The Brokerage Roles of City-Regions in Global Corporate Networks

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Abstract

City-regions are conferred economic advantage through their brokerage roles, which close structural holes between other city-regions that would otherwise not be connected within firm networks. Here, we identify city-regions whose brokerage roles are defined by their network positionality as intermediaries using flows based on ownership relations between headquarters and subsidiary locations. Applying Gould and Fernandez’s framework of five potential brokerage types, we find city-regions play one or more brokerage roles characterised by both global and domestic flows. Moving beyond understandings of brokerage as a position, we explain diversity in brokerage as defined by economic processes underlying urban networks.

Keywords: Brokerage; World City Networks; World Cities; Intermediaries; Economic Geography
Introduction

The globalisation and urbanisation literatures have increasingly focussed on the brokerage role of city-regions (Malecki, 2010, Scholvin, 2019), in reference to the intermediary role that city-regions play between scales (i.e. global and local) and/or between other cities and regions. In a move to diversify beyond the concentrated focus on top-tier ‘global cities’ and ‘world cities’ in the globalisation literature (cf. Friedmann, 1986; Sassen, 1991) accounts of city-regions as ‘gateways’, ‘backdoor cities’, ‘entrepôts’, ‘relational cities’, and other forms of intermediary roles aim to contextualise how many medium-sized and smaller cities fit within global urban networks shaped by more nuanced economic functions and processes (Atienza et al., 2021; Dörry, 2015, Short et al., 2000; Scholvin and Breul, 2020; Sigler, 2013; Taylor et al., 2002). Nonetheless, there has been a methodological disconnect in how such literatures have captured brokerage as both a process of intermediation, and as a position within global urban-economic networks.

On one hand, largely qualitative accounts of brokerage look to explain the underlying processes in city-regions by focussing on the stakeholders, actors, governance structures, and agents shaping various intermediary functions (Price and Benton-Short, 2008; Scholvin et al., 2019; Breul and Revilla-Diez, 2019). A common thread is that city-regions require unique occupational competencies, governance structures, and infrastructures to accommodate the intermediation of financial, digital, and physical flows (Akhavan, 2019; Krijnen et al., 2017).

On the other hand, hundreds of quantitatively focused world city network (WCN) research papers have generally used social network analysis (SNA) metrics to understand city-region centrality within global networks of service firms (Derudder et al., 2010; Neal, 2012), industry sub-sectors (Wall and Van der Knaap, 2011), or country-specific networks (Martinus et al., 2019). Betweenness centrality is the most common measure in determining brokerage in city networks, identifying the nodes (places) most often on the shortest path between two others. Whilst there is merit in understanding brokerage as a
network position, betweenness centrality measures fail to capture the nuanced processes underlying how brokerage occurs, and the specific relationships mediated by city-regions.

In this paper, we draw on five potential brokerage types to understand the specific brokerage roles of city-regions according to their positionality in mediating inter-urban networks of information, capital, and labour as proxied by financial and authority flows between two others. Initially proposed by Gould and Fernandez (1989), each of five exhaustive brokerage types describes a different set of triadic relations between a node and the two others it connects to in a network (Martinus et al., 2019). In this case, we examine how each city-region in the global firm network sits between other two others, identifying a brokerage role when the other city-regions are not otherwise connected, assuming the relationship is statistically significant. Burt (1995, 1992) identified brokers as filling a ‘structural hole’, reflecting a gap within a network matrix. As Allen (2010) has argued, brokerage in urban networks can bridge gaps that otherwise leave city-regions poorly connected, strengthening the overall network. Thus, one could argue that brokerage is a critical process in globalization, as it simultaneously accelerates space-time compression in the overall network, and confers a transactional advantage to city-regions as reflected by their specialised and nuanced economic position in global financial and commercial networks. These comprise a diverse range of brokerage functions, including one that is entirely domestically focussed (coordinator), two that link domestic and international city-regions (gatekeeper, representative), and two that are internationally focussed (itinerant, liaison). The analysis reveals that each brokerage type characterises a distinct subset of global city-regions, some of which play diverse roles across multiple brokerage types.

In the sections that follow, our analysis outlines how each of five brokerage roles derived from sociometric analysis can be applied to better understand the network positionality that particular city-regions occupy, and ultimately how city-regions are responsible for both global and domestic brokerage in multiple, and often overlapping, ways.
Brokerage in World City Networks

The focus on intermediacy has a long tradition in the study of city-regions, relating to the fundamental geographical concepts of ‘site’ and ‘situation’. The latter of these implies the position of a city-region in relation to others, as well as to natural resources, political systems, and so on. Focussing specifically on a city-region’s intermediary situation, the advent of significant long-distance trade during the modern period meant that certain city-regions gained great advantage from their situation of in-betweenness. This can be understood in many senses—between land and sea (e.g. port cities), between countries, between local and regional scales, or between cultural, political or social systems (e.g. providing a common lingua franca). Such cities were viewed as entrepôts – centres of economic trade bringing together commodities from the hinterlands, and traders from around the world (cf. Boon, 2013; Gordon, 1998). As Smith (1910) writes, entrepôts were historically the result of advantageous geographical position, for example at the mouth of a large river system or at the edge of a major empire. One might attribute the geographical advantage of pre-modern Seville to its positionality near the end of the Guadalquivir Valley, just as early modern Venice’s is explained by its position at the northern edge of the Adriatic Basin. However, the term entrepôt largely suggests a commercial positionality, blurring the complexity of relationships that converge on such cities – which themselves are not homogenous in the brokering services supplied. Furthermore, entrepôts’ strong focus on physical intermediation misses many of the financial and virtual flows defining city-regions’ intermediary roles in a more modern context.

Gateway cities are a variation on entrepôts focusing on a specific type of positionality, being cities providing a point of contact between the core and peripheries and/or hinterlands of a nation or region (Muller; 1976). In an urban studies context, Burghardt (1971) suggested that they are contextualized by ‘their relationships with central places’ (p.269), developing in the ‘contact zones’ between economically active regions and defined more by transport and wholesaling than central places. More recently, scholars have seen gateway cities as a valuable supplement to the world cities literature
(Taylor et al., 2002), particularly as tertiary and quaternary industries supplant primary and secondary ones (Short et al., 2000).

The shift from industrial capitalism to new forms of capitalist production fundamentally favours city-regions able to monopolise brokerage functions tied to capital and informational flows (Friedmann, 1986). This was a profound change from previous modes of capital accumulation in which industrial capacity was paramount, and brokerage was achieved through commercial advantage derived – at least in part – from geographical situation. This pivot has led to the rise of particular ‘relational cities’ such as Dubai (Sigler, 2013), which are defined by global flows being ‘dedicated to intermediary services such as offshore banking, container- and bulk-shipping, and regional re-exportation’ (p. 612). Such city-regions benefit from both economies of scale with regard to certain intermediary infrastructures (e.g. large ports, airports), but also from the advantages gained from informational asymmetries (Akerlof, 1978) in information brokerage. Furthermore, as financialisation grows in importance through globalising processes, financial brokerage takes new and nuanced forms, as Scholvin and Breul (2021) recently found in Mauritius.

In a post-industrial context, some have also looked at how cities and regions broker in between scales (Ernstson et al., 2010; Breschi and Lenzi, 2015) rather than places. For example, Walther and Reitel (2013) examine how actors in one nation play brokerage roles across national borders in the formation of cross-national regional transportation policy. Gorgoni et al. (2018) note that regionalisation in economic networks is strengthened by brokerage. However, despite this growing research on the brokerage of cities and regions, delineating precisely how brokerage is understood geographically, and measured empirically, remains difficult. Moreover, given the complexity of the contemporary economy, the recognition of perhaps multiple overlapping brokerage types explaining the positionality of city-regions in global networks is ripe for investigation.
Research in city networks has largely treated brokerage in abstract and highly generalized terms in applying betweenness centrality to understand network positionality (Krätke, 2014; Wall and Van der Knaap, 2011). This is despite sociological traditions recognizing dynamic dyadic and triadic node relationship structures and differences identifying unevenness and asymmetry in actor influence, information, power, as well as policy context (Simmel and Hughes, 1949; Spiro et al., 2013). Indeed, brokerage refers to an actor that sits between two others, forming a bridge or being a mediator in cases where there would otherwise be a structural network hole or weak connectivity (Diani, 2003; Kirkels and Duysters, 2010; Neal et al., 2019). Spiro et al. (2013) argue that brokerage is both a position and a process, which can be classified by: 1) broker transferal of a network resource between nodes; 2) broker matchmaking of two other nodes; and, 3) broker coordination between the activities occurring between two other nodes. Drawing on Gould and Fernandez (1989) brokerage types situated in ‘transferal’, they argue for more dynamic understandings of brokerage where actors transition between different brokering roles – or to even no role at all.

We follow a growing number of scholars investigating various city networks (cf. Gorgoni et al., 2018; Martinus et al., 2019; Walther and Reitel, 2013) to use the Gould and Fernandez (1989) brokerage typologies. The typology of five brokerage types follows the basic principles of social network analysis (SNA) to ascribe a brokerage role to actors within an open directed triad. In a triad of three nodes (A, B, and C), node B is a broker for A and C if A sends resources to B and B sends resources to C, but A does not send resources to C. That is, B brokers or facilitates the flow of resources from A to C.

In our case, our two-mode network is constructed from city-regions as nodes, which fall within countries as sovereign political and territorial entities. The five potential relationships set out by Gould and Fernandez (1989) appear in Figure 1 below, with countries representing network communities as cities as nodes within them.
Figure 1. Five Potential Brokerage Relationships, Adapted from Gould and Fernandez (1989)

As Figure 1 indicates, there are five potential broker types: Coordinator, Itinerant, Gatekeeper, Representative, and Liaison. These are exhaustive, meaning there are no other potential brokerage types within a directed network.

**Coordinator** city-regions are the most common brokerage type, facilitating resource flows within their own country: that is, they are domestic brokers. We would therefore anticipate that coordinators would be city-regions of high importance in a national system or community because they are often the most powerful city-regions across a range of functions nationally.

**Itinerant** city-regions (sometimes called consultants) are unique as they broker between two others in a common, foreign country. Such a city-region has economic value-add outside of its own national system; for example, through regulatory advantages, lower taxes, or varying levels of development. This is a highly specialised form of brokerage, and most often found in offshore financial centres whose intermediary role is tied to practices such as transfer pricing and/or round-tripping, whereby nations can obscure business transactional flows by moving outside borders before bringing them back in again (Fung et al., 2011; Sigler et al., 2019).

**Gatekeeper** city-regions facilitate flows from a city-region in a foreign country to a city-region in its own country. Gatekeepers play a ‘gateway’ role as they allow global corporations access markets in other countries. Scholvin et al. (2019) see gateway cities as acting as a “hinge” between regional hinterlands and global production systems. This is the case as described by Scholvin and Draper (2012) for South African cities (such as Johannesburg and Cape Town) mediating brokerage into (South) African cities and regions in general for the rest of the world, and in how Singapore specifically organises
services for the oil and gas sector between resource peripheries and firm offices across Southeast Asian city-regions (Scholvin et al., 2019), assuming the scale of brokerage were expanded to regions.

*Representative* city-regions reverse the direction of gatekeeper brokerage by facilitating flows from a city-region in their own country to a city-region in a foreign country. Representatives act globally to represent the special interests of one community, for example a large primate city in a country with a poorly developed urban system. Representative city-regions act as powerful global spokespersons for a group of others (Martinus et al., 2019), which in this case would be a city whose connections bridge global and national financial and commercial circuits.

Finally, *liaison* brokerage denotes highly internationalised city-regions that broker flows from city-regions in one foreign country to those in another. The liaison role of city-regions is perhaps the most ‘global’ as brokerage by definition involves a minimum of three distinct communities. Martinus et al. (2019) note that liaison city-regions were often highly specialised small sovereign states or territories offering corporations and wealthy individuals a shroud of secrecy for financial or other purposes. They are also nations which are seen to stand independently from others. Examples given in Martinus et al. (2019) are Singapore and Luxembourg—both city-states whose commercial and financial flows are often between neighbouring countries.

**Data and Methods**

Our analysis looks to identify brokerage roles played by city-states as intermediaries in flows of corporate information, capital, and resources. This study is among the first to use Gould & Fernandez’s framework in the analysis of a large world city network (Martinus et al., 2019). We apply a firm-based approach inspired by previous WCN literatures (cf. Neal, 2012) emphasising the influence that multinational firms wield in creating ties between distant city-regions through inter- and intra-organisational networks. The data and code necessary to replicate the analyses of this section are available at: [https://bit.ly/3q3wLxk](https://bit.ly/3q3wLxk).
To derive our inter-urban network of firm-subsidiary ties, we first begin with data from the Osiris database, a commercially available tool by Bureau van Dijk used under university license. The database was compiled by the authors in 2019 using all available publicly listed firm data from 208 global stock (securities) exchanges, and included 1,272,525 unique subsidiaries of 57,399 firms. One fundamental assumption is that firms gain strategic advantage from their location, either to minimise input costs, maximise market share and/or access, or to leverage other locational attributes such as tax regimes, regulatory structures, and so on (Dunning, 1998; Porter, 1994). City-regions were chosen as the unit of analysis due to the increasing recognition that they are the dominant territorial organizational scale in globalisation (Scott, 2001). Moreover, the modifiable areal unit problem (MAUP) suggests that ‘cities’ can be highly variable in relative size, and in some contexts (e.g. the United States), have much firm activity outside central city boundaries. The city-region scale thus includes both inner-cities and outer-suburbs to capture the full range of urban geographic structures and to add some consistency to our territorial definition across a diverse range of global contexts. Firm and subsidiary locations were first geocoded to discrete points and reclassified as the closest major city-region. For the purposes of reclassification, city-regions were created in ESRI ArcGIS by ascribing radii to major cities based on size. This meant cities with populations of more than one million captured smaller cities (suburbs) within a 75-kilometre buffer zone, whereas medium- (100,000 to 1,000,000) and small-sized cities (10,000 to 100,000) captured others within 50 and 25 kilometre radii respectively. Firms in small cities and towns outside these buffer zones were not reclassified. This was fairly straightforward when large cities were dominant to the surrounding suburbs (e.g. the extended metropolitan city-regions of Chicago, New York, Paris). Judgment calls were made in instances (such as the Dutch Randstad or Yangtze Delta regions) when distinct cities (e.g. Rotterdam and Amsterdam or Suzhou, Hangzhou and Shanghai) were geographically close but functionally separate. Dropping cases where the headquarters’ or subsidiaries’ location were unknown yielded a dataset of 959,713 unique subsidiary-headquarters pairs. Figure 2
illustrates the transformations and analyses we apply to these data to identify the type and frequency of city-regions acting as brokers.

### Figure 2. Identification of city brokerage from firm location data

Second, we aggregate these data into a weighted, directed city network. In this network, city-regions serve as nodes, and edge weights capture the number of subsidiaries in the origin node that are owned by firms headquartered in the destination node. For example, as illustrated in Figure 2, the weight of the LAX → NYC edge is 2 because there are two subsidiaries located in Los Angeles that are owned by firms headquartered in New York (i.e. firm A and firm C).

Third, we transform this weighted directed city network into a binary directed city network by retaining only edges with statistically significant weights. There are many strategies for deciding which edges to retain, but we use the disparity filter (Serrano et al., 2009), as implemented in the SKYNET package (Teixeira and Derudder, 2019). We use this approach because, where simpler methods retaining edges exceeding a threshold value would yield a network focused only on the highest-degree nodes (here, the largest city-regions), the disparity filter preserves the potentially multi-scale nature of this network by using a unique threshold for each edge. Because this transformation requires testing of the statistical
significance of each edge’s weight, we ensure a familywise error rate of $\alpha = 0.05$ by applying a Bonferroni correction.

As Figure 2 illustrates, this transformation results in a simpler network in which edges are either present or absent. While the raw data and weighted network directly convey locations of firms and their subsidiaries, and can be viewed as reflecting significant flows of resources between city-regions. The assumption that there is a ‘flow’ between a subsidiary and a headquarters location draws upon the same logic as previous WCN papers applying branch-headquarters data (cf. Alderson and Beckfield, 2004). Flows represent the intensity and directionality of knowledge, information, and other dimensions of genuine human interaction connecting people and places through firm geographies. As Derudder (2006) points out, these flows – although heuristic data points for research purposes – represent both the nature of corporate organisation as well as physical and digital infrastructures between places. Moreover, literature in strategic management suggests that there are distinct things that ‘flow’: tangible resources (e.g. machinery, technology), intangible resources (e.g. capabilities, competencies), and responsibilities (Schmid et al., 1990). Such an approach supports a view of firms and their subsidiaries as both inter- and intra-organisational networks (Ghoshal and Bartlett, 1990). However, in this case, we can only infer the transfer of financial and authority flows, as our headquarters-subsidiary ties indicate only corporate ownership rather than reporting structures or resource transfers as such.

Finally, we examine brokerage in this simplified binary network in three steps: identification of, classification of, and testing of brokerage. These three steps are performed using the SNA package (Butts, 2019). The identification of brokerage involves locating each ordered triple in which $A \rightarrow B$ and $B \rightarrow C$, but not $A \rightarrow C$. In such cases, B brokers the flow from A to C, because this flow must pass through B. In Figure 2, there is one instance of brokerage: New York brokers the flow from Los Angeles to London.
The classification of brokerage following Gould and Fernandez’s (1989) typology involves assigning each node to one of a set of mutually exclusive and exhaustive communities, then determining which of the five configurations in Figure 1 describe the triple. Here, we use countries as communities because countries function as sovereign administrative units that set regulate commercial and financial activities, and therefore are the entities across which economic activity must be brokered. Although domestic production systems that developed in the late 19th and early 20th century preceded contemporary globalisation and the expansion of the contemporary multi-national firm, a number of regulatory, linguistic, and cultural constraints still limit the vast majority of firm activity to within national boundaries. The OECD estimates the 67% of global gross output is by domestic firms, with another 21% the domestic activities of multi-national enterprises (OECD, 2018). In Figure 2, New York’s one instance of brokerage is classified as “representative brokerage” because New York is located in the same country as the origin node (Los Angeles), but in a different country than the destination node (London). New York “represents” the United States in an economic interaction connecting Los Angeles to the United Kingdom via London. In practice, a city may play multiple brokerage roles (e.g. New York could be a representative and a gatekeeper), and it may play a single brokerage role multiple times (e.g. New York could be a representative of Los Angeles to London, and a representative of Boston to London).

The significance testing of brokerage roles involves evaluating whether the number of times a given city plays a given brokerage role exceeds the number of times expected at random, given the structure of the network and sizes of countries. For example, in our complete data, New York plays the role of a coordinator 1,242 times, which is statistically significant, but plays the role of an itinerant only once, which is not statistically significant. Because this step involves testing of the statistical significance of each brokerage role played by each city, we ensure a familywise error rate of $\alpha = 0.05$ by applying a Bonferroni correction.

Figure 3 illustrates the complete set of identified brokerage roles for Johannesburg. As the largest city-region in South Africa, Johannesburg plays the role of representative twice, representing both
Durban and Cape Town (within South Africa) to London (in the United Kingdom). Similarly, it plays the role of gatekeeper twice, serving as the entry point for Windhoek’s (in Namibia) access to Pretoria and Cape Town (in South Africa). It plays the role of coordinator three times, facilitating flows fully within South Africa among Cape Town, Durban, and Pretoria. Finally, we observe a single instance of Johannesburg playing the role of liaison, allowing Windhoek (in Namibia) to access London (in the United Kingdom) by way of South Africa. Johannesburg plays each of these brokerage roles a statistically significant number of times, except the role of liaison, which is therefore drawn as a dashed line to indicate that it is not significant.

Figure 3. Johannesburg’s brokerage roles

After identifying, classifying, and testing all instances of each type of brokerage in the network, we identified clusters of city-regions that play the same combination of brokerage roles. In principle, there are 32 possible combinations of these five brokerage roles (i.e. \(2^5 = 32\)). However, in practice, each of the city-regions in this network play one of just 10 combinations of brokerage roles.
Results: The Brokerage Roles of City-regions in Corporate Networks

In this network of 395 city-regions, 54 (13.7%) play one or more brokerage roles to a statistically significant extent. Table 1 lists the range of city-regions across each of the five brokerage types. The table displays the city-regions whose brokerage role was statistically significant ($\alpha=0.05$) and reflects brokerage between more than two city-regions.

<table>
<thead>
<tr>
<th>Coordinator</th>
<th>Itinerant</th>
<th>Gatekeeper</th>
<th>Representative</th>
<th>Liaison</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>1242 (0.52)</td>
<td>74 (0.04)</td>
<td>424 (0.18)</td>
<td>609 (0.3)</td>
</tr>
<tr>
<td>Tokyo</td>
<td>274 (0.31)</td>
<td>Tokyo 6 (0.01)</td>
<td>287 (0.14)</td>
<td>566 (0.24)</td>
</tr>
<tr>
<td>London</td>
<td>144 (0.07)</td>
<td>Tokyo 196 (0.23)</td>
<td>Tokyo 260 (0.3)</td>
<td>Tokyo 134 (0.15)</td>
</tr>
<tr>
<td>Chicago</td>
<td>72 (0.8)</td>
<td>Paris 56 (0.17)</td>
<td>Paris 128 (0.39)</td>
<td>Paris 78 (0.24)</td>
</tr>
<tr>
<td>Paris</td>
<td>61 (0.19)</td>
<td>Zurich 24 (0.69)</td>
<td>Boston 25 (0.3)</td>
<td>Hong Kong 22 (0.96)</td>
</tr>
<tr>
<td>Boston</td>
<td>48 (0.58)</td>
<td>Toronto 19 (0.56)</td>
<td>San Francisco 17 (0.38)</td>
<td></td>
</tr>
<tr>
<td>Mumbai</td>
<td>37 (0.73)</td>
<td>Frankfurt 17 (0.61)</td>
<td>Houston 14 (0.48)</td>
<td></td>
</tr>
<tr>
<td>Philadelphia</td>
<td>25 (0.56)</td>
<td>Boston 9 (0.11)</td>
<td>Philadelphia 14 (0.31)</td>
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</tr>
<tr>
<td>Seoul</td>
<td>25 (0.76)</td>
<td>Chicago 6 (0.07)</td>
<td>Beijing 12 (0.5)</td>
<td></td>
</tr>
<tr>
<td>San Francisco</td>
<td>21 (0.47)</td>
<td>Osaka 6 (0.75)</td>
<td>Chicago 12 (0.13)</td>
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</tr>
<tr>
<td>Los Angeles</td>
<td>20 (0.77)</td>
<td>Philadelphia 6 (0.13)</td>
<td>Mumbai 8 (0.16)</td>
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<tr>
<td>Houston</td>
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<td>Los Angeles 5 (0.19)</td>
<td>Madrid 6 (0.5)</td>
<td></td>
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<tr>
<td>Beijing</td>
<td>12 (0.5)</td>
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<td>Stockholm 6 (0.32)</td>
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<tr>
<td>Toronto</td>
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<tr>
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<td>Amsterdam 5 (0.71)</td>
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<td>Madrid</td>
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<tr>
<td>Milan</td>
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<td>Taipei 3 (0.5)</td>
<td>Milan 4 (0.5)</td>
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<td>Zurich</td>
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<td>Sao Paulo 4 (1)</td>
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<td>Johannesburg</td>
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<td>Warsaw 4 (1)</td>
<td></td>
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<tr>
<td>Taipei</td>
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<td>Johannesburg 2 (0.25)</td>
<td>Bangkok 3 (1)</td>
<td></td>
</tr>
<tr>
<td>Washington,</td>
<td>3 (0.27)</td>
<td></td>
<td></td>
<td>Oslo 3 (1)</td>
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<tr>
<td>Calgary</td>
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<td></td>
<td>Toronto 3 (0.09)</td>
<td></td>
</tr>
<tr>
<td>New Delhi</td>
<td>2 (1)</td>
<td></td>
<td>Brussels 2 (0.5)</td>
<td></td>
</tr>
<tr>
<td>Osaka</td>
<td>2 (0.25)</td>
<td></td>
<td>Johannesburg 2 (0.25)</td>
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</tr>
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<td>Shenzhen</td>
<td>2 (0.4)</td>
<td></td>
<td>Montreal 2 (0.67)</td>
<td></td>
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<tr>
<td>Stockholm</td>
<td>2 (0.11)</td>
<td></td>
<td>Sydney 2 (0.4)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Broker City-regions by Type. Value represents number of brokerage relationships, with proportion of city-region’s overall relationships in that category in brackets. Includes city-regions with more than one brokerage role.
The most common brokerage role was coordinator with 44 city-regions showing significant values, followed by representative (31), and gatekeeper (22). Only four city-regions played a significant liaison role in the overall network, and two played an itinerant role.

Coordinators are mainly city-regions that play an outsized role in domestic production networks within large countries. Ten are American city-regions, four are in the United Kingdom, and another three each in Japan, Canada, and Germany. A number of primate cities also act as coordinators, including Jakarta, Santiago, Paris, Moscow, Kyiv (Kiev), Stockholm and Helsinki. Overall, New York played the coordinator role most frequently (1242), followed by Tokyo (274), London (144), Chicago (72), and Paris (61). No other city-region brokered between more than 50 city pairs.

Itinerants sit in the most rarefied category, with only London (74) and Tokyo (6) registering a significant role. Itinerants are thus *bona fide* global city-regions in the sense that they mediate flows outside of their home country. Perhaps unsurprisingly, both city-regions sit atop of the Globalization and World Cities (GaWC) league table as Alpha++ and Alpha+ cities (GaWC, 2020), reflecting their deep global connectivities. London’s itinerant role derives primarily as a broker on both sides of the Atlantic, in which it mediates between a number of American city-regions (e.g. Boston, Chicago, San Francisco), and those city-regions within Belgium, Germany, the Netherlands, and Spain that would otherwise not be connected within the network.

Gatekeeper city-regions are gateways that provide an economic window for foreign companies. There are a total of 22 gatekeepers. New York (424), London (287) and Tokyo (196) played the gatekeeper role most often, followed by Paris (56), Zurich (24), Toronto (19), and Frankfurt (17). Another 15 city-regions were gatekeepers at least once, often brokering between a major world city and domestic production centres. For example, Mumbai is a gatekeeper between Dubai and a number of Indian city-regions. In terms of the city-regions with a large proportion of their brokerage role dedicated to gatekeeping, smaller city-regions stand out, with Munich and Osaka as the highest.
Representatives are similar in their role to gatekeepers, but provide an ‘economic window’ to domestic firm activities as they internationalise. London plays a representative role most often (609), followed by New York (566), Tokyo (260), and Paris (128), followed by four large US city-regions (Boston, San Francisco, Philadelphia, Houston). The remainder of representatives are highly globalised city-regions such as Zurich, Amsterdam, Milan, and Sydney. Those with the highest overall proportion are again major city-regions within their countries, but not top-tier global city-regions. For example Sao Paulo, Warsaw, Bangkok, Oslo, Geneva and Kuala Lumpur only played a representative brokerage role (100%) in the network.

Liaisons are similar to itinerants, with the exception that they broker between city-regions in Country A and Country C rather than two in the same country. Thus, they are highly globalised city-regions in that they link two others outside of their home country, in contrast to coordinators, gatekeepers, and representatives. Only five city-regions were identified by their liaison role, including New York (2385), London (2056), Tokyo (870), Paris (325) and Hong Kong (22). Although New York is numerically the most significant, 96% of Hong Kong’s brokerage roles are liaison roles, meaning that as a major global city-region its intermediary activities are often between two distinct countries. In the specific case of Hong Kong, this indicates an intermediary role between those in mainland China and other city-regions, corroborating Martinus et al. (2019).

**Brokerage Clusters**

Having identified how the individual brokerage types differ from one another in their geographical extent and concentration, we now focus on how city-regions can simultaneously perform multiple brokerage roles. The majority of city-regions (329 of 395) in the network did not play any brokerage role, while 12 more appeared as brokers in the network but not to a statistically significant extent (Atlanta, Copenhagen, Dublin, Las Vegas, Luxembourg, Miami, Norfolk, Singapore, Stamford, Stuttgart, Suzhou, Vancouver).
However, examining which city-regions most often serve as brokers yields the usual list (c.f. Sassen, 1991) of economic hubs: New York is at the top with 2385 instances of brokerage, followed by London (2056) and Tokyo (870). A more nuanced understanding of city-regions’ roles as brokers emerges by examining how they combine distinct brokerage roles in unique ways to emerge as specific types of brokers. As Table 2 illustrates, some city-regions fit two or more of Gould and Fernandez’s types simultaneously.

<table>
<thead>
<tr>
<th>Broker Type</th>
<th>Examples</th>
<th>Number</th>
<th>Coordinator</th>
<th>Gatekeeper</th>
<th>Representative</th>
<th>Itinerant</th>
<th>Liaison</th>
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<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
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<td>Sentries</td>
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<tr>
<td>National Representatives</td>
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<td>Non-brokers</td>
<td>–</td>
<td>341</td>
<td></td>
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</table>

Table 2. Brokerage Clusters and Respective Type Contingencies with Indicative City-Regions

There are a total of ten different clusters describing the observed combinations of brokerage roles a city-region assume in the network. Some city-regions play both a domestic brokerage role (coordinator, gatekeeper, representative) as well as the highly international brokerage role (itinerant, liaison) shared by only a few other city-regions. There are theoretically other potential combinations (e.g. itinerant and liaison), but as far more city-regions play domestic brokerage roles than international ones, such combinations were not found in the data.
City-regions that play multiple brokerage roles facilitate exchanges both within and through their own countries as well as between foreign countries, being uniquely global in the brokerage functions they perform. We observe four city-regions in this position – London, Tokyo, New York, and Paris – and retain their common label as world cities or global city-regions because they engage in the most international combination of brokerage roles. This corroborates Sassen’s more recent comments on her initial global city thesis, being that “intermediation can now be thought of as a variable that […] facilitates the globalizing of firms and markets” (2016, p. 98) in reference to how these cities service an agglomerations function. Global city-regions exhibit a truly diverse economic base across a range of industries, as well as an advanced services agglomeration whose professionals have deeply distributed global networks (Allen, 2010), making them attractive locations to firms in other countries despite high input costs (e.g. wages, office space). By corollary, we confirm that their status as bona fide global city-regions is supported by brokerage in its diverse forms, reaffirming that the ‘power of place’ is derived not only from agglomeration, as many have suggested, but from global connectivity through critical network positionality.

Similarly, although they play only the role of liaison, city-states are also globally facing in their brokerage functions because they only coordinate exchanges between pairs of foreign countries. Indeed, the key feature that distinguishes city-states from global city-regions is the size of their country. Hong Kong only has opportunities to play the role of liaison, because there are no other domestic city-regions for which it could act as coordinator, gatekeeper, or representative. Both Martinus et al. (2019) and Pan et al. (2018) have pointed to Hong Kong’s strong brokerage role vis-à-vis financial flows to and from mainland China. Hong Kong’s liaison role confirms the value that Chinese firms derive in locating within the Special Administrative Region (SAR), including access to a unique regulatory environment and global services agglomeration (Sigler and Zhao, 2015).

For city-regions in larger countries, more broker roles are possible. Some city-regions simultaneously play the role of gatekeeper, monitoring access to their domestic economies, and the role
of representative, linking their domestic economy to the rest of the world. Because economic interactions with a country, whether inbound or outbound, must go through these gatekeeper-representative, we call them *sentries*. As Table 2 highlights, sentries tend to be the financial hubs of countries with a global economic footprint, including Sydney and Toronto. As Allen recounts, Sydney was historically "characterised as a ‘switching point’ in the powerful city networks that connect it to the large Asian, North American and English-speaking European cities", and more recently "Sydney has switched itself into global financial networks, brokering arrangements that have enabled its professional intermediaries to excel in putting together new financial deals that link finance, property and securitisation transactions across global cities" (2010, p. 2905). Similar logic applies to other sentries, which play commanding roles in their domestic economies, yet are critical to global connectivity, as illustrated by Johannesburg’s network in Figure 3.

However, not all brokers are as internationally focused. Accordingly, we observe groups of city-regions that function primarily as *national gateways* (e.g. Washington) or as *national representatives* (e.g. Beijing), facilitating inbound or outbound economic activity, respectively. These include a large number of national capitals (e.g. Jakarta, Madrid, Seoul), major commercial hubs (e.g. Milan, Sao Paulo), or economically specialised city-regions (e.g. Houston, San Jose (Silicon Valley), Calgary).

We also observe a larger group of *domestic broker* city-regions whose brokerage consists entirely of coordinating domestic interactions. Finally, the majority of the city-regions in this network (N = 341, 86.3%) do not play any significant brokerage roles at all. Importantly, the lack of brokerage roles does not necessarily place these city-regions at an economic disadvantage because in many cases they maintain direct economic links with other city-regions, and therefore do not require brokers to access the global economy.
Discussion and Conclusion

The literature on how cities and regions fit within global networks has evolved to include novel economic processes and patterns, notably a focus on brokerage vis-à-vis city-regions’ key intermediary functions. In this analysis, we have operationalised brokerage first as a position, and then a process, with a view to better understand the diversity of roles that city-regions play in connecting the vast global network of firms and their subsidiaries. The analysis follows Gould and Fernandez (1989), whose seminal piece on brokerage types allows us to systematically understand the role of individuals – in this case city-regions – in positions of informational, financial, or commercial intermediacy.

In terms of their position, city-regions are identified as brokers when they connect two others that are otherwise not linked, thereby closing a ‘structural hole’ in the network. This confers three advantages. First, to the broker city-region, through the local impacts of brokerage activities—traditionally, intermediary services such as ports and warehousing and more recently advanced information technology (IT) and financial intermediaries with deep global connections. Second, to the city-regions that are connected, in that they otherwise would not share a common link. Though our data does not reveal the exact nature of each set of flows, it can be assumed that such relationships provide less-connected city-regions with pathways to globalisation. For example, a single firm relation with London or New York would extend great onward connectivity to other city-regions in the network. And third, to the overall network. The WCN literature has confirmed that cities are integral to the extension of globalisation, and therefore city-regions as brokers contain the specific intermediary actors and agents through which this process occurs.

The diversity of brokerage types illustrates that brokerage is a process. Some city-regions’ brokerage roles focus on domestic brokerage processes, while others are internationally oriented brokers, or in the most ‘global’ cases—a combination of all. Distinct processes distinguish city-regions that are coordinators, itinerants, gatekeepers, representatives and liaisons from one another, each the result of a
particular industry focus, path-dependent history, or relationship with global, regional and national production networks. This explains how highly globalised city-regions such as Toronto and Sydney act as ‘sentries’ that connect their respective national systems to the global economic network. Such city-regions offer a ‘window’ through either gatekeeping or representation that acts as an intermediary between domestic and international city-regions. Furthermore, we distinguish between the fundamentally extraterritorial processes at work in liaison city-states such as Hong Kong, and those that define the brokerage processes in domestic coordinator intermediaries such as Busan, Shenzhen and Dallas.

Firms may choose to locate their headquarters and subsidiary locations in particular city-regions to leverage the advantage of inter-urban brokerage. As Waiengnier et al. (2019) suggest, “because of their intermediary functions, advanced producer services (APS) firms look for characteristics of places associated to central locations (prestige, density, accessibility, amenities, etc.), but to various degrees, depending on the nature of specific APS functions” (p. 588). Our empirical analysis extends the common focus of APS by demonstrating that brokerage is present in many different contexts, ranging from highly economically specialised city-regions (e.g. Houston and Calgary as energy hubs) to small- and medium-sized city-regions (e.g. Helsinki, Rotterdam) playing niche brokerage roles. Although large global city-regions (e.g. New York, London) feature across all brokerage types, we find that specific city-regions’ economic functions are explained by the diversity of their brokerage roles. Moreover, even the largest and most significant global city-regions play divergent roles: New York and Paris are multifunctional ‘generalist’ brokers, while London is more of an extraterritorial broker, and Chicago is more of a domestic broker.

The technique we have applied provides a primary overview of brokerage across five types and in a global context. However, Gould and Fernandez’s framework only provides a solution to understanding brokerage when extracting triplets of nodes and communities respectively. In a complicated network, such as that of the global urban system or the global financial system, new methods
are needed to understand brokerage. Further research may indeed highlight the actors, agents, and processes underlying brokerage in city-regions more precisely, or focus on applying alternative means of measuring inter-urban connectivity, for example through corporate reporting structures or quantifiable financial or informational flows. Though much is known about the brokers and intermediaries in city-regions, such as New York and London (Wojcik, 2013), more research is needed in the vein of Grant (2009) and Krijnen et al. (2017) regarding how firms in city-regions (such as Accra and Beirut) intermediate between national, regional, and global urban networks. It is possible that many smaller city-regions, for example, play a minor brokerage role that we are unable to detect. Also, as economic development pivots ever-further toward digital flows, new forms of brokerage may emerge that rely less on physical infrastructures and more on informational and financial advantage tied to digital infrastructures and human capital. We have yet to understand how such shifts may rearrange and reposition city-regions currently acting as brokers, or change the process of brokering itself.
References


