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Ben Derudder and Peter J. Taylor

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Preamble: What we do not know about Brussels and Antwerp

1 The upsurge of concepts such as «world cities» (Friedmann and Wolff, 1982) and «global cities» (Sassen, 1991) have been instrumental in rooting urban geography in the globalization debates that have dominated the social sciences from the 80s onwards. World cities are commonly conceived within the framework of a «global network of cities» (King, 1990, p. 12), and envisaging them in a relational context gained further momentum in the nineties, when authors like Castells (1996) asserted that globalization processes are basically all about transnational processes operating through numerous networks. Given this upturn in interest in the spatial outline of a global urban network, it is not surprising that in a recently compiled overview of urban research by Belgian geographers, De Lannoy and De Corte (2000, p. 190) have devoted their first section to «cities in networks», a choice that can indeed be traced back to their observation that «there seems now to be a widespread conviction that large, post-industrial cities are becoming much more important as the powerhouses of the globalized economy.» The two most salient epistemological consequences of such a stance are that these «power houses» should be evaluated (i) on their proper *global* scale and (ii) in their appropriate *networked* context. However, their overview reveals that actually there is very little we

know about how Belgium's major cities relate with other major cities across the world. Various patterns of relations, networks and connectivities are, of course, illustrated by research on communication and transport issues, but a systematic account of these relations is – to our knowledge – not yet available. The prime purpose of this paper is therefore to show how the empirical gap in De Lannoy and De Corte's (2000) section on «cities in networks» may be filled[1].

2 In the first section of this paper, we will take closer look at the knowledge lacuna with respect to Brussels' and Antwerp's position in the world city network. In the second section, we will briefly outline the research methodology developed by the Globalization and World Cities Group and Network (GaWC), which enables systematic assessments of relations between cities across the world. In the last section, we will shed light on the structure of Brussels' and Antwerp's relations with other important cities through comparative descriptions of their overall global network connectivity and their patterns of service provisioning around the world.

Brussels and Antwerp under conditions of contemporary globalization: conceptualisation and previous research

World cities: global relations and local polarisation

3 Since its original outset, urban geography has always been conceived as having two basic areas of study, i.e. internal patterns and external relations. The former research area culminated in studies such as Burgess's famous concentric zone model, the latter in systematic accounts of full-fledged «city systems» such as Christaller's central place theory. The advent of world city research has begun to reinstate this equilibrium by focusing on both the importance of relations *between* world cities and the shifting spatial patterns *within* world cities (Taylor, 2004).

4 The theoretical raw materials for contemporary world city research can be traced back to Friedmann and Wolff's (1982) identification of world cities as centers that control and articulate the international division of labour being created by multinational corporations[2]. World cities were thus conceptualised as the basing points in a global urban network, and specifying this network therefore relates to the identification of «cities in global matrices», as Smith and Timberlake (1995) reminded us. Related discourses focus on a «global network of cities» (King, 1990, p. 12), a «transnational urban system» (Sassen, 1994, p. 47), a «functional world city system» (Lo and Yeung, 1998, p. 10), and a «global urban network» (Short and Kim, 1999, p. 38). The contemporary outline of this global urban network thus derives from the increasingly complex spatial organization of production and distribution around the world, and this emphasis on the power position of cities naturally implies a focus on cities in the core regions of the world-economy – especially New York, London, and Tokyo (Sassen, 1991).

5 Apart from this interest in the external relations of world cities, the world city paradigm has also provided a new perspective on the apparent upturn in social polarization in a number of world cities (Mollenkopf and Castells, 1991; Marcuse and Van Kempen, 2002). Friedmann (1986), for instance, has put forward the thesis that the internal economic and social structure of a world city reflects its particular position and function in the global

urban hierarchy, while Kesteloot (2000, pp. 207-208) has contended that at least a part of the increasing post-fordist spatial polarization in Brussels can be related to its role as a world city[3]:

> «in the late 1980s and the 1990s Brussels became a divided city where processes on the labor market and on the housing market reinforce each other. Since the city is clearly a second-tier world city, the social polarization mechanisms related to the city's function in the world economy are at work.»

6 World cities can thus be conceived as critical global-local nexuses that involve two separate – albeit largely entwined – research agendas, the first focusing on the relations between world cities and the second on shifting internal socio-economic patterns.

Brussels and Antwerp as world cities: previous research

7 Within the context of this dichotomy, research on Belgium's major cities has been rather uneven. While the internal consequences of Brussels' role as a world city has been thoroughly elaborated on various occasions by Kesteloot (1994, 1995, 1999, 2000) and Swyngedouw (1999), systematic accounts of Brussels' position within the wider context of the world city network have been limited to rather general and/or qualitative contributions by Elmhorn (1998), Vandermotten (1999) and Beaverstock et al. (1999). We will briefly review these contributions in order to highlight in what respect their findings – although insightful – lack systematic representation of relations in the world city network.

8 Elmhorn's (1998, p. 81) elaboration of contemporary Brussels was primarily framed upon the unravelling of the specificity of its world city-ness, and started from the recognition that world cities «(...) come in different size, complexity and specialization. Some will be more finance and business oriented, others more politically or production oriented». In the case of Brussels, these specializations obviously emerge from its important role within the institutional context of a unified Europe. Combined with the more classic focus on the relation between producer services and world city-formation as argued by Sassen (1991, 1995), the presence of European institutions articulating the production of policy and legislation provided a firm basis for designating Brussels as a European-shaped world city:

> «(...) Brussels can be analysed as a world city on a European level, playing an important role as a control and co-ordination centre in the European economic space, both in the political and the economic domain. When applying the world city approach, the role of cities like Brussels becomes clearer in this time of increasing globalization. These cities are part of a network in the global (...) economy, between which the main economic flows move.» (Elmhorn, 1998, p. 96).

9 By addressing Brussels' role as a European-sized yet global meeting point, Elmhorn thus primarily explores the specific nature of the myriad of flows of people, capital and information that can be found in Brussels. Elmhorn's extensive analysis is thus confined to a *description* of the nature of the relations with other cities within the framework of flows of information, people and capital, while the thoroughness and the patterns of Brussels' connections in the context of a global urban network remain unclear.

10 Vandermotten (1999), for his part, has compiled an overview of Brussels position within the framework of the «international metropolitan competition», in which Brussels was identified as an international city that functions across a myriad of scales. According to Vandermotten (1999, p.18), this international context implies that Brussels' city policies

should no longer solely focus on local and regional assets, but also be centred upon the strategic positioning of Brussels as an actor in the global space-economy:

> «Aujourd'hui, les plus grandes metro poles valent par la qualité de leur insertion transnationale et transcontinentale; elles peuvent avoir plus de contacts dans la cadre de ces réseaux internationaux qu'avec certaines portions de leurs propres hinterlands territoriaux.»

11 This is indeed the crucial starting point for world city analyses, but the ensuing lists of *attributional* classifications do not offer on the patterning of Brussels' global *connections per se*. This is equally clear in the analysis of European cities offered by Rozenblat and Cicille (2003), where much perceptive information is offered on a whole range of attributional indicators, but where we remain agnostic about the relations Brussels has with other major cities around the world.

12 At a more general level, and using Saskia Sassen's (1991, 1995) argument that it is advanced producer services which are the distinctive feature of contemporary world city formation, Beaverstock *et al.* (1999) have focused on four key services (accounting, advertising, banking and law) to systematically evaluate cities as global service centres. Based on an aggregation of these results, they devised a roster of 55 world cities, divided into 10 «Alpha» world cities, 10 «Beta» world cities and 35 «Gamma» world cities, in addition to 68 cities showing evidence of world city-formation. In this study, Brussels was identified as a Beta world city, whereas Antwerp was designated as a city that exhibits minimal evidence of world city formation[4]. This assessment clearly indicates that Brussels can indeed be asserted as a second-tier world city as Kesteloot (2000) suggested, while Antwerp – although connected to the wider network – acquires only a marginal position at best. This aggregated appraisal does indeed infer a measure of connectivity for both cities, but it does not make clear what their primary linkages are.

13 The crucial point we wish to make here is that – although insightful – earlier contributions on Belgium's major cities in the world city network all share one basic feature: they do not provide a systematic account of their global *relational* patterns. It is however exactly due to their privileged location at the intersection of all that matters in global economic terms (flows of people, goods, capital and ideas) that world cities get hold of their status. The main reason for the ensuing knowledge lacuna is that hitherto the information to assess these inter-city flows has been lacking, and it is this void we wish to address in the next section.

Assessment of the world city network

14 The knowledge lacuna described in the previous section is for a large part due to difficulties pertaining to more formal specifications of the command centers of the world-economy (Short *et al.*, 1996): while it is obvious that cities like London and New York are world cities, there has hardly been a consensus as to the status of less significant cities in this context. As a consequence, world city taxonomies of cities below the Londons and New Yorks in the world economy are often reduced to somewhat vague discourses on patterns of global competence in the outer reaches of the world city network. The Globalization and World Cities Research Group and Network (GaWC, http://www.lboro.ac.uk/gawc) has been set up at Loughborough University (UK) with the express mission of encouraging and organizing standardized data collection that allows us to go beyond these very general and/or qualitative descriptions of world cities. As well

as performing the necessary task of providing a central focus for this work, GaWC is concerned to ensure that data is collected in a manner which allows precise comparisons to be made between different cities. A detailed outline of the methodology and the research pursued by GaWC can be found in Taylor (1997, 2001a) and Taylor *et al.* (2002), in this section we will summarize the main arguments to clarify how this methodology enables us to compare the global relations of Brussels and Antwerp.

Theoretical specification

15 GaWC combines Sassen's (1991, 1995) and Castells' (1996) entwined descriptions of world cities in the context of the vast multinational networks created by a number of advanced producer services. Thus the world city network is interpreted as an inter-locking network with three levels: a network level (world cities connected in the world-economy), a nodal level (the world cities) and a sub-nodal level (advanced producer services). It is at the latter level that world city network formation takes place, since it is global service firms that «inter-lock» world cities into a network of global service centres. Therefore in this argument city governments are not the prime actors in world city-formation even though their 'boosterism' policies may indeed influence relations between nodes. In the interlocking relations between cities within the world economy, the nodes (cities) themselves constitute vital enabling environs to be sure but they are not the critical level of decision making within the identified triple structure. Rather, it is advanced producer firms that perform this role; in order to carry out their business, they seek out knowledge-rich environments in which they can prosper (world cities), and through their attempts to provide a seamless service to their clients across the world they have created global networks of offices in cities around the world. Each office network thus represents a firm's global strategy for dispensing its services, which is an outcome of location decision making at the scale of the world-economy. The world city network is therefore defined as the aggregate of the many service firms pursuing a global location strategy (Taylor, 2001a).

Empirical model

16 This theoretical specification culminates in an empirical model that can be formally represented by a matrix $\mathbf{V}_{ij}$, which is defined by n cities x m firms, where $\mathbf{V}_{ij}$ is the «service value» of city i to firm j. Service value is the importance of a city to a firm's office network which depends upon the size and functions of an office or offices in a city. Table 1 presents a simple example of $\mathbf{V}_{ij}$, and gives the service values for four advanced producer firms in Antwerp, Singapore, and New York – every column denotes a firm's global strategy, and every row describes each city's mix of services.

Table 1. A simple matrix of service values.

	Advanced Producer Firm A	Advanced Producer Firm B	Advanced Producer Firm C	Advanced Producer Firm D
New York	5	4	5	3
Singapore	2	2	0	5
Antwerp	2	0	1	0

17 The data used in the subsequent analyses are derived from global service firms with offices in 15 or more different cities. Firms meeting this criterion were selected from rankings of leading firms in different service sectors. The other key criterion was purely practical – whether adequate information could be found on the firm's website. In the event 100 firms were identified in six sectors: 18 in accountancy, 15 in advertising, 23 in banking/finance, 11 in insurance, 16 in law, and 17 in management consultancy. Selecting cities was much more arbitrary and was based upon previous GaWC experience in researching global office networks. Capital cities of all but the smallest states were included plus many other important cities in larger states. Initially a total of 315 cities were selected. The data collection focussed on the size of offices (e.g. number of practitioners) and their extra-locational functions (e.g. regional headquarters). The exact nature of the information collected for each firm differed to that for every other firm. This was standardized to provide «service values» ranging from 0 to 5 as follows. The city housing a firm's headquarters was scored 5, a city with no office of that firm was scored 0. An «ordinary « or «typical» office of the firm resulted in a city scoring 2. With something missing (e.g. no partners in a law office), the score reduced to one. Particularly large offices were scored 3 and those with important extra-territorial functions (e.g. regional offices) scored 4. For this exercise we deal with just the top 123 cities in terms of global network connectivity, a variable that will be defined in the next section. Cities with lower connectivities were omitted because of the increasing sparseness of the data matrix (increasing numbers of zeros): with less firms represented in an analysis, a result becomes of course much less reliable. Thus the input upon which our findings below are based is (i) a 315 x 100 matrix $\mathbf{V}_{ij}$ to provide basic measures, and (ii) a 123 x 100 matrix $\mathbf{V}_{ij}$ to analyse for patterns; in both cases $\mathbf{V}_{ij}$ ranges from 0 to 5 (Taylor *et al.*, 2002).

Comparing the global role of Brussels and Antwerp

Global Network Connectivity

18 The advantage of a precise specification of the world city network is that techniques of network analysis can be used. Using elementary network analysis, the most basic measure of a city is its connectivity in relation to all other cities in the matrix. To compute the global network connectivity for, say, Antwerp, we first calculate the elemental interlock link $r_{Antwerp\text{-}x,j}$ link between Antwerp and city x for firm j as follows:

19 $$r_{Antwerp\text{-}x,j} = v_{Antwerp,j} \cdot v_{x,j}$$

20 Based on Table 1, the elemental interlock links for firm A are 4 for Antwerp-Singapore and 10 for Antwerp-New York. The conjecture behind using the values $\mathbf{V}_{ij}$ to compute the interlock links between cities is that the larger the office, the more connections there will be with other offices in a firm's network. This needs to be empirically investigated, here it is treated as a plausible assumption as long as large data sets are used to iron out idiosyncrasies. Aggregating these interlock links $r_{Antwerp\text{-}x,j}$ over all cities yields an estimate of firm j's contribution to Antwerp's global network connectivity:

21 $$r_{Antwerp,\,j} = \Sigma\, r_{Antwerp\text{-}x,j}$$

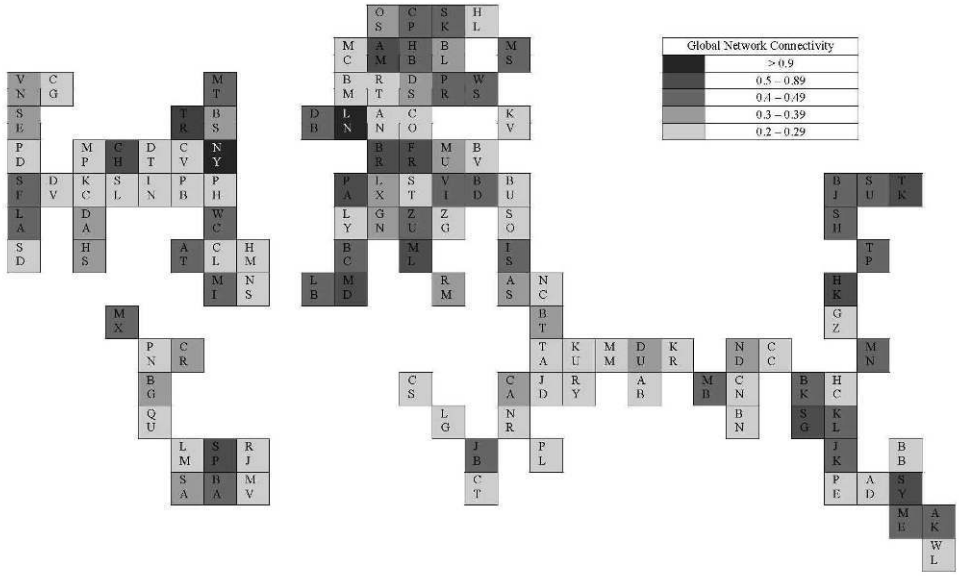
22 Based on Table 1, the contribution of firm A to Antwerp's connectivity is thus 10 + 4 = 14, for Singapore and New York this yields 14 and 20 respectively. The aggregate of these inter-lock links across all firms then produces the global network connectivity (GNC) for Antwerp:

23 $$GNC_{Antwerp} = \Sigma\, r_{Antwerp,j}$$

24 Based on Table 1, this yields 19 for Antwerp, 37 for Singapore, and 48 for New York. To make these numbers interpretable, we will express GNC's as proportions of the largest computed connectivity in the data (i.e. New York), thus creating a scale from 0 to 1. Thus New York's connectivity is 1, Singapore's is 0.77, and Antwerp's is 0.40.

25 When these GNC's are computed for all 315 cities across all 100 firms, we find that London is the most connected in the world-economy, while Brussels' GNC is 0.56 and Antwerp's is 0.24. To put these results in perspective, Figure 1 provides a diagram that shows the GNC's for all 123 cities, while Table 2 presents an excerpt of the GNC's comparable to those of Brussels and Antwerp. Brussels is ranked 15th overall, and has a GNC comparable to that of Amsterdam and Frankfurt. Clearly behind the likes of New York and London, but more connected than cities such as San Francisco and Zurich, Brussels thus fits into the second tier of world cities. Antwerp is ranked 96th, and has a global connectivity that is slightly lower but largely comparable to Stuttgart and Rotterdam, confirming its position in the outer reaches of the world city network. This ranking shows that Antwerp is less connected than cities such as Luxemburg and Minneapolis, but more connected than cities such as Manchester and San Diego. This should not necessarily be surprising, but in this case our designation is based on empirical evidence that is both comprehensive (i.e. the location strategies of 100 advanced producer firms) and rigorous (i.e. based on a theoretical specification).

Figure 1. Global connectivity of the major nodes in the world city network.



This cartogram places cities in their approximate relative geographical positions. The codes for cities are:
AB Abu Dhabi; AD Adelaide; AK Auckland; AM Amsterdam; AS Athens; AT Atlanta; AN Antwerp; BA Buenos Aires; BB Brisbane; BC Barcelona; BD Budapest; BG Bogota; BJ Beijing; BK Bangkok; BL Berlin; BM Birmingham; BN Bangalore; BR Brussels; BS Boston; BT Beirut; BU Bucharest; BV Bratislava; CA Cairo; CC Calcutta; CG Calgary; CH Chicago; CL Charlotte; CN Chennai; CO Cologne; CP Copenhagen; CR Caracas; CS Casablanca; CT Cape Town; CV Cleveland; DA Dallas; DB Dublin; DS Dusseldorf; DT Detroit; DU Dubai; DV Denver; FR Frankfurt; GN Geneva; GZ Guangzhou; HB Hamburg; HC Ho Chi Minh City; HK Hong Kong; HL Helsinki; HM Hamilton(Bermuda); HS Houston; IN Indianapolis; IS Istanbul; JB Johannesburg; JD Jeddah; JK Jakarta; KC Kansas City; KL Kuala Lumpur; KR Karachi; KU Kuwait; KV Kiev; LA Los Angeles; LB Lisbon; LG Lagos; LM Lima; LN London; LX Luxembourg; LY Lyons; MB Mumbai; MC Manchester; MD Madrid; ME Melbourne; MI Miami; ML Milan; MM Manama; MN Manila; MP Minneapolis; MS Moscow; MT Montreal; MU Munich; MV Montevideo; MX Mexico City; NC Nicosia; ND New Delhi; NR Nairobi; NS Nassau; NY New York; OS Oslo; PA Paris; PB Pittsburg; PD Portland; PE Perth; PH Philadelphia; PN Panama City; PR Prague; QU Quito; RJ Rio de Janeiro; RM Rome; RT Rotterdam; RY Riyadh; SA Santiago; SD San Diego; SE Seattle; SF San Francisco; SG Singapore; SH Shanghai; SK Stockholm; SL St Louis; SO Sofia; SP Sao Paulo; ST Stuttgart; SU Seoul; SY Sydney; TA Tel Aviv; TP Taipei; TR Toronto; VI Vienna; VN Vancouver; WC Washington DC; WL Wellington; WS Warsaw; ZG Zagreb; ZU Zurich.

Table 2. Relative global network connectivity in the world city network.

	City	Relative GNC
1	London	1
2	New York	0,98
3	Hong Kong	0,71
4	Paris	0,70
5	Tokyo	0,69
6	Singapore	0,65
7	Chicago	0,62
8	Milan	0,60
9	Los Angeles	0,60
10	Toronto	0,59
11	Madrid	0,59
12	Amsterdam	0,59
13	Sydney	0,58
14	Frankfurt	0,57
15	Brussels	0,56
16	Sao Paulo	0,54
17	San Francisco	0,51
18	Mexico City	0,49
19	Zurich	0,48
20	Taipei	0,48
...	...	...
...	...	...
95	Riyadh	0,24
96	Antwerp	0,24
97	Adelaide	0,23
...	...	...

Absolute urban hinterworlds

26 In a previous paper (Taylor, 2001b), the notion of an «urban hinterworld» was introduced as a means of describing relations between world cities. It was necessary to invent this new concept because the traditional urban geography concept of hinterland was found to be inadequate as a tool for describing the «urban influence» of world cities under conditions of contemporary globalization. Hinterlands demarcate the service area of cities and towns as local service centres but in recent decades application of IT technologies and electronic communications has enabled advanced producer firms to serve their clients through world cities across all regions of the world. For instance, a Belgian firm doing business in Australia can work through the «local» office of a global bank in Antwerp just as an Australian firm doing business in Belgium can work through the «local» office of a global bank in Sydney. In these circumstances, there are no boundaries to draw around a world city's hinterland, rather provision by its leading service firms can be to all parts of the world. One does not have to be a technology determinist to appreciate this importance of electronic communications to the rise of contemporary globalization[5].

27 However, although distance *per se* need not to be a critical factor, it may still have an indirect effect as evidenced by the strong regional patterning in global service provision (Taylor, 2004). For instance, in a previous analysis, we have argued that it is possible to discern world city arenas in geographical space, which implies that patterns of world city formation are not unfolding in some sort of abstract «service space» (Derudder *et al.*, 2003). World cities thus entail a multifaceted geography of cities that operate as service centres for global capital. Hence, as well as the commonplace notion that individual world

cities represent critical local-global nexuses, there are also urban arenas that represent regional-global nexuses within contemporary globalization. The worldwide intensity of service provision will vary from city to city, and it is this spatial variation that is captured by the concept of an urban hinterworld. As such, this global distribution of service connections allow for assessments of spatial patterns that add up to a city's overall GNC.

28 For the sake of clarity, we will limit the specification of a city's hinterworld again to the simple data set shown in Table 1. First, we count how many of our advanced producer firms have a presence in each city. When we multiply this score by 5, we get a number that represents the maximum possible service value one can expect when doing business in the other 2 cities. In Table 1, these highest levels of possible service provision are 20 for New York, 15 for Singapore, and 10 for Antwerp. Now for each city, we take other cities in turn and sum their service scores but ONLY for firms present in the original city. For instance, starting with New York, the sums for Singapore and Antwerp are 9 and 3 respectively; starting with Singapore the sums for New York and Antwerp are 12 and 2; and starting with Antwerp the sums for New York and Singapore are 10 and 2. The latter sums are expressed as proportions of the highest level of possible service in Table 3. For instance, the proportions for New York are Singapore 0.45 (= 9/20) and Antwerp 0.15 (= 3/20); for Singapore this yields 0.8 (=12/15) for New York and 0.13 (=2/15); and for Antwerp the proportions are 1.0 (=10/10) for New York and 0.2 (=2/10) for Singapore.

Table 3. Levels of servicing derived from Table 1.

	New York	Singapore	Antwerp
New York	-	0.8	1.0
Singapore	0.45	-	0.2
Antwerp	0.15	0.13	-

29 The interpretation of Table 3 is relatively simple. The columns in this table define the average level of service that can be expected in a city when visiting a global service firm in a row city. Thus, going into an office in New York to do business in Singapore the service level is 0.45, but to do business in Antwerp the level falls to 0.15. Notice that from Antwerp, doing business in New York has a 1.0 service level showing that Antwerp's two service firms in Table 1 have their headquarters in New York. In contrast, the lowest level of service in this data is a paltry 0.13 for doing business from Singapore in Antwerp. In other words, the columns represent the servicing linkages that form the basis for describing the hinterworld of a city.

30 Computed for all 123 cities and across all 100 firms, for Brussels the level of service is shown to range from 0.75 in London and 0.72 in New York to 0.11 in cities such as Zagreb and Lagos. Antwerp's hinterworld ranges from 0.79 in London and 0.75 in New York to 0.14 in cities such as Pittsburgh and Sophia. This shows that firms can expect to be serviced well for Brussels and Antwerp when their business takes them to London and New York, while they may have low expectations when their business leads them to cities such as Zagreb and Pittsburgh. The latter low scores can be traced back to the fact that

most global service firms present in Brussels and Antwerp have no presence in the likes of Pittsburgh and Zagreb. Nevertheless, there are connections within the office networks of global service firms between, say, Antwerp and Pittsburgh, revealing that the hinterworld of Antwerp is indeed worldwide.

31 A systematic description of absolute hinterworlds is very difficult, since they are thoroughly influenced by the strong hierarchical tendencies in the world city network. In Table 3, it could already be noticed that New York (Antwerp) appears with very high (low) service levels for the other two cities, which replicates the overall strength (weakness) importance of New York's (Antwerp's) position in Table 1. Thus when computed for the 100 x 123 data set, it is found that every city has its highest external provision in either London or New York, while most cities have low levels of external provision in cities like Lagos and Nicosia. In other words, external service provisions tend to closely follow the level of a city's global network connectivity, and mapping absolute hinterworlds more or less replicates the connectivity map of Figure 1 so that all hinterworlds – although not exactly the same – look very much alike. To overcome this comparative deficiency, we will calibrate the absolute hinterworlds against global network connectivity, which will allow for a more thorough description of the relations of Antwerp and Brussels in a global urban network.

Relative urban hinterworlds

32 Taking out the underlying general influence of global network connectivity from the absolute provisioning values for a city is a relatively simple task, and can be completed as follows (Taylor and Walker, 2003). A city's absolute hinterworld (AH) is regressed against overall connectivity measures (GNC) by using the simple equation[6]:

33 $AH = a + b\ GNC$

34 Calibrating this equation for any city produces an estimate of the level of service provision given a city's overall GNC. The difference between this estimate and the actual level of provision is the residual, which defines a «relative» hinterworld RH – where a city is strongly serviced and where it is weakly serviced in relation to the overall connectivities. Large positive residuals show that there is an «over-linkage» with this city, large negative residuals exemplify «under-linkages». In other words, the residuals in Figures 2-3 show where Brussels' and Antwerp's relations are notably weak or strong.

Figure 2. Brussels' relative hinterworld.

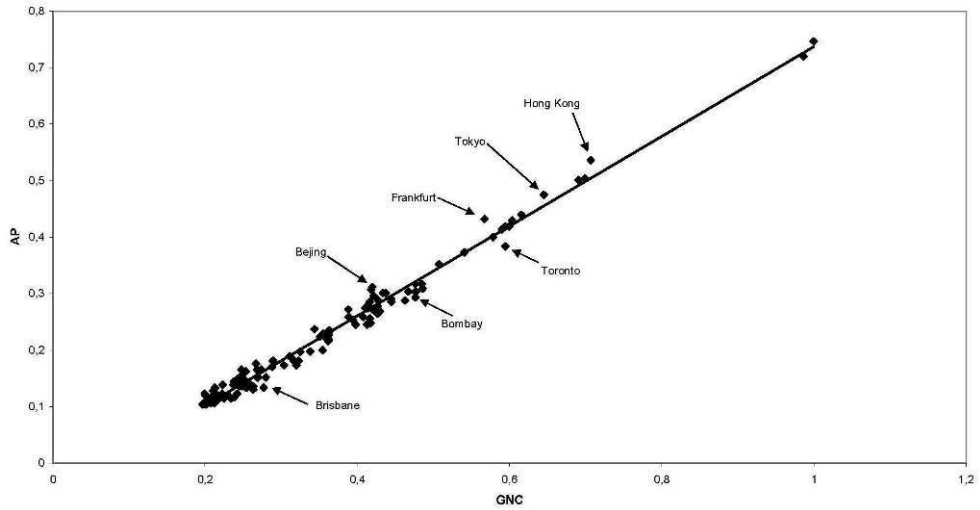
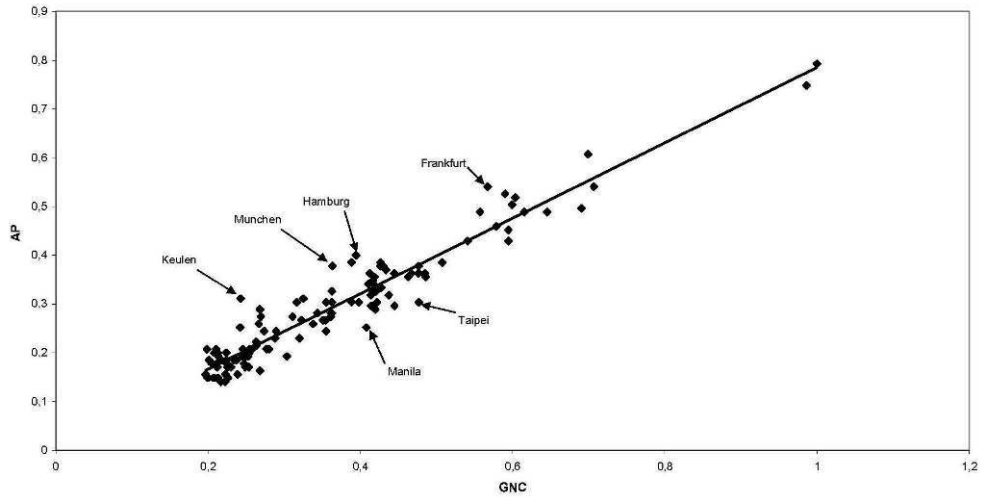


Figure 3. Antwerp's relative hinterworld.



35 Figures 4 and 5 gauge Brussels' and Antwerp's relative hinterworlds through an interval measure. The most common way to express residuals is in units of the standard error, but the use of an interval scale allows us to assert the different levels of dispersal for both cities. From the figures it can be read that Antwerp's hinterworld is far more dispersed than Brussels'. The linkages between Brussels and other major cities around the world are thus strongly related to the overall pattern of the world city network. Antwerp, on the other hand, has a significantly larger number of residuals that stretch to high values. Apart from the overall difference, the residuals are also expressed in different spatial patterns. Brussels' few residuals are in fact characterised by the lack of a spatial pattern, while Antwerp's relative hinterworld exhibits a distinct relational pattern, with residuals concentrated in Western Europe, the Pacific Rim, and – to a lesser degree – North America.

Figure 4. Brussels' hinterworld.

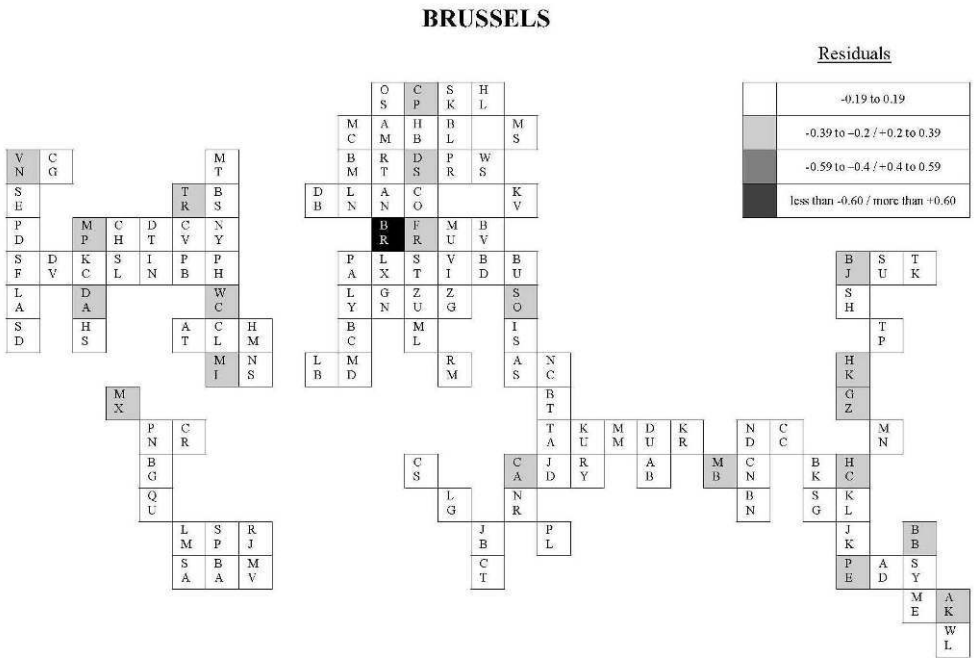
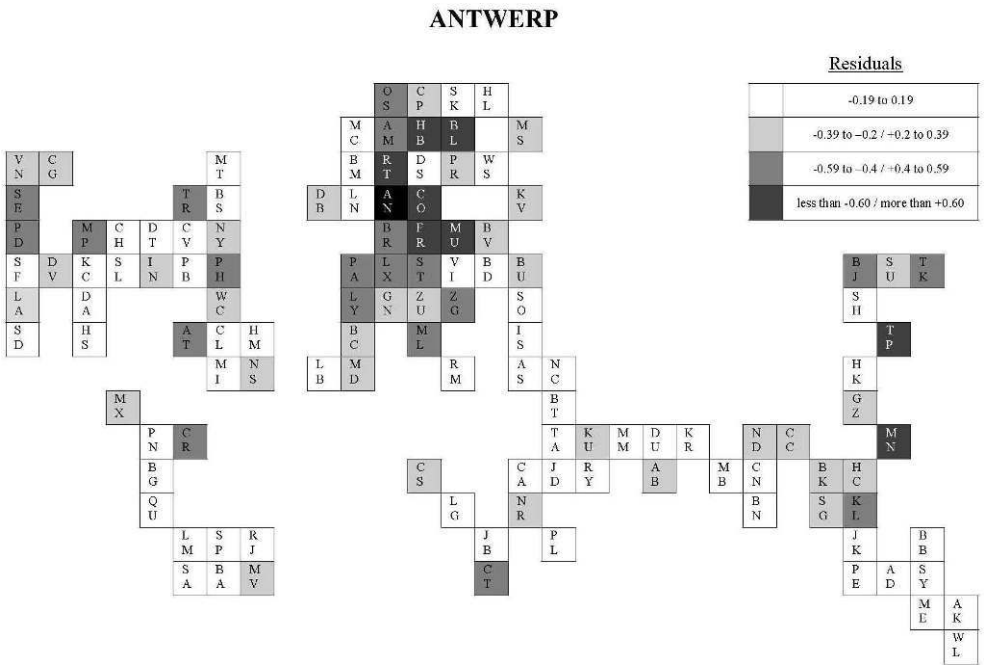


Figure 5. Antwerp's hinterworld.



36 An evaluation of the spatial patterns can be provided through an ordinal mapping of the strongest over- and under-linkages of Antwerp and Brussels, since this approach allows for comparisons irrespective of the size range of the residuals. Antwerp's over-linkages exhibit a very concentrated, «local» pattern: the ten strongest over-linkages are confined exclusively to cities in France, the Netherlands and Germany (Figure 6). Casablanca and New Delhi are the only two cities outside North America and Europe that figure among Antwerp's strongest relations. There are some relatively strong over-linkages with North

American cities, but this represents hardly a trend since these over-linkages are countered by an even larger number of under-linkages (Figure 7), especially with Seattle, Portland, Toronto and Philadelphia. Antwerp has only a limited number of under-linkages with European cities, while its weakest links can be found in East Asia (Tokyo, Taipei, Manila, Beijing and Kuala Lumpur) and scattered across Latin America, the few African cities that are connected in the world city network, and the rest of Asia.

Figure 6. Antwerp's major over-linkages.

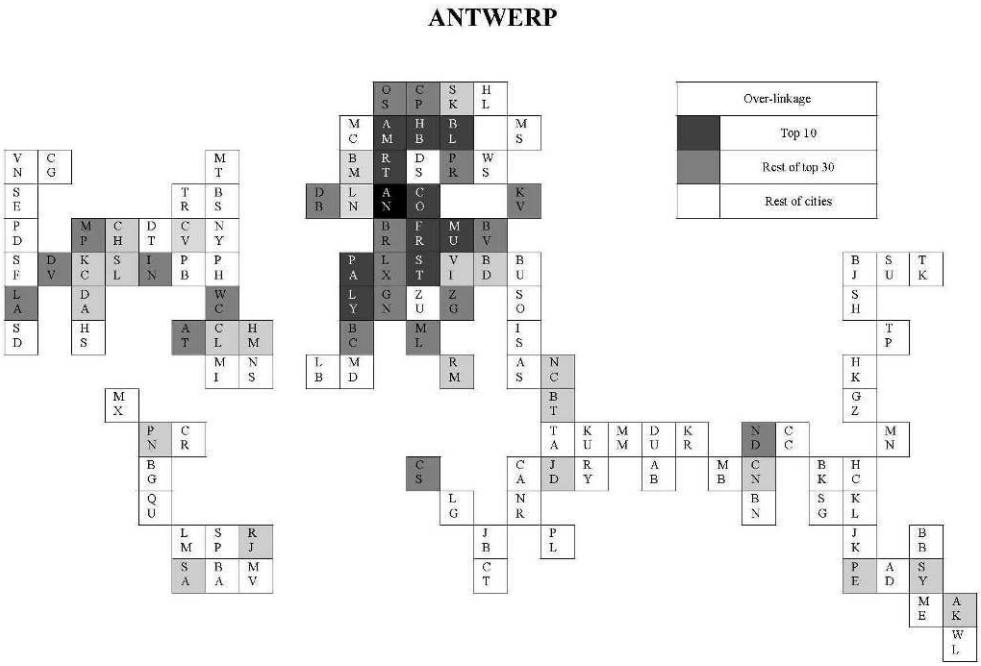
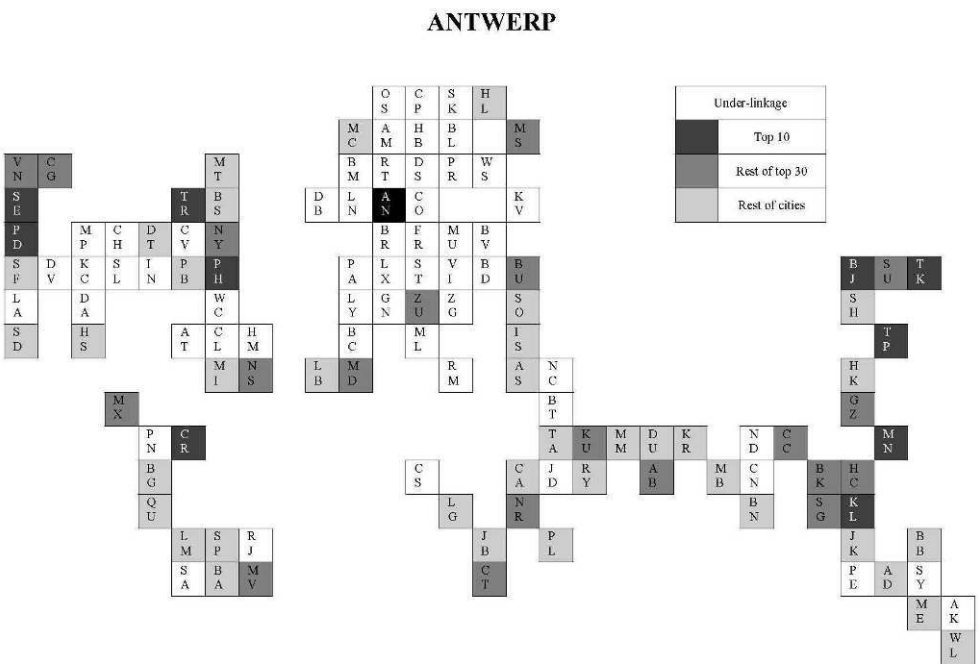


Figure 7. Antwerp's major under-linkages.



37 The ordinal mappings of Brussels' relative hinterworld (Figures 8-9) show that its strong connections are with German cities (especially Cologne, Frankfurt, Dusseldorf), important cities in the Pacific Rim (especially Beijing, Hong and Tokyo), and a number of North American cities. Apart from the general tendency to be a under-linked with Latin American and Australian cities, Brussels' hinterworld is dispersed without apparent structural regional outliers.

Figure 8. Brussels' major over-linkages.

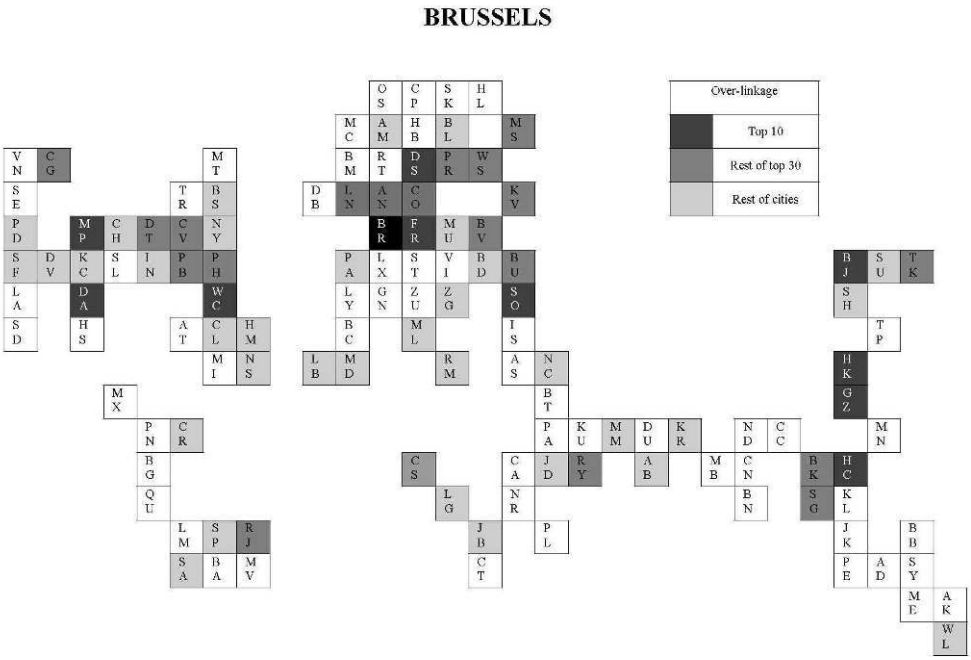
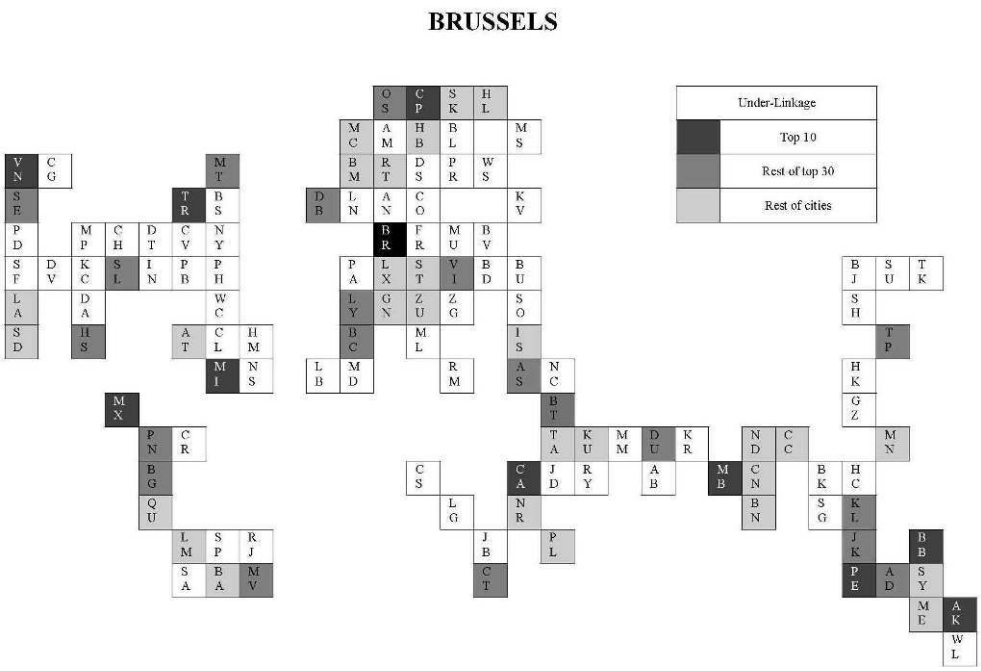


Figure 9. Brussels' major under-linkages.



38 An extremely simple yet salient conclusion that can be drawn from this overview is that Antwerp's hinterworld is characterised by dense «local» relations[7], while Brussels' hinterworld is truly «global». This can also be observed if the residuals of the ten most connected cities in the world city network are summed, which yields a positive value for Brussels and a negative value for Antwerp. This reiterates that on average Brussels is over-connected and Antwerp is under-connected with the major world cities across the globe. In other words, apart from being more thoroughly connected in the world city network, it is clear that Brussels' relations are also far more «global» than Antwerp's relations[8].

Conclusion

39 In this paper, we have tried to show how the empirical gap in De Lannoy and De Corte's (2000) section on «cities in networks» may be filled. Based on a more precise theoretical specification of the world city network and the development of the concept «urban hinterworld', we have presented an exploratory comparison of the relational patterns of Antwerp and Brussels. The two most salient points that emerged from this assessment are the observations that (i) Brussels is more strongly connected than Antwerp in the world city network, while (ii) at the same time Brussels' «global» relations contrast with Antwerp's more intense «local» relations (see also Taylor, 2002).

40 Obviously, there is a lot of extra work to do to make sense of the detailed spatial patterns presented in Figures 6-9, and the results of this empirical analysis should therefore be theoretically contextualized. It is thus important to point out that we have by no means «explained» spatial patterns; we have merely offered a description that may serve as the starting point for theoretical elaborations. Furthermore, the patterns we have described are only the tip of the proverbial knowledge iceberg for understanding Brussels' and Antwerp's place in the contemporary world. In Castells' (1996) conception of the space of flows underpinning the *Rise of the Network Society,* he identifies three «layers» of space, of which the world city network is just one part of the middle layer. In other words, the contemporary global space of flows is an incredibly complex mixture of chains, circuits, hierarchies and networks of all manner of flows simultaneously criss-crossing the world in all directions. Even if we restrict our concern to only the nodes that are world cities, it is self-evidently that these great cities are much more than global service centers.

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NOTES

1. There is of course a little irony in devoting this paper to «Belgium's major cities», since our most salient starting point asserts that a relational assessment of Brussels and Antwerp should not depart from a national framework. As such, Brussels and Antwerp are important cities *located* in Belgium, but their importance is not necessarily derived from their national setting.

2. Friedmann and Wolff (1982) and Friedmann (1986) asserted world cities in a *new* international division of labour, but it can be argued cities have been playing key roles in organizing space beyond their own national boundaries ever since the evolution of a world-system in the sixteenth century (Taylor, 1995; 1997). Today's complexity in the relations between world cities is thus to a large degree the result of the unfolding of the capitalist world-system before 1970, that is to say of patterns and processes that long pre-date a medium term analysis. In these first stages of world-system growth, the key roles for world cities involved the organization of trade and the execution of colonial, imperial, and geopolitical strategies. Today, the key roles of world cities are concerned less with the deployment of imperial power and the orchestration of trade and more with transnational corporate organization, international banking and finance, supranational government, and the work of international agencies (Knox, 2002).

3. To be sure, Brussels was already a divided city well before the late eighties, but the salient point in Kesteloot's analyses is that more recent waves of gentrification processes are specifically tied to the influx of global capital. As such, post-Fordist polarization adds another layer of complexity to Brussels as a gentrified city.

4. Since Brussels and Antwerp are the only two Belgian cities that figure among the cities that show at least minimal evidence of world city formation, our systematic assertion will solely focus on these two cities.

5. We do not wish to suggest that hinterworlds have replaced hinterlands; local newspapers continue to operate in their local catchment areas and rural people still shop in the local town. Globalization processes do not supplant existing processes, they add a further dimension to them: new practices operating alongside, and interacting with, old practices.
6. Scatter diagrams of global network connectivity against a city's external provisioning levels show a strong positive *linear* relationship in every case, e.g. for Brussels this yields an $R^2 = 0.98$ and Antwerp an R^2 of 0.92.
7. If we had expressed the residuals in terms of standard errors, this contrast would of course not have been clear.
8. This replicates previous findings comparing the hinterworlds of Amsterdam and Rotterdam (Taylor, 2002).

ABSTRACTS

The paper has two purposes: (i) to outline a methodology for systematically measuring economic relations between the world's major cities and (ii) to provide a general assessment of the position of Belgium's major cities in this global urban network. In the first section, we stress that research on Brussels and Antwerp under conditions of contemporary globalization lacks a systematic account of their global relational patterns, a knowledge lacuna that can at least partly be traced back to the dearth of suitable data. In a second section, we outline the methodology for measuring the networked context of the world's major cities. In a third section, we provide a systematic overview of Antwerp's and Brussels' position in this global urban network. Apart from the rather common sensical observation that Brussels is more strongly connected than Antwerp, it is also shown that Brussels' «global» relations contrast with Antwerp's more intense «local» relations. In relative terms, Brussels is strongly connected to East Asia and North America, while the most thorough links of Antwerp are exclusively with nearby European (especially German) cities.

Deze bijdrage heeft twee doelstellingen: (i) het beschrijven van een methodologie die toelaat om de economische relaties tussen steden te meten, en (ii) een algemene analyse van de twee belangrijkste Belgische steden gebaseerd op deze methodologie. In een eerste deel wordt geargumenteerd dat in het bestaande onderzoek over Antwerpen en Brussel een systematische analyse van hun mondiale relationele patronen ontbreekt. In een tweede deel wordt de methodologie uiteengezet die toelaat om economische relaties tussen steden in te schatten. In een derde deel, ten slotte, geven we een overzicht van de voornaamste conclusies over de positie van Brussel en Antwerpen in dit mondiale stedennetwerk. Naast de voor de hand liggende vaststelling dat Brussel sterker geconnecteerd is dan Antwerpen, kan ook vastgesteld worden dat Brussel een echte wereldstad is in de zin dat de connecties «globaal» zijn, terwijl de belangrijkste relaties van Antwerpen eerder «lokaal» georiënteerd zijn. Brussel is bijvoorbeeld sterk geconnecteerd met Pacifisch Azië en Noord-Amerika, terwijl de belangrijkste relaties van Antwerpen die zijn met naburige Europese (vooral Duitse) steden.

INDEX

Keywords: world city network, hinterworld, service industries, globalization
motsclesnl wereldstedennetwerk, hinterwereld, dienstenfirma's, mondialisering

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