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PAPER

Beyond Size: The Rise in Power of the Transaction Sector in India Post-Liberalization

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Abstract The macro literature on transaction costs has hitherto focused only on the input side while assessing the importance of the transaction sector. This ignores the nature of services provided by the sector to facilitate exchange in the economy. We use the tools of Social Network Analysis as well as Indian Input-Output tables to examine the magnitude, direction (both input as well as output), and network structure of the pattern of resource exchanges between the transaction sector and the rest of the Indian economy in the post-liberalization era. We find that although resource use by the transaction sector is increasing over time, the sector is relatively isolated from the rest of the economy on the input side, indicating a lack of importance from a network perspective. In contrast, the transaction sector is highly integrated with the rest of the economy on the output side. Further, there is a high level of dependence of other sectors on the transaction sector to conduct resource exchanges. Increasing network density is accompanied by a simultaneous decentralization of the economy, supported by the rise in importance of the transaction sector on the output side.

Keywords Transaction sector - Liberalization - Social network analysis

JEL Classification C67 - D23 - D57 - E01

1. Introduction

Wallis & North (1986, pg.95) observed that transaction costs i.e. the costs of making exchanges have assumed an important role in explaining the structure of market and non-market forms of economic organization. They made the first attempt to quantify transaction costs at the macroeconomic level by focusing on the sum of resources used by economic actors associated primarily with making exchanges i.e. transacting.

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This sum of resources is their estimate of the transaction sector in the economy. In doing so, they shed light on a hitherto unexamined aspect of structural transformation in the US economy i.e. the steady increase in transaction costs over time, as measured by the increase in the size of the transaction sector as a proportion of GDP. The growing size of the transaction sector as a proportion of GDP can be explained in terms of the greater division of labor that accompanies economic development, giving rise to more exchange and hence requiring more resources to be spent on transacting (Wang 2007). Further, during the development process, hitherto non-market transactions start occurring through the market, thus reinforcing the need for greater resources to be spent on transacting (Chobanov & Egbert 2007).

Although the methodology of Wallis & North (WN hereafter) did not go unchallenged (see Davis 1986 for a critique), their seminal paper was followed by a burgeoning literature that has measured the size of the transaction sector at the macroeconomic level for different countries over different periods of time (see Wang 2007 for a survey). In all the countries analyzed, the size of the transaction sector as a proportion of GDP was found to be large and increasing over time, reflecting an increase in transaction costs over time (see Table 1).

Table 1 Some estimates of the size of the transaction sector

Paper	Country	Start year	Fraction of GDP	End year	Fraction of GDP
Wallis & North (1986)	USA	1870	25%	1970	54%
Dollery & Leong (1998)	Australia	1911	32%	1991	60%
Ghertman (1998)	USA	1960	55%	1990	62%
	Japan	1960	40%	1990	56%
	Germany	1960	38%	1990	52%
	France	1960	34%	1990	63%
Dagnino-Pastore & Farina (1999)	Argentina	1930	25%	1990	35%
Chobanov & Egbert (2007)	Bulgaria	1997	37%	2003	53%

Note: Adapted from Datta et al 2011

WN and the subsequent literature measured the importance of the transaction sector in the economy by looking at its size in terms of resources used by the sector. However, this approach looks only at the input side, ignoring the services provided by the transaction sector to the rest of the economy to facilitate exchange in the economy. Given the role of the transaction sector as a facilitator of exchange, any measure of importance of the sector must take simultaneous cognizance of both the input side as well as the output side. We argue that a comprehensive measure of importance of the transaction sector should examine both the magnitude and direction (both input as well as output) of its resource exchanges, as well as the position occupied by it in the network structure of the economy.

Social Network Analysis (SNA) provides such a comprehensive approach to assessing

importance in terms of "power" of the sector, where power is measured using the SNA concepts of centrality, betweenness, and closeness (see for example Borgatti & Everett 1992; Borgatti & Foster 2003; Brass 1992; Brass & Burkhardt 1993; Iyengar et al 2012). The centrality of the transaction sector measures the number and strength of direct ties (resource exchanges) between this and the rest of the economy. Betweenness is a measure of the extent to which the rest of the economy depends on the transaction sector to conduct exchanges by virtue of its intermediation of the commodity exchanges in the rest of the economy. Closeness is a measure of the strength of indirect ties between the transaction sector and the rest of the economy (Brass 1992).

By focusing simultaneously on magnitude, direction (both input use as well as output supply), and network structure of the pattern of resource exchanges between sectors, the SNA conceptualization of importance of a sector in terms of power confers two benefits. First, it allows us to see whether the results of WN and their followers on the importance of the transaction sector are robust to an alternate conceptualization of importance. Second, it allows us to get at the fundamental issue of how the manner in which the transaction sector performs its primary function of facilitating exchange in the economy, affects both itself and the economy as a whole. The latter issue has hitherto been ignored in the literature, but is important to explore if we are to understand how the structure of market and non-market forms of economic organizations evolve in an attempt to minimize transaction costs (which the literature has already shown to be large and increasing through time). To these ends, we apply the tools of SNA to Input-Output tables (I-O tables hereafter) for post-liberalization India to examine (1) resource use as well as resource supply patterns for the transaction sector, (2) the direction and magnitude of both direct and indirect linkages between the transaction sector and the rest of the economy, and (3) the network structure of the economy as well as the position in the network occupied by the transaction sector.

We focus on post-liberalization India for our analysis. Prior to the 1970s, the Indian economy was one of the most heavily regulated and protected economies in the world, characterized by the infamous "license-permit-quota raj" and with a substantial informal sector (Kotwal et al 2011). This regime had four pillars of control, all of which were substantially eased in the 1991 reforms: (1) tariff and non-tariff barriers to imports, (2) restrictions on both domestic and foreign private investment, (3) state control of banking and insurance, and (4) public sector monopolies (Kotwal et al 2011). With the retreat of the state from the commanding heights of the economy and increased scope for private sector participation in the economy, the post-liberalization period was accompanied by increased marketization and formalization of transactions, the concomitant increased division of labor and specialization, and increased integration with the rest of the world. This period therefore provides an ideal testing ground for an analysis of how the manner in which the transaction sector performs its primary function of facilitating exchange in the economy, affects both itself and the economy at large.

We find that although resource use in the transaction sector is increasing over time, the sector is relatively isolated from the rest of the economy on the input side, indicating a lack of importance from a network perspective on the input side. In contrast, the

transaction sector is highly integrated with the rest of the economy on the output side. Thus, results of WN and their followers on the importance of the transaction sector are robust to an alternate conceptualization of importance, although importance is now on the output side, not the input side as originally conceived by WN.

Further, there is a high level of dependence of other sectors on the transaction sector to conduct resource exchanges. Increasing network density of the economy as a whole is accompanied by a simultaneous decentralization of the economy, supported by the rise in importance of the transaction sector on the output side. Thus, the manner in which the transaction sector performs its primary function of facilitating exchange in the economy, affects both itself and the economy at large. The rest of the paper is organized as follows. SNA concepts of power and their application to the transaction sector are reviewed in Section 2. Section 3 describes the data and discusses the results, and Section 4 concludes.

2. SNA and the transaction sector

The concept of power was first enunciated by Emerson (1962). Emerson describes power as the ability of a person (actor) to control or exert influence on others. Emerson also clarifies that power is a property of a social relation rather than an attribute of an actor. In effect, this means that in order to measure power, we would have to look into the overall network structure to gauge the relative powers of the various actors making up the network.

SNA is useful to measure power in the context of a network as a whole, given that there are relationships and interdependence between actors in the network (Borgatti & Foster 2003; Brass 1984; Casciaro & Piskorski 2005; Pfeffer 1981). Central actors are more powerful than peripheral actors in a network due to their higher levels of access to information and resources (Casciaro & Piskorski 2005). In an organization context for example, centrality of employees was found to be positively associated with power (Brass 1984, 1985; Burkhardt & Brass 1990; Fombrun 1983, 1986).

SNA associates centrality with three different aspects of power: alternatives, access, and control (Brass and Burkhardt 1993). An actor with more opportunities and alternatives for information and resources has more power in the network. Degree centrality measures alternatives by the number of actors who connect directly with the focal actor. An actor with greater access to the network i.e. better able to reach other actors or more reachable by other actors, has more power. Closeness centrality measures access by summing the lengths of the shortest paths from a focal actor to all other actors in a network, thus accounting for both direct and indirect links between actors (Brass 1984; Freeman 1979; Freeman et al 1980). Control refers to the ability of an actor to facilitate or prevent exchanges between other actors. Betweenness centrality measures control by computing "the extent to which a focal person falls between pairs of other persons on the shortest path connecting the pairs." (Brass and Burkhardt 1993, pg. 446) Degree and closeness centrality can be analyzed separately for incoming and outgoing links between actors. An independent analysis of incoming and outgoing connections helps test whether these connections are equal or not in terms of the three aspects of

power.

An I-O table is a representation of an economy as a matrix of commodity flows between industries. It shows inter-industry transactions in value terms at factor cost. We use commodity by industry I-O tables, where the columns represent the industries and the rows represent the groups of commodities which are the principal products of the corresponding industries. Rows depict supply of commodities to the different industries for intermediate consumption and final use. Columns depict commodity inputs of raw materials and services that have resulted in the outputs of the particular industries[1] (CSO 1997). An I-O table therefore provides a network representation of an economy, where industries are actors, and ties between actors are resource exchanges between industries. Strength of a tie between two industries is measured by the value added by the inputting industry to the receiving industry (Iyengar et al 2011). Value added by one industry to another is given by , where is value added by industry i to industry n, is output from industry i to industry n, is input used by industry i from industry t.

Following the literature, we consider the following industries to comprise the transaction sector: Communication, Trade, Banking, Insurance, and Other Services[2]. The degree centrality of the transaction sector can be measured by the number and strength of direct ties between this and the rest of the economy. The greater the extent of division of labor and specialization in the economy, the greater will be the number of industries that will have need of transaction services, and the greater will be the need of transaction services by any given industry. This will necessitate an increase in the number and strength of ties between transaction sector and the rest of the economy, thus increasing the degree centrality of the transaction sector. We measure degree centrality following Freeman (1979) as where is the value added by the output of the producing industry i when sold to the consuming industry j.

Closeness is a measure of the strength of indirect ties between the transaction sector and the rest of the economy. An indirect tie exists if there is a commodity exchange between the transaction sector and another industry via a third industry. Closeness centrality is measured by , where is the geodesic distance between the focal industry i and all other industries j. Closeness centrality thus helps check whether an actor is central only in a particular neighborhood of the network or is central to the network as a whole (Borgatti & Li 2009). The nature of the services provided by the transaction sector implies that as division of labor and specialization increases in the economy, the sector will become more central to the economy as a whole rather than only to some subset of the economy, thus implying increasing closeness centrality of the transaction sector.

Betweenness is a measure of the extent to which other industries depend on the transaction sector to conduct exchanges. As the transaction sector facilitates exchanges between different industries, commodity exchanges between different industries must

1 For further information on construction of I-O tables in India, see CSO's website at http://mospi.nic.in/Mospi_New/site/inner.aspx?status=2&menu_id=92.

2 Other Services includes public administration, business services, computer and related activities, legal services, real estate activities, information and broadcasting, renting of machinery and equipment, recreation and entertainment, and other communication, social and personal services.

necessarily be accompanied by the simultaneous purchase of transaction services by these industries from the transaction sector. The transaction sector therefore occupies a position "between" other industries because of its intermediation of the commodity exchanges between these industries. Thus, the greater the extent of division of labor and specialization, the greater is the betweenness of the transaction sector. Betweenness centrality is measured as , where is the geodesic distance between actors i and j passing through focal actor k, and is geodesic distance between actors i and j.

3. Data and results

This study limits its focus to the commodity exchange relationships within the Indian economy during the post-liberalization period. The main source of data are the I-O tables for the years 1993-94, 1998-99, 2003-04, and 2006-07, compiled by the Central Statistical Organization (CSO) of the Government of India. These are the only tables available for the post-liberalization period. The specific industries used in the analysis are given in Table A1 in the Appendix.

The I-O tables from 1993-94 through 2006-07 give us fourteen years' worth of data for the post-liberalization period. As new sectors emerged in the Indian economy during this period, it became necessary to aggregate / disaggregate industries so that all I-O tables used were of identical size i.e. 111x111. Also, all prices were adjusted for inflation using Nation Master's GDP deflator index, so as to make them consistent with 1999-2000 price levels. We used the UCINET 6 (Borgatti et al 2002) software program, a popular SNA tool, to compute the various power metrics reported below.

Recall that the main issues this paper deals with are: (1) resource use as well as resource supply patterns for the transaction sector, (2) the direction and magnitude of both direct and indirect linkages between the transaction sector and the rest of the economy, and (3) the network structure of the economy as well as the position in the network occupied by the transaction sector. We first discuss resource use patterns, using the notion of degree centrality. Table 2 shows the ranks of the constituent industries of the transaction sector[3] in weighted and unweighted indegree centrality, and Figure 1 depicts the corresponding raw scores. Weighted measures of centrality use quantum of value addition between industries. Unweighted measures of centrality replace quantum of value addition with an indicator variable taking the value 1 if value addition occurs between industries and 0 otherwise. Thus, weighted indegree centrality figure for each industry shows the resource use by that industry. Unweighted indegree centrality figure for each industry shows the number of other industries from which the particular industry has drawn resources.

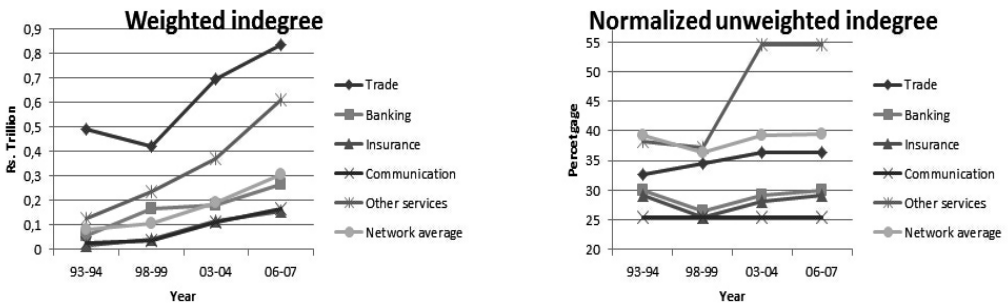
Table 2 Transaction sector weighted and unweighted indegree centrality ranks

3 Recall that the transaction sector includes Communication, Trade, Banking, Insurance, and Other Services.

Sector	Weighted indegree centrality ranks				Unweighted indegree centrality ranks			
	1993-94	1998-99	2003-04	2006-07	1993-94	1998-99	2003-04	2006-07
Trade	3	4	7	8	80	71	68	69
Banking	47	19	35	36	82	83	84	83
Insurance	84	58	48	51	83	84	85	85
Other Services	21	12	12	11	69	61	14	14

Figure 1 Indegree centrality of the transaction sector

Note that the Trade, Banking, and the Other Services industries have always been in the



top half of the weighted indegree centrality rankings, and also have centrality values higher than the network average (see Figure 1), while the Communication and Insurance industries began in the bottom half of the rankings, but entered the top half by 2003-04 (see Figure 1). Further, all constituent industries of the transaction sector except Trade have experienced significant increases in their weighted indegree centrality rankings from 1993-94 to 2006-07 (see Figure 1). Thus, resource use in the transaction sector is both relatively large (since most constituent industries appear in the top half of the rankings) as well as increasing over time, thus appearing to reinforce the findings of WN and their followers regarding the importance of the transaction sector insofar as resource use is considered. However, we will show that from a network perspective, the transaction sector is relatively isolated from the rest of the economy, and thus less important on the input side. Recall that the unweighted indegree centrality figure for each industry shows the number of other industries from which it has drawn resources. Note that in contrast to the weighted degree centrality results, the ranks of all constituent industries of the transaction sector except Other Services have always been in the bottom half of the unweighted indegree centrality rankings, and also have centrality values lower than the network average (see Figure 1). This implies that although the transaction sector may use a relatively large amount of resources, it does so from a relatively small

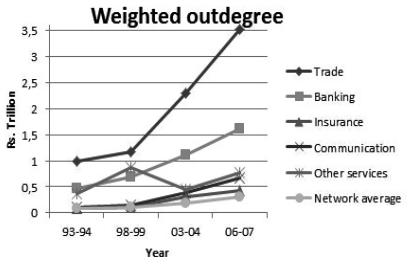
number of industries. Therefore, from a network perspective, the transaction sector appears to have relatively low power on the input side since it has fewer alternative ways to satisfy its resource needs (Wasserman & Faust 1994). Further, the sector[4] does not appear to be central to the network since its constituent industries do not have access to many other industries, and consequently are unable to leverage more of the collective resources of the network (Borgatti et al 2002), indicating a relative isolation from the rest of the economy. The role of the transaction sector is to facilitate transactions in the economy, which can be done only if the sector supplies its transaction services to the rest of the economy. Therefore, we argue that the importance of the transaction sector should not be evaluated based on input side measurements, as has been done by WN and their followers, but rather on the basis of the nature and quantity of services the sector supplies to the rest of the economy i.e. on the output side. The SNA approach allows us to do this by examining the power of the transaction sector in terms of resource supply to the rest of the economy. Table 3 shows the ranks of the transaction sector in weighted and unweighted outdegree centrality, and Figure 2 depicts the corresponding raw scores. The weighted outdegree centrality figure for each constituent industry of the transaction sector shows the resource supply to the rest of the economy by that sector. Note that all constituent industries have continuously been in the top half of the weighted outdegree centrality rankings since 1993-94, and also have centrality values higher than the network average (see Figure 2). It is clear from Table 3 that resource supply from the transaction sector is relatively large compared to that of other industries of the economy. Clearly, the transaction sector plays a relatively more prominent role in resource supply than in resource use, since rankings are higher across the board in weighted outdegree centrality than in weighted indegree centrality.

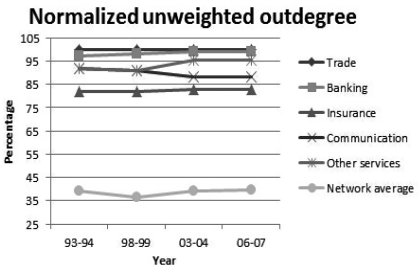
Table 3 Transaction sector weighted and unweighted outdegree centrality ranks

Sector	Weighted outdegree centrality ranks				Unweighted outdegree centrality ranks			
	1993-94	1998-99	2003-04	2006-07	1993-94	1998-99	2003-04	2006-07
Trade	1	1	1	1	1	1	1	1
Banking	4	5	5	5	4	4	4	4
Insurance	28	31	15	21	16	16	14	14
Communication	23	21	13	12	7	8	12	12
Other Services	6	2	10	11	7	8	7	7

Figure 2 Outdegree centrality of the transaction sector

4 Note however, that the Other Services sector has dramatically increased in power from 2003-04 onwards. Recall that Other Services sector includes real estate, information & broadcasting, and recreation & entertainment; all of which grew rapidly in the post-liberalization era (see Footnote 5).





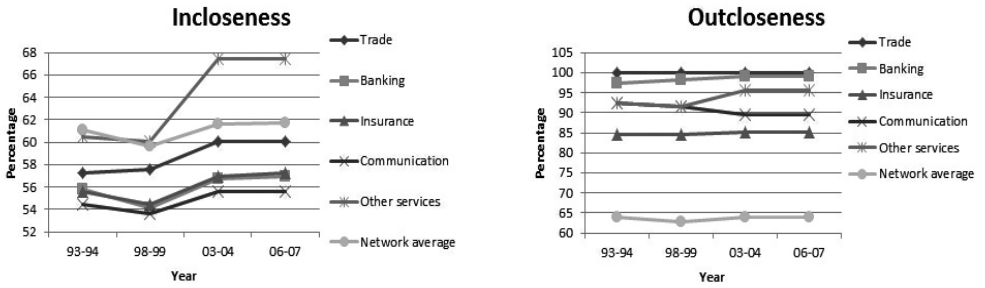
The unweighted outdegree centrality figure for each industry shows the number of other industries to which it supplies resources. Note that unlike in the case of indegree centrality, the ranks of the constituent industries of the transaction sector are high, and not significantly different for weighted and unweighted outdegree centrality. This means that, not only does the transaction sector supply a relatively large amount of resources to the rest of the economy, it does so to a relatively large number of other industries. Therefore, the transaction sector appears to have relatively more power and appears to be more central to the network on the output side than on the input side.

Table 4 shows the ranks of the constituent industries of the transaction sector in normalized incloseness and normalized outcloseness centrality, and Figure 3 depicts the corresponding raw scores. Recall that closeness centrality takes into account the indirect ties of an industry to all other industries in the economy. This is useful since it can identify situations where one industry might be connected directly to a large number of other industries i.e. high degree centrality, but those other industries are relatively disconnected from the network as a whole. In this case, the particular industry could be isolated in the context of the economy as a whole i.e. low closeness centrality (Borgatti & Li 2009). Higher ranks of closeness centrality indicate relatively higher levels of integration with the rest of the economy.

Table 4 Transaction sector incloseness and outcloseness centrality ranks

Sector	Incloseness centrality ranks				Outcloseness centrality ranks			
	1993-94	1998-99	2003-04	2006-07	1993-94	1998-99	2003-04	2006-07
Trade	82	75	69	70	1	1	1	1
Banking	83	94	92	87	4	4	4	4
Communication	91	97	96	98	7	8	12	12
Other Services	71	56	17	17	7	8	7	7

Figure 3 Closeness centrality of the transaction sector



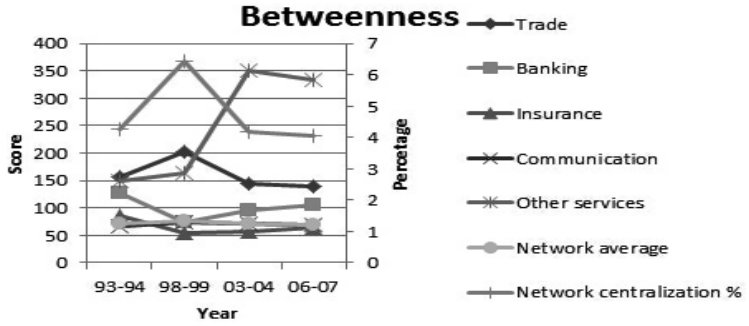
Note that the constituent industries of the transaction sector have relatively low incloseness centrality ranks, and also have centrality values lower than the network average, (see Figure 3), indicating that they are relatively isolated from the rest of the economy on the resource use side. However, the exact opposite is true on the resource supply side. This reinforces our earlier degree centrality results (see Tables 2 and 3) that the transaction sector appears to have relatively less power and appears to be less central to the network on the input side, while the opposite is true on the output side. Therefore, the true importance of the transaction sector, both from a resource as well as form a network perspective, must arise, and therefore be demonstrated primarily on the output side. Table 5 shows the betweenness centrality ranks of the constituent industries of the transaction sector, and Figure 4 shows the corresponding raw scores. Higher betweenness centrality implies a higher probability that a particular industry lies along the resource transfer chain connecting any two other industries. The function of transaction sector is to facilitate transactions between all sectors of the economy – therefore, the constituent industries of this sector should be more likely to occupy a position along the resource transfer chain connecting any two other industries, and therefore have relatively high betweenness centrality. As expected, all constituent industries of the transaction sector appear in the top half of the betweenness centrality rankings, and also have centrality values higher than the network average[5] (see Figure 4), indicating the high dependence of other industries of the economy on the transaction sector to facilitate exchange.

Table 5 Transaction sector betweenness centrality ranks

Sector	Betweenness centrality ranks			
	1993-94	1998-99	2003-04	2006-07
Trade	16	13	17	17
Banking	20	31	30	26
Insurance	31	40	43	43
Communication	38	32	38	40
Other Services	18	16	2	2

5 Except the Insurance sector.

Figure 4 Betweenness centrality of the transaction sector



Note the spectacular improvement in the betweenness centrality ranking of the Other Services industry over the period 1993-94 to 2006-07. This period was marked by the rapid growth of the Real Estate, Information & Broadcasting, and Recreation & Entertainment sectors, all of which are constituents of the Other Services industry[6]. Not only was the Other Services industry already strongly connected with the rest of the economy on the resource supply side (see Table 3), they rapidly added links to the rest of the economy on the input use side (see Table 2) – therefore, its betweenness centrality increased dramatically. Finally, we discuss the evolution of the network structure of the Indian economy in the post-liberalization era, in terms of changes in the economy's network density. Network density is the ratio of the number of pairs of industries that exchange resources to the total number of pairs of industries in the economy. Higher network density implies that a greater fraction of possible resource exchanges between industries are being realized. We find that network density of the Indian economy has changed significantly (at the 10% level) for each year for which data is available from 1993-94 through 2006-07. In particular, network density has increased continuously from 1998-99 to 2006-07 (see Table 6).

Table 6 Network density of the Indian economy

Year	Network density
1993-94	0.39
1998-99	0.36
2003-04	0.39
2006-07	0.40

Although network density increased from 1998-99 to 2006-07, network centralization

6 We test for the presence of an unknown structural break in the series of Net Domestic Product (NDP) at constant 2004-05 prices for the sector Real Estate, Ownership of Dwellings and Business Services, using the average of the generated F statistics ala Andrews and Ploberger (1994). We find one structural break in the series at 1991, with faster growth of sectoral NDP post break (the average value of F is 73.38 and the Hansen (1997) approximate asymptotic p value of the test is less than 2.2e-16 (all calculations done using strucchange package in R). Data for this analysis was drawn from Ministry of Statistics and Programme Implementation of Government of India (results available on request).

has decreased over the same period (see Figure 4). This means that the Indian economy has become more decentralized even though the number of resource exchange links between industries has increased. The rise of the transaction sector has therefore facilitated more and deeper resource exchanges between industries of the economy, while at the same time permitting greater decentralization of the economy; which is precisely what we would expect given the nature of the services provided by the transaction sector.

4. Summary and conclusion

We used the tools of Social Network Analysis as well as Indian Input-Output tables to examine the magnitude, direction (both input as well as output), and network structure of the pattern of resource exchanges between the transaction and other sectors of the economy. This allowed us to see whether the results of the macro literature in transaction costs on the importance of the transaction sector are robust to an alternate conceptualization of importance. Further, it allows us to get at the fundamental issue of how the manner in which the transaction sector performs its primary function of facilitating exchange in the economy, affects both itself and the economy at large. We find that on the input side, resource use in the transaction sector is both relatively large as well as increasing over time (as measured by weighted degree centrality), thus appearing to reinforce the findings of the macro literature on transaction costs regarding the importance of the transaction sector. However, the sector scores low on unweighted degree centrality and closeness centrality on the input side, indicating relatively few direct and relatively weak indirect ties with, and hence relative isolation from, the rest of the economy. Therefore, the transaction sector cannot be considered important from a network perspective if we consider just the input side. We argue however that importance of the transaction sector should not be evaluated on the input side but from the nature and quantity of services it supplies to the rest of the economy i.e. on the output side. We find that resource supply from the sector is relatively large (as measured by weighted degree centrality). The sector also scores high on unweighted degree centrality and closeness centrality on the output side, indicating many direct and relatively strong indirect ties with, and hence a high level of integration with the rest of the economy. Therefore, the true importance of the transaction sector, both from a resource as well as a network perspective, must arise primarily on the output side. Thus, results of WN and their followers on the importance of the transaction sector are robust to an alternate conceptualization of importance, although importance is now on the output side, not the input side as originally conceived by WN.

Examining the input and output sides simultaneously, the transaction sector scores high on betweenness centrality, indicating that the rest of the economy depends heavily on the transaction sector to conduct exchanges. The strong impact of the rise of this sector on the economy is borne out by the fact that although network density of the economy increased from 1998-99 through 2006-07, network centralization decreased over the same period. Thus, the rise in importance of the transaction sector facilitated

more and deeper resource exchanges between all industries of the economy, while at the same time permitting greater decentralization of the economy. Thus, the manner in which the transaction sector performs its primary function of facilitating exchange in the economy, affects both itself and the economy as a whole.

It would be interesting to see whether this pattern of post-liberalization increase in network density with simultaneous decentralization of the economy, supported by the rise of the transaction sector, is experienced in other transition economies. If so, this would constitute a hitherto unexamined structural transformation of the economy during the transition process, i.e. a particular kind of transformation in the economy's network structure.

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Appendix

Table A1 List of sectors in the I-O tables

No.	Sector	Transaction Sector?	No.	Sector	Transaction Sector?
1	Paddy	No	57	Plastic products	No
2	Wheat	No	58	Petroleum products	No
3	Jowar	No	59	Coal tar products	No
4	Bajra	No	60	Inorganic heavy chemicals	No
5	Maize	No	61	Organic heavy chemicals	No

No.	Sector	Transaction Sector?	No.	Sector	Transaction Sector?
7	Pulses	No	63	Pesticides	No
8	Sugarcane	No	64	Paints, varnishes and lacquers	No
9	Groundnut	No	65	Drugs and medicines	No
10	Jute	No	66	Soaps, cosmetics & glycerin	No
11	Cotton	No	67	Synthetic fibers, resin	No
12	Tea	No	68	Other chemicals	No
13	Coffee	No	69	Structural clay products	No
14	Rubber	No	70	Cement	No
15	Coconut	No	71	Other non-metallic mineral prods.	No
16	Tobacco	No	72	Iron, steel and ferro alloys	No
17	Other crops	No	73	Iron and steel casting & forging	No
18	Milk and milk products	No	74	Iron and steel foundries	No
19	Animal services(agricultural)	No	75	Non-ferrous basic metals	No
20	Other livestock products	No	76	Hand tools, hardware	No
21	Forestry and logging	No	77	Miscellaneous metal products	No
22	Fishing	No	78	Tractors and agri. implements	No
23	Coal and lignite	No	79	Industrial machinery(F & T)	No
24	Crude petroleum, natural gas	No	80	Industrial machinery(others)	No
25	Iron ore	No	81	Machine tools	No
26	Manganese ore	No	82	Other non-electrical machinery	No

No.	Sector	Transaction Sector?	No.	Sector	Transaction Sector?
27	Bauxite	No	83	Electrical industrial Machinery	No
28	Copper ore	No	84	Electrical wires & cables	No
29	Other metallic minerals	No	85	Batteries	No
30	Lime stone	No	86	Electrical appliances	No
31	Mica	No	87	Communication equipment	No
32	Other non-metallic minerals	No	88	Other electrical Machinery	No
33	Sugar	No	89	Electronic equipment(incl.TV)	No
34	Khandsari, boora	No	90	Ships and boats	No
35	Hydrogenated oil(vanaspati)	No	91	Rail equipment	No
36	Edible oils other than vanaspati	No	92	Motor vehicles	No
37	Tea and coffee processing	No	93	Motor cycles and scooters	No
38	Miscellaneous food products	No	94	Bicycles, cycle-rickshaw	No
39	Beverages	No	95	Other transport equipment	No
40	Tobacco products	No	96	Watches and clocks	No
41	Khadi, cotton textiles(handlooms)	No	97	Miscellaneous manufacturing	No
42	Cotton textiles	No	98	Construction	No
43	Woolen textiles	No	99	Electricity	No
44	Silk textiles	No	100	Water supply	No
45	Art silk, synthetic fiber textiles	No	101	Railway transport services	No
46	Jute, hemp, mesta textiles	No	102	Other transport services	No
47	Carpet weaving	No	103	Storage and warehousing	No
48	Readymade garments	No	104	Communication	Yes

No.	Sector	Transaction Sector?	No.	Sector	Transaction Sector?
49	Miscellaneous textile products	No	105	Trade	Yes
50	Furniture and fixtures-wooden	No	106	Hotels and restaurants	No
51	Wood and wood products	No	107	Banking	Yes
52	Paper, paper prods. & newsprint	No	108	Insurance	Yes
53	Printing and publishing	No	109	Education and research	No
54	Leather footwear	No	110	Medical and health	No
55	Leather and leather products	No	111	Other services	Yes
56	Rubber products	No			