate both the current and upcoming better-off residents. Also unlike London, Beijing's tertiarisation went along with de-agriculturalisation, with many farmers becoming low-skilled service workers. Once living near farmland in the peripheries, these workers now need to live closer to those being serviced. This change of residence, together with the arrival of low-skilled service workers, thus made the worse-off concentration fall in the peripheries but rise in and around the centre. With the fast speed in both urban growth and restructuring, the suburbs in Beijing actually become a socially mixed area to which both better-off and worse-off groups have moved. Their movements then helped other areas become less homogenous and then led Beijing to take the opposite road from London to see weakening spatial clustering.

Conclusion and Discussion

Over the past half century, socio-spatial inequalities have grown dramatically in many urban settings and become a key issue in many academic debates. To date, much of the blame has been put on the economic evolution towards services and the political movement towards neoliberalism. This accusation is usually thought to be universal but actually evidenced by just a few highly-developed cities with limited recent urban expansion. For fast-developing cities seeing remarkable changes in both structure and scale, evidence collection is still missing. Hence the universality of that accusation should be doubted, and this motivated us to compare the socio-spatial dynamics between London and Beijing. Indeed, both cities have experienced the two hypothesised shifts over the first decade of the current century. But over this period, a fast expansion in both population and urban space was seen by Beijing but not by London. Thus a comparison between the two cities should help us to see whether the accusation holds true in different urban settings. Unfortunately, our answer is no. Even though in that decade both cities strengthened their service economy and neoliberal practices, Beijing weakened its socio-spatial inequality whereas London worsened it. In the fast-developing Beijing, districts became more similar in socioeconomic profiles, economically separating social groups lived closer to each other, and concentrations declined within spatial clusters. In the highly-developed London, however, all these trends were in the opposite direction.

How could Beijing have the two hypothesised shifts but not the problem of growing socio-spatial inequality that London had in the same period? The speed of development, an often bypassed factor in theorising urban change, might play out here. Beijing, a fast-developing city (that may well slowdown in future as we turn to shortly below), underwent rapid de-agriculturalisation and explosive urban expansion; features that were seen by London not now but around a century ago. Between 2000 and 2010, Beijing's ambition to leapfrog into a service economy pushed numerous farmers towards taking service jobs. Once living near farmland located mostly in the peripheries, many of these new workers moved towards the centre to serve their new customers. The employment shift and residential change therefore deconcentrated the worse-off in the peripheries and increased their visibility in and around the better-off centre. Also, a booming population in Beijing needs to be accommodated, and this turned much of the once-rural suburbs into new, spacious and 'idyllic' residential areas. These areas, in contrast to the old, congested and unkempt inner city, then became popular among the expanding new rich. Hence thanks to the complex structural change and rapid urban expansion, re/displacement, a major process for raising socio-spatial inequalities under the two accused shifts, was far less prevalent in Beijing than in London. Instead, different social groups in Beijing co-occupied the newly expanded areas, making the space less unequal.

The history of London shows that a city cannot grow forever. Beijing is no

exception. Very recently, Beijing has slowed down its growth in nearly all aspects. It not only saw population fall in 2017 but also planned to reduce the construction land over the next two decades. Hence the speed in Beijing seems to be getting closer to that in London, and re/displacement that has long troubled London becomes ever more likely to set in. This prospect makes follow-up studies to this paper very necessary. It also urges us to think how Beijing, as growth fades away, can lessen the risk of re/displacement in neo-liberal times. Should the city re-orient its industrial policy to support the growth of the middle social strata? Or should it restore the power of the egalitarian ideology? We may not know what the future holds. But we know that plenty of countermeasures against growing socio-spatial inequality are available; the question is whether the socialist capital has the will.

Our comparison directly contributes to the revelation of both strengths and limitations in some of the existing theories surrounding socio-spatial inequalities. The London story confirms their success in linking economic, political, and spatial changes together. But the Beijing story highlights their failure in seeing the contingency of that link on the speed of development. This is a failure that comes primarily from previous working having a limited geographical scope. Overcoming it thus needs a comparison like the one made here which brings together both cities in and those out of that scope. Further, neither are these theories of inequality the only ones being limited by the scope, nor is Beijing the only city being out of the scope. Many fast-developing cities are also outsiders in

terms of consideration when it comes to urban theorising, and many theories can be further advanced if researchers step out of their comfort zones. In this globalised world, knowledge decolonisation through comparative urbanism is especially critical and urgent. The speed of development highlighted in our study can be a possible entry point. This speed is both omnipresent and not categorical. In using it, not only urban fields for comparison can be broadened, but also the divides defining which places are 'suitable' to be compared can be redefined.

A number of research directions can be opened up by our inter-city comparison. The first would be to compare the *levels* of socio-spatial inequalities at the city level. To do this, different cities should ideally have comparable areal units, which unfortunately is not the case for Beijing and London, but might be the case for other cities; and nevertheless we have shown what is possible here to come to some unexpected conclusions even when the units being compared are quite different. Second, below the city level, it can be enlightening to compare the socio-spatial inequalities between districts and across scales. In doing this, one needs to distinguish between inequalities at different scales. For example, if a certain group moves into a district but in a specific part of it, then segregation will rise within that district but might decrease for the whole city. Also, caution should be taken when interpreting the results. For example, the same level of segregation can be felt differently by residents in different districts, as the smaller the district, the more likely for people to meet, and the less segregation to be felt. This point is

highly related to the third avenue on which future research can be advanced. This avenue cares more about 'feelings' (or people) than about 'numbers' (or areas), both of which describe some part of inequalities but not all of them. People living in the same building but never talking to each other are socially segregated but spatially not. All these untouched fields, together with what our study in this paper shows, reveal how little we actually know about socio-spatial inequalities and the city, despite our long-standing concern in geography with measuring and talking about inequality and the city.

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Appendix A

UK Census (Using SOC 2010)		Beijing Census (Using CSOC2009)	
Major	**Sub-major**	**Approximate sub-majors**	
		01	Senior officials in the Chinese Communist Party
		02	Senior officials in national and local governments
11, 12	Corporate managers and directors; Other managers and proprietors	03	Directors, chief executives, and senior officials of democratic party and major organisations
		04	Managers and administrators of public institutions
		05	Managers and administrators of enterprises
1	Managers, directors and senior officials		
21, 31	Science research, engineering and technology professionals, and associated professionals	11,12	Scientific researchers
		17	Agricultural professionals
		13,14, 15,16	Engineers and technicians
22	Health professionals	19	Health professionals
23	Teaching and educational professionals	24	Teaching and educational professionals
24	Business, media and public service professionals	21	Business professionals
		23	Legal professionals
		27	Journalists and culture occupations
		28	Clergy
32	Health and social care associate professionals	46	Health associate professionals
33	Protective service occupations	32	Protective service occupations
		X0	Armed forces
34	Culture, media and sports occupations	25	Artistic and literary occupations
		26	Sports occupations
		84	Photographers, audio-visual and broadcasting equipment operators
35	Business and public service associate professionals	18	Aircraft, ship, and hovercraft technicians
		22	Finance professionals
		92	Inspectors of environment wasted material
2,3	Professional, associate professional and technical occupations		

41	Administrative occupations	31	Administrative and secretarial occupations	
42	Secretarial and related occupations	39	Office workers n.e.c.	
4	Administrative and secretarial occupations			
61,	Caring personal service occupations;	47,48	Social and personal services occupations	
62	Leisure, travel and related personal service occupations	45	Transportation services	
6	Caring, leisure and other service occupations			
71	Sales occupations	41	Sales occupation	
72	Customer service occupations	33	Postal and telecommunication occupations	
7	Sales and customer service occupations			
52	Skilled metal, electrical and electronic trades	66	Metal forming, machining and related trades	
		71	Machine maintenance fitters	
		72	Electricians and electrical fitters	
		73	Electronics and electronic fitters	
53, 81	Skilled construction and building trades; Process, plant and machine operatives	61	Coal mine and quarry operatives	
		62,63	Metal making and treating process operatives	
		64,65	Chemical and related process operatives	
		67,68,69	Assemblers	
		74	Rubber and plastic process operatives	
		75	Textile process operatives and sewing machinists	
		77	Food and drink process operatives	
		78	Tobacco process operatives	
		79	Pharmaceutical production operatives	
		81	Paper and wood machine operatives	
		82	Construction material process operatives	
		83	Glass and ceramics process operatives	
		88,89	Construction and building trades and operatives	
		87	Culture, education and sports products making operatives	
		93	Routine inspectors, testers, weighers, graders and sorters	
54	Textiles, printing and other skilled trades	76	Weavers, knitters, and footwear and leather working trades	
		85	Printing trades	
		86	Arts and crafts making trades	
82	Transport and mobile machine drivers and operatives	59	Agricultural workers n.e.c.	
		91	Transportation and mobile machine drivers and operatives	
5,8	Skilled trades occupations; Process, plant and machine operatives			

		51	Crop cultivation workers
		52	Forestry workers
		53	Animal husbandry workers
91	Elementary trades and related occupations	54	Fishery workers
		55	Agricultural water facilities management and maintenance occupations
		99	Process, plant and machine skilled trades and operatives n.e.c.
		42	Storage occupations
92	Elementary administration and service occupations	43	Catering occupations
		44	Hotel, leisure, travel and fitness services
9	Elementary occupations		

Notes: Some sub-majors, such as 29 Professional and technical workers n.e.c., 49 Sales and service workers n.e.c., and Y0 inconvenient to classify are unable to be reclassified into the UK SOC 2010 because of the limited information provided by their descriptions. These sub-majors in total only constitute 0.13% of the whole employment in Beijing in 2010.

Appendix B

Borough name	Abbreviation	Borough name	Abbreviation	Borough name	Abbreviation
City of London	Cty	Hackney	Hck	Lewisham	Lsh
Barking and Dagenham	Bar	Hammersmith and Fulham	Hms	Merton	Mrt
Barnet	Brn	Haringey	Hgy	Newham	Nwm
Bexley	Bxl	Harrow	Hrw	Redbridge	Rdb
Brent	Brt	Havering	Hvg	Richmond upon Thames	Rch
Bromley	Brm	Hillingdon	Hdn	Southwark	Swr
Camden	Cmd	Hounslow	Hns	Sutton	Stn
Croydon	Crd	Islington	Isl	Tower Hamlets	Tow
Ealing	Elg	Kensington and Chelsea	Kns	Waltham Forest	Wth
Enfield	Enf	Kingston upon Thames	Kng	Wandsworth	Wns
Greenwich	Grn	Lambeth	Lam	Westminster	Wst