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Measuring Institutional Relatedness

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Abstract

Firms in most emerging economies are engaged in seemingly un-related activities. This is particularly observed in the case of business groups which dominate the landscape of these economies. Initially, diversification in emerging economies that was not based on product or technological considerations was considered value reducing. However, according to the new emerging consensus unrelated diversification is a strategic response to the institutional voids that exist in such economies. Despite major breakthroughs in conceptualizing this institutional relatedness, the empirical support for this concept has come only through case studies and hence is not generalizable. Creating an appropriate measure of institutional relatedness is a challenge because it has to take into account the 'unique and invisible' nature of institutional relatedness. An appropriate measure should capture the myriad reasons used by firms to combine various businesses in emerging economies as a response to various institutional voids, without giving undue importance to any specific rationale. Besides, the measure should not be a fixed value; it should be allowed to change to help gauge the impact of institutional transitions on relatedness. Finally, it should provide for the uniqueness of each firm when it ventures into areas not tried by other firms. In this paper we purport to address this lacuna in research by proposing an empirically implementable measure for institutional relatedness having the features described above. We also show that the empirical estimates for India of our measure of relatedness are in consonance with the tendencies observed by studies using the case-study method and seem to be linked with the institutional transitions that have been observed in recent years.

Measuring Institutional Relatedness[1]

Karthik Dhandapani

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A striking feature of most emerging economies is the seemingly un-related nature of the different activities of their firms. This is particularly observed in the case of business groups which dominate the landscape of these economies. Initially, diversification in emerging economies that was not based on product or technological considerations was considered value reducing. However, according to the new emerging consensus unrelated diversification is a strategic response to the institutional voids that exist in such economies. Despite major breakthroughs in conceptualizing this institutional relatedness, the empirical support for this concept has come only through case studies. In this paper we purport to address this lacuna in research by proposing an empirically implementable measure for institutional relatedness.

In section 1, we delve into the existing relatedness literature in the context of emerging economies and discuss the emergence of the idea of 'institutional relatedness'. Section 2 discusses key analytical and measurement issues relating to the existing measures of 'institutional relatedness'. Section 3 discusses the new measure proposed for institutional relatedness and in section 4 we illustrate this new measure, using data on Indian Business groups. The final section concludes.

1. Institutional Relatedness

While managers and consultants in the West continue to dismantle conglomerates and refocus the mildly diversified firms, large, diversified firms and business groups continue to remain a dominant form of organization in emerging economies. This high diversification is attributed to the differences in institutional context between the emerging and developed economies. Using institutional theory (North, 1990) which focuses on the role of political, social and economic systems on the behavior of firms, studies in emerging economies attribute the unrelated nature of diversification to a number of institutional factors. For instance, lack of intermediaries in the emerging economies makes it difficult for firms to acquire necessary finance, technology and

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[1] This paper builds on a part of the doctoral dissertation of the first author (Karthik, 2006). The research reported here has no links with the work undertaken by the first author for his current employers, Fidelity Business Services India Pvt. Ltd. The usual disclaimers apply.

management talent. Business groups fulfill this gap and diversify to utilize their finances and managerial talent (Khanna and Palepu, 2000; Khanna and Rivkin, 2001; Nachum, 2004). In other words, unrelated diversification is a mechanism whereby a firm or a business group internalizes markets and expands firm boundaries in order to deal with imperfections in the product, labour, capital and technology markets. In addition, researchers have found that capability of business groups to make <u>repeated</u> entries that often are non-industry specific also induces diversification. Such skills which are developed over long periods of time include ability to negotiate with the government using contact capabilities, setting up manufacturing or service facilities etc. (Guillen, 2000). Another factor that facilitates diversification bearing the institutional characteristic label is the lack of contract enforcement mechanisms and government interference in economic activities which provide opportunities for diversification (Khanna and Palepu, 1997, Ghemawat and Khanna, 1998).

Synthesizing the literature on unrelated diversification and the role of institutional voids Peng et al (2005) have developed the notion of institutional relatedness to explain evolution of scope of the firm in emerging economies overtime. They suggest that firm scope in emerging economies is driven by a combination of product and institutional relatedness:

- Product relatedness is the extent to which a group's different lines of business and/or industries are linked.
- Institutional relatedness refers to scope economies arising out of dense network of ties with dominant institutions which enables a firm to leverage social, political, and reputational capital.

Given the reasons outlined above, an institution-based theory of corporate diversification would be consistent with the possibility of a diversification premium in emerging economies. In fact, there is evidence to show that some business group-affiliated companies outperform competing firms not affiliated with business groups.[2] The dynamics of the relationship between institutional change and diversification strategies is still at its nascent stage. Peng et al (2005) and Kock and Guillen (2001) have developed hypotheses concerning change in institutional relatedness during institutional transitions in emerging economies. However, empirical support for such

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[2] See, Lee, Peng and Lee, (2008) and Peng et al, (2005) for recent reviews.

propositions has come essentially in the form of anecdotal evidence and case studies (Khanna and Palepu, 1997, Ghemawat and Khanna, 1998), which lack generalizability to other business groups in other emerging economies.

A recent study has shown that over time as institutional transitions unfold, with the liberalization and opening up of capital, labour and product markets, diversification premium in emerging economies may dissipate and eventually become a diversification discount (Lee, Peng and Lee, 2008). The study uses some conventional measures of diversification to categorize firms as diversified and explores if the diversification premia for such firms change during long periods that also encompass phases of institutional transition. And they find evidence of the dissipation of diversification premiums. If diversification premiums get dissipated, the nature of institutional relatedness should also undergo a change as firms adjust to new realities in the environment that they face. However, using the latest developments in the field of econometrics Villalonga (2004) and Campa and Kedia (2002) have found that diversification discount disappears and sometimes becomes a premium in the US firms. As argued by Oliver (1997) and Ingram and Silverman (2002) institutional relatedness might also be relevant for developed economies.

In a recent comprehensive review of literature on business groups Khanna and Yafeh (2006) posit lack of longitudinal studies as a big lacuna in understanding of business groups. The proposed measure of institutional relatedness being dynamic in nature can help address such a lacuna. We now turn to a discussion of the existing measures of relatedness and assess if they can, on their own, reflect changes in diversification premium and/or discount. A measure of institutional relatedness might also help explain why diversification might be profitable in developed economies.

2.   Issues in Measuring Institutional Relatedness

Different measures have been used to capture relatedness, including those based on Standard Industrial Classification (SIC) surveys etc. But these measures have certain inadequacies, which make them unsuitable for capturing institutional relatedness.

SIC based measures of relatedness

In the established SIC based indexes the responsibility of assessing relatedness between industries rests on the criteria used to establish the categories and sub-

categories in which the industrial classification is composed. This approach tends to rely too much on the manufacturing process criteria and the market-based criteria on which SIC is based. This measure of relatedness, however suffers from the following limitations:

- SIC categories capture at the most the production similarity, and ignore the multidimensional nature of relatedness of which product similarity is only one dimension (Pehrsson, 2006, Stimpert and Duhaime, 1997).

- Besides, the assumption of homogeneity in relatedness is limiting. If the sectors share the same level-2 classification they are deemed to be related in the same way as the sectors in any other level-2 category. This assumption is not valid as common knowledge suggests that some sectors are more related than others. (Davis and Thomas, 1993).

- Moreover, the degree of relatedness between two sectors is assumed to remain constant overtime. Apart from changes in technology that may bring in changes in the degree of relatedness, this assumption is also not tenable because changes in the external environment are likely to bring changes in production, marketing and other synergies. (Davis and Thomas, 1993).

Consequently, SIC based measures of relatedness are not appropriate to capture institutional relatedness.

Surveys

Other measures of relatedness that rely on survey instruments (Pehrson 2006, Stimpert and Duhaime, 1997) try to overcome some of these limitations. But these require an *ex–ante* definition of what the researcher understands by relatedness. It would be difficult to capture institutional relatedness using surveys in emerging economies because business groups diversify to overcome institutional voids in myriad ways. As Peng et al (2005) point out, social capital of such groups reduces information asymmetries and reputational capital may reduce capital market constraints. Under such circumstances, product and institutional relatedness can potentially combine in complex ways to create a large variety of industry/product combinations at the level of the business group. A survey instrument taking all these into account would be very difficult to construct and administer. In addition there is a possibility of bias due to the subjective nature of the judgments of the researchers

regarding relatedness, which may lead different researchers to place the same industry combinations in different diversification categories. This argument is well captured in by Rumelt;

> Each company had a unique history and had developed its own pattern of relationships among technologies, products and markets. What was a discrete business for one firm was often an integral and non separable part of a larger business in another firm (Rumelt, 1974: 12).

Case studies

This brings us to the third approach of ascertaining relatedness i.e. case studies. Amsden (1989), Ghemawat and Khanna (1998), Khanna and Palepu (1997), Kedia et al (2006) and Dielman (2007) have used case studies in ascertaining institutional relatedness in emerging economies. In the case studies on business groups, one way of inferring institutional relatedness has been to check for lack of product relatedness. Case studies are able to chronicle the diversification moves in a much more accurate fashion than the SIC based measures and surveys. Indeed, such documentation has brought out significant insights into the processes of diversification and how institutional environment can potentially affect diversification patterns. The main limitation of using case studies is the problem in generalizing the findings. Many propositions vis-à-vis relatedness are at the economy level and it would be difficult to test them without considering an adequate sample of multiple business groups over time.

It is clear from the above that there is a need for an appropriate measure of institutional relatedness. Creating such a measure is a challenge because as institutional relatedness is "more informal, unique and invisible" (Peng et al, 2005, pp 631). Any measure has to take into account this unique and invisible nature of institutional relatedness. Therefore, the measurement approach should have the following characteristics:

- It should have room to capture the myriad reasons used by firms and business groups to combine various businesses in emerging economies as a response to the various institutional voids, without giving undue importance to any specific rationale.

- The relatedness measure should not be a fixed value, it should be allowed to change to help gauge the impact of institutional transitions on relatedness as hypothesized by Peng et al (2005), Kock and Guillen (2001) etc.

- Finally, it should provide for the uniqueness of each firm and business group when it ventures into areas not tried by other firms.

3.   Measuring Institutional Relatedness

What we propose is an approach to measure institutional relatedness. This underlying idea is similar to case study, since it infers institutional relatedness from lack of product relatedness. Our measure combines the traditional approach to measure relatedness based on SIC and the survivor measure of relatedness proposed by Teece et al (1994).

Survivor Measure of Relatedness

More recently, a wider concept of relatedness which also embodies firm-specific aspects (capabilities and technological competencies) has been gaining acceptance (Valvano and Vannoni, 2003). This novel measure conceived by Teece, et al (1994), first captures relatedness among <u>industry pairs</u>, and then uses it to construct an index of relatedness at the <u>firm</u> level. In contrast to the standard methods that either classify *a priori* two sectors as related, or try to find some common characteristics between clusters of industries, this new relatedness measure is embedded in empirical reality. It is obtained by directly observing the behaviour of firms in the real world: the 'relatedness' between two activities depends on the frequency with which firms are found to perform those activities jointly.

This measure is based on the *survivor principle* which foresees that diversification moves that offer no economies of scope would gradually disappear, and that surviving firms have the tendency to combine industries that exhibit economies of scope. Industry i and industry j are thus seen as related if firms in the real world are frequently combining these as a part of their commercial activity. Such a method allows *the firm to speak*, without necessarily assuming *ex-ante* that activities i and j are related. The <u>frequency of combinations</u> is used for measuring the relatedness between various industry groups. There is no need to specify exactly what causes this relatedness. Being empirically embedded, without any *a priori* assumptions regarding

relatedness, this measure can also capture the immeasurable synergies, which is critical for measuring institutional relatedness. Since 1994 when Teece et al originally proposed this measure, many researchers have subsequently used this measure (cf. Valvano and Vannoni, 2003).

The following characteristics of the survivor measure of relatedness make it very attractive for use as a component in measuring institutional relatedness:

(i) The observed tendency to combine certain types of businesses, indirectly encompasses all measurable and immeasurable synergies that pertain to such businesses (Zuckerman, 2000);

(ii) The prevalence of such combinations in various firms can be taken as an evidence of relatedness and adds legitimacy to the diversification moves of follower firms;

(iii) It considers the experimental nature of diversification discussed above. Based on the count of occurrences in which two business activities were combined together within the firms' portfolios, provides a plausible way to establish a criteria for relatedness based upon the idea that the firm does not know what is related until trying it out (Piscitello, 2004);

(iv) If the decisions are poor i.e. offer no economies of scope then such decisions will be screened by the competitive environment prevailing in emerging economies, which will enforce a tendency towards reversal of such decisions. Thus, frequency with which firms are found to operate jointly between fields determines their relatedness.

Combining SIC Based Measure and Survivor Measure of Relatedness

Although the SIC based measure is limited and cannot capture forms of relatedness other than product or technological relatedness, when combined with survivor measure, this becomes a more effective measure. SIC based measures have been found to have some validity for assessing the extent of diversification (Hoskisson et al, 1993, Sambharya, 2000). The validity of the SIC based measures to capture product similarity between industries is further established by Stimpert and Duhaime (1997). Using surveys of manager's perceptions of relatedness, they found that perception of relatedness is multidimensional. One of these dimensions was the product market relatedness which was significantly correlated with the SIC based measure of

relatedness. This shows that the SIC based measure of relatedness does a good job of capturing the product relatedness.

The survivor measure of relatedness and the SIC measure, when combined make a unique measure of relatedness, which simultaneously captures product market relatedness as well as different kinds of rationale for combining businesses including the prevailing institutional environment. Peng et al (2005) conceptualize relatedness in emerging economies to be composed of product relatedness and institutional relatedness. Using survivor measure of relatedness we can first measure relatedness between all the industry combinations that are empirically observed. We can then attribute the relatedness to the industry combinations that share the same level 2 as *product* relatedness and use those combinations that do not share the same level 2 as a 'proxy' for *institutional* relatedness.

Measurement Method

The methodology involves the following steps

Step 1: Identify the number of industries that the firms can operate in.

Step 2: Measure survivor measure of relatedness between all the industry combinations.

Let us consider a population of K diversified firms and define the following variables:

$C_{ik} = 1$ if firm k is active in industry i and 0 otherwise;

$n_i = \sum_k C_{ik}$ and $n_j = \sum_k C_{jk}$ are the number of firms k active in industries i and j, respectively;

$J_{ij} = \sum_k C_{ik}C_{jk}$ is the number of firms simultaneously active in i and j with $0 < J_{ij} \leq \min (n_i, n_j)$.

If a combination is more commonly found in firms, then we treat that combination as highly related, after taking into account the difference in the number of firms present in different industries.

A measure of inter-business relatedness is obtained by comparing the observed J_{ij} with the number of links that would emerge from random diversification. The latter can be calculated through the hyper-geometric random variable X_{ij}. After having

extracted without replacement from a population of *K* firms two samples n_i and n_j, the probability to find x firms operating simultaneously in *i* and in *j* is the following:

$$\Pr(X_{ij} = x) = \frac{\binom{n_i}{x}\binom{K - n_i}{n_j - x}}{\binom{K}{n_j}}$$

The mean and variance of X_{ij} are respectively:

$$\mu_{ij} = E(X_{ij}) = \frac{n_i n_j}{K}$$

$$\sigma_{ij}^2 = \mu_{ij}\left(1 - \frac{n_i}{K}\right)\left(\frac{K - n_j}{K - 1}\right)$$

The index of relatedness is constructed by comparing the observed value of *Jij* with *μij* , and scaling the difference with the standard deviation of *Xij* :

$$SR_{ij} = \frac{J_{ij} - \mu_{ij}}{\sigma_{ij}}$$

Step 3: Categorize the combinations into those denoting product relatedness and institutional relatedness. Combinations that are in the same level 2 SIC category denote product relatedness and those not sharing the same level 2 SIC code would denote institutional relatedness.

4. Empirical Implementation of Relatedness Measure for India

This section presents estimates of the suggested direct measure of institutional relatedness for India and provides a brief analysis of how this measure has changed during the post-reform period. Bulk of the discussion in the literature regarding the analytical utility of the concept of institutional relatedness and of the associated hypotheses has been in the context of conglomerates. Hence we take business groups as our unit of analysis. Also groups are considered to be the decision makers particularly for strategic response to opportunities thrown up by opening up of the economy (Khanna and Palepu, 1997, Ghemawat and Khanna 1998).

Firm level data on diversification were obtained from the annual database published by the Centre for Monitoring Indian Economy (CMIE). CMIE is acknowledged as the leading provider of data on Indian firms and many researchers have used their data (Khanna and Palepu, 2000, Ramaswamy, Li and Petitt, 2004). This database, which covers the Indian public limited firms, is built on financial reports filed by all companies with a federal agency called Registrar of Companies. Since we have a focus on business groups for illustrating our measure of institutional relatedness and there is no data as such on groups, we have aggregated the data available at the firm level to arrive at the group level figures. For identifying group affiliation, we adopt CMIE's classification of firms into groups. Though a group is not a legal construct, CMIE uses a variety of sources to classify firms into groups. This classification is based on a combination of historical reports published by the government for antitrust purposes, tracking the announcement of new corporate ventures and public listings as well as other filings made by firms, and tracking public announcements made by individual companies and by groups. Khanna and Palepu (2000) cross checked the classification and found it to be valid.

The CMIE classification of businesses is based National Industrial Classification (NIC) which is similar to SIC. It needs to be noted, however, that this measure of institutional relatedness is not limited to any specific industrial classification and can be applied to any system that provides an exhaustive classification of activity and identifies like the SIC system, a broad logic of vertical structure.

At the firm level, data on 7244 firms were available from the CMIE for over a period of 15 years from 1989 to 2003. Of these 2561 were group affiliated and belonged to about 600 business groups. The diversified business groups were active in 236 of the total 27730 combinations possible if we take two industries at a time. Many combinations were not found in any business group. Relatedness score for the observed combinations were computed using the approach discussed in detail in the previous section.

The year-wise average relatedness for mainly product market relatedness and other relatedness are reported in Table 1. We report the number of combinations, in

addition to mean, standard deviation, minimum and maximum relatedness score for each category.

Table 1: Year-wise Average Relatedness Indices										
Product Relatedness						*Institutional Relatedness*				
Year	*N*	*Mean*	*Std Dev*	*Min*	*Max*	*N*	*Mean*	*Std Dev*	*Min*	*Max*
1989	171	5.06	2.71	0.57	12.94	8,022	2.10	1.67	-1.82	15.87
1990	188	5.20	2.97	0.47	16.76	8,643	2.08	1.67	-1.62	16.76
1991	191	5.32	3.39	0.32	18.03	9,579	2.07	1.67	-1.95	18.03
1992	202	5.56	3.25	0.2	15.85	10,167	2.07	1.67	-1.83	15.87
1993	198	5.86	3.32	0.55	16.27	11,084	2.18	1.75	-1.69	16.77
1994	213	6.18	3.72	0.66	18.41	12,192	2.15	1.75	-2.26	15.23
1995	215	6.35	3.72	-0.02	19.37	12,883	2.13	1.76	-2.47	15.59
1996	217	6.22	3.8	0.54	19.11	12,889	2.08	1.72	-2.19	15.6
1997	223	6.22	3.66	0.56	19.78	13,162	2.05	1.68	-2.7	13.99
1998	221	6.03	3.52	0.47	18.62	13,235	2.03	1.67	-2.14	16.08
1999	224	5.93	3.57	0.38	18.16	13,510	2.08	1.67	-2.32	14.8
2000	223	5.95	3.55	0.47	17.89	13,475	2.06	1.67	-2.17	16.47
2001	223	5.93	3.66	0.63	18.07	13,613	2.12	1.66	-1.72	16.45
2002	220	5.88	3.63	0.22	18.07	13,005	2.14	1.65	-1.96	17.46
2003	212	5.86	3.42	0.37	17.72	11,872	2.21	1.69	-1.81	14.34

The strengths of the proposed measure of institutional relatedness are apparent when we look at the relatedness scores. Without this measure we would have assumed that the combinations have zero relatedness. As indicated by 'N' in Table 1, the number of combinations for this seemingly unrelated category is too high and labeling all of them as unrelated would mean denying any logic of their prevalence among business groups. We also see that the measure for institutional relatedness does not impose any homogeneity as indicated by non-zero standard deviation, which reflects variation in the relatedness scores for both product market relatedness and other relatedness. Another interesting result is that combinations based on other relatedness can have higher relatedness scores than those sharing same level-2 codes. In 1989, the maximum score for combinations sharing same level-2 is 12.94 while the score for those not sharing the same level-2 code is 15.87. This is just an indication that the seemingly unrelated combinations can have higher relatedness than the seemingly related ones. Finally we also observe that the average relatedness score for both institutional and product relatedness changes over time. This characteristic is very

useful for testing dynamic propositions about institutional relatedness and institutional transitions, which we discuss next.

Before we delve into the patterns of institutional and product relatedness over time we need to understand that India underwent rapid institutional transition beginning 1991 when reforms were initiated following a balance of payment crisis. The reforms included many policy shocks such as removal of stringent restrictions on entry into industries and capacity expansion in existing industries.[3] The new policies also led to reduction on entry barriers for the private sector and the foreign firms. Virtual abolition of Monopoly and Restricted Practices Act (MRTPA) meant that firms that were hitherto not able to undertake related diversification due to anti-trust concerns now had the freedom to do so.[4] All this, combined with trade liberalization resulted in the enhancement of competitive pressures. However, certain areas were untouched such as the labor market and also many industries such as insurance were highly regulated in the initial years. These are explained in much more detail in Khanna and Palepu (1999). The changes in product and institutional relatedness need to be seen in the light of these institutional transitions.

To enable examination and comparison of major trends in these two types of relatedness, the year-wise average scores for both product and institutional relatedness are shown in Figure 1. When comparing product and institutional relatedness scores for each year we can clearly see that product relatedness have higher relatedness scores than institutional relatedness scores. This indicates that business groups have a higher tendency to diversify when there is product relatedness than when there is institutional relatedness. We can also observe that during the period under study major changes have taken place only in the product market relatedness. It has increased from the 1989 levels and has a reached a new level from 1995 onwards. It declined a bit in the subsequent years but not to any significant extent. The increase in product market relatedness immediately after the introduction of the economic reform was partly a consequence of the 'corrections' the large firms made by diversifying into related areas, an option that was not available to them during the pre-reform

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[3] Stringent policies of industrial licensing during the pre-reform period curtailed entry as for each new entity/capacity state approvals were required and these were difficult to come by.

[4] There were severe restrictions on large, referred to as MRTP companies with moderately large fixed investments, to expand capacity and undertake diversification, especially in related industries, given the concerns about monopolization. For example, it was difficult for a large company to get a license.

period due to MRTP and other restrictions. In fact, many observers of the Indian economy have observed that dysfunctional anti-trust and licensing policies had resulted in unrelated diversification during the pre-reform period. Interestingly, the product relatedness indices had started showing an increase even before 1991 when the economic reform process was formally unleashed. This is consistent with another widely observed fact that economic reforms in the form of import liberalization and de-licensing had actual begun during the late 1980s (Datt and Ravallion, 2002, Panagriya, 2004).

Figure 1: Patterns in Relatedness
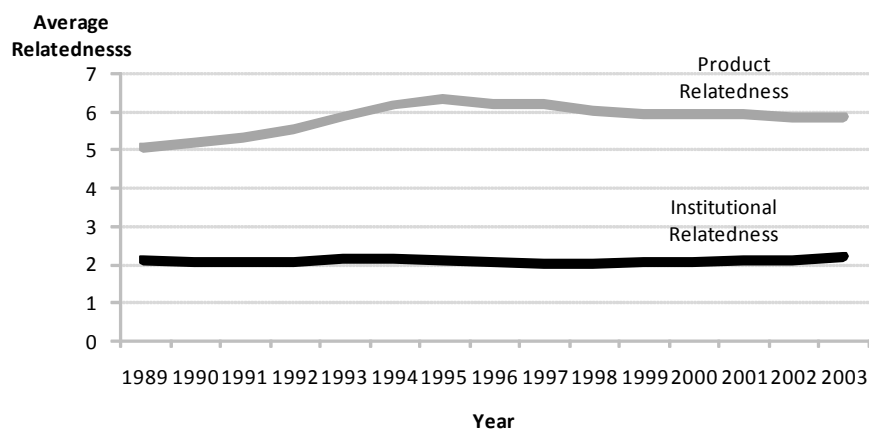
Institutional relatedness on the other hand has only changed marginally during the post reform period. This shows that even after more than a decade of reforms the importance of institutional relatedness has not diminished. Rather it has shown a small increase over the years for business groups.

These findings are in consonance with the findings of Ghemawat and Khanna (1998), Khanna and Palepu (1999) who found that the market intermediation of business groups has increased in the post liberalization period. Khanna and Paleupu (1999) suggest that the policy changes in India have only resulted in deregulation of primary markets but the restrictions on market intermediaries continue to remain, which is being filled in by the business groups. The reason is that other relatedness represents the capability to simultaneously leverage capabilities like project execution, reputation, dealing with bureaucracy, repeated industry entry etc. These skills were very important before 1991, and their importance has not diminished post 1991, because these are not capabilities that are acquired over a short period of time. These

capabilities are nurtured over years, and it has been argued that they help the conglomerates, particularly business groups, attract opportunities for joint ventures with large multinationals entering emerging markets like India (Khanna and Palepu, 1999; Amsden and Hikino, 1994). Apart from this benefit, these capabilities also play an important role in exploiting opportunities thrown up by the liberalization of the economy.

The findings pertaining to product and institutional relatedness confirm the hypothesis that as the economy goes through reforms and competitive pressures build up, the importance of technological and organization relatedness would increase (Kock and Gullen, 2001). The findings on institutional relatedness also confirm the hypotheses of Peng et al (2005) that "In the short run, the importance of institutional relatedness is likely to increase". What we have found here is that the importance of institutional relatedness has not diminished as a result of deregulation of the markets in India.

5. Concluding Observations

The proposed measure of institutional relatedness satisfies all the three criteria discussed in section 2. Firstly it helps us identify the extent of relatedness beyond technological relatedness. It is not biased toward any specific rationale of combining business by business groups. Secondly the measure does not take a fixed value. It does not assume that institutional relatedness between different industries would be the same. Instead it allows some business combinations to be more synergistic than others. It also allows for some business combinations to be non-synergistic by giving them a lower relatedness score. Finally the measure also changes over time thus allowing us to examine its dynamic nature.

Given all these dimensions, the index seems to be an appropriate measure to capture related and unrelated diversification. More specifically, it provides a good proxy for institutional relatedness which can be tracked over time to explore trends in such relatedness. The fact that it is consistent with the findings of other scholars using case study and other methods to explore relatedness in the Indian corporate sector makes it even more attractive as a measure that can be used to identify generalizable trends. For example, in an economy if diversification premia becomes a diversification discount, our index will reflect that change, if not immediately but certainly after a lag as firms respond to these environmental changes.

To conclude, it may be useful to link our discussion with the interesting distinction between *output and input diversification.* Traditionally, and as discussed in this paper as well, the literature on diversification refers to the range and distribution of *outputs* of the firm, usually classified in terms of products, output markets or businesses. Such an understanding of diversification has been complemented by the idea of *input* or resource diversification. Inputs are 'classified not only in terms of raw material, physical capital and financial assets but also in terms of technologies, knowledge, competencies, IPRs, network relations and other forms of intangible inputs' (Torrisi and Granstrand, 2004: 51). Part of *input* diversification can also be seen as *technology* diversification. There is no one to one correspondence between *output* and *input* diversification. However, the complex interplay between these two types of diversifications can create diversification trajectories (Cantwell, Gamberdella and Grandstrand, 2004). While part of *input* diversification will get captured by our measure of product relatedness, there is likely to be a part that would be reflected in our measure of institutional relatedness. Consequently, the measure of institutional relatedness developed in this paper should be seen with a lens that is wider than the lens of the 'institutional voids' that firms fill through such diversification activity.

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