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Globalisation *Can* Be Measured -

Unveiling Tales of Mystery and Globalisation with a New Integrative and Metric Measurement Concept

2.1 Market Entry and Locational Strategies

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***Abstract** - According to the frequent use of the term “globalisation”, this phenomenon is widely taken for granted. In fact there are grave doubts about whether MNCs do work on a global scale. In this paper, a new quantitative measurement concept is presented that integrates multiple dimensions of internationalisation in a complex number and is actually able to measure globalisation instead of simple internationalisation. The measure is applied to assess the globalisation states and processes of the most internationalised German MNCs. The results suggest that they are neither globalised nor show a straightforward path towards globalisation in the last decade. This outcome clearly contradicts the common assumption of global MNCs which has strong implications for future research as well as business and political decisions. The new quantitative concept of globalisation developed in this paper will hopefully be of proper use in empirical work whenever internationalisation or globalisation are to be measured.*

1 Demystification of the Term “Globalisation”

Globalisation has become a frequently used term that apparently replaces the formerly used concept “internationalisation”. While this substitution is taking place on the language level it is not clear whether the subject of interest has changed as well. This means that an impressive number of research approaches are probably not dealing with globalisation as a new quality of internationalisation but are just using a different, more fashionable word. As a result there is not only a research gap concerning the difference between internationalisation and globalisation but also a lack of empirical knowledge covering the actual state of globalisation in multinational corporations (MNCs).

Globalisation is a multi-faceted phenomenon which consists, besides economic issues, of environmental, social, political, and technical factors. It seems that because of this complexity, scholars tend to shy away from deeper investigations of globalisation’s concrete characteristics and prefer to treat globalisation as something exciting which needs to be taken into account in whatever context. Many publications not only from popular science (DiSabatino, 2000; Tremblay, 2000) but also from the discipline of international management (Campbell/Verbeke, 1994; Birkinshaw/Morrison/Hulland, 1995; Hwang/Burgers, 1997) assume that particularly large firms are meanwhile globalised to an advanced degree after there had been an accelerating process of globalisation over the last decade. By contrast, Rugman (2000) presents much evidence for the fact that this assumption is untrue. He points out that MNCs rather focus on the triad of the US, Europe, and Japan than work on a global scale. This paper tries to work out a measure that is able to capture precisely the degree to which MNCs are globalised. It will hopefully enable an even more profound discussion on further globalisation issues in international management.

Talking about internationalisation in the field of international management traditionally meant to deal with economic activities of a company in at least one more country than in its home country. Simply stated, the higher is the share of revenues abroad the higher is the degree of internationalisation. Though a high amount of international revenues as compared to the home country does not necessarily imply globalisation. International revenues can stem from a few countries which are situated very close to the home country. Globalisation by contrast means

that the entire world is the “home country” of an MNC. The origin of relevant resources and the location of relevant markets are not determined by the fact that an MNC was originally set up in one particular country but by the economic power of the related countries. Hence, the measurement of globalisation must start from a global economic view rather than from the incremental view of individual MNCs’ internationalisation processes. According to our understanding a global MNC reflects the global activities of the world’s economies; i. e. their degrees of spread equal. This approach intends to blow away those mystic clouds about the question whether an MNC is to be considered global or not; it relies on an absolute criterion of globalisation instead of intuitive estimation with respect to an advanced level of international activities.

Theoretically such an understanding is based on a competitive approach, assuming that the economic power – or better the purchasing power of a country which is an outcome of its gross national product – determines c. p. the attractiveness of this country for an MNC to unfold activities. Following this approach means to emphasise the MNC’s sales rather than the profits or value added in a country. A look at the currently intensified struggle of MNCs to grow by all means, i. e. to enlarge their market share, (e. g. DaimlerChrysler, GM/Fiat, Vodafone/Mannesmann, or Hoechst/Rhone Poulenc) should justify our underlying assumptions and the negligence of other practical objectives according to theories like the classical theory of interest rate differentials (Aliber 1970) or the monopolistic advantage theory (Hymer 1960/1976; Kindleberger 1969).

The paper is organised as follows: First traditional concepts to measure the degree of internationalisation are analysed. As a consequence of their limitations a new concept is suggested. It combines the geographical spread and the cultural diversity in MNCs’ activities in one single complex measure which is based on a metric scale and allows for all known numeric operations. Then the new measure is applied to German “supposed-to-be global companies”. Their actual states of globalisation and internationalisation paths are evaluated with the new measure. The outcome is finally discussed and checked for future research implications.

2 Limitations of Traditional Measurement Concepts

When it comes to measure a construct such as internationalisation, there are always numerous ways to solve the problem but none of them leads to a satisfactory outcome. An extensive qualitative assessment of each case probably delivers the most meaningful result - with respect to the individual case. Qualitative assessments of individual cases, though, can hardly be compared. Furthermore an adequate but lengthy evaluation of internationalisation cannot be fed directly into a numerical model as an independent variable which is often the plan in empirical research of international management. Projection of the construct internationalisation onto a uni- or multidimensional scale is a solution to these problems but is in turn affected by other specific limitations.

2.1 Unidimensional Measures

The most common way to measure the degree of internationalisation is the ratio of foreign sales to total sales. Sullivan (1994) presents a list of 17 studies on the relationship between financial performance and the degree of internationalisation from 1971 to 1990. 16 of these studies solely rely on the sales ratio as an estimator; one of them additionally considers the share of foreign assets in total assets. The same approach is followed in a more recent study by Reeb, Kwok, and Baek (1998); Chen et al. (1997) use the ratio of foreign pre-tax income to total pre-tax income. Other possible measures are the number of countries with foreign operations and the shares of foreign employees, profits, value added or shareholders. Nguyen and Cosset (1995) investigate the properties and interrelationships of single internationalisation measures in an embracing review.

Regardless of a deep discussion about which of these measures reflects the degree of internationalisation best, there are typical advantages and disadvantages of the unidimensional approach of foreign to total ratios on an abstract level. Unidimensional ratios are very attractive measures in at least three respects. One, they are convenient to obtain from databases from virtually every company in the world. This property allows for large sample sizes in empirical research projects. Two, foreign ratios are easy-to-understand indicators of international activities; their meaning is clear and straightforward. Three, they are facile to handle in mathematical operations. Comparisons through the course of time and between

companies can be done with ease. Altogether unidimensional measures cause least problems in their treatment and are therefore a convincing option for pragmatists.

The apparently charming simplicity of the unidimensional approach carries a nasty drawback: One single measure captures only one single dimension of internationalisation. It might be feasible to pick the adequate aspect for measuring and observing states and processes of internationalisation. Such lucky strikes are rare, though; data availability is often the crucial point in selecting indicators. Internationalisation is likely to happen in other dimensions than the one considered. But even if the selected measure is a good estimator at a certain point of time the characteristics of internationalisation could change so one cannot really draw consequences from the unidimensional observations made.

There is a second concern that hits foreign ratios in particular. The share of foreign activities tells nothing about their distribution, i. e., a company with constant foreign sales can shift its activities from a few neighbouring countries to many countries on a different continent but is still recognised equally internationalised. Consequently unidimensional ratios lack a great deal of validity.

2.2 Multidimensional Measures

Multidimensional measures pick a set of unidimensional measures and thereby try to cover a larger and more representative range of the construct “internationalisation”. Apart from data problems there are little obstacles to measure more than one internationalisation indicator. The challenge, however, is to derive compact conclusions from a whole set of numbers.

Sullivan (1994) chooses five out of nine possible variables to measure internationalisation. These are the foreign sales as a percentage of total sales, the overseas subsidiaries as a percentage of total subsidiaries, the foreign assets as a percentage of total assets, the psychic dispersion of international operations, and top managers’ international experience. All calibrated from 0 to 1, they receive equal weights, are summed up, and result in a degree of internationalisation which happens to be a number in the interval of 0 to 5. Ramaswamy and Kroeck (1996) express severe criticism about Sullivan’s approach. His gravest mistake can be viewed as adding up completely different things to a common index score. For example, in a comparison of two “equally internationalised” companies, foreign assets realised by one

company compensate for top managers' experience in the other. Strictly speaking, Sullivan's measure compares apples with oranges. He clearly took a courageous step forward and was one of the first to present a multidimensional measure of internationalisation. Yet his methodology has decisive shortcomings, as he later admits (Sullivan, 1996). Another measure, the UNCTAD transnationality index that weights the percentages of foreign assets, sales, and employees (UNCTAD, 1995), suffers from corresponding deficiencies.

The network spread index recently published by Ietto-Gillies (1998) is a remarkable attempt to overcome the foreign-home country dichotomy which all foreign ratio approaches are affected by. As was stated above, the pure share of foreign activities does not reflect their international spread. Therefore, Ietto-Gillies multiplies the foreign assets, sales, and employees ratios with the percentage of the world's 178 countries in which the respective MNC owns subsidiaries. Despite of this improvement some concerns remain about her internationalisation measure. As it makes little sense to require a global MNC have activities in all 178 countries of the world Ietto-Gillies' measure offers no reference of globalisation. Foreign activities can shift within the set of established subsidiaries to a high extent while the index is unchanged. In addition, the extent of management problems in an MNC, especially caused by cultural heterogeneity, which are included in Sullivans index is completely neglected. Last not least the question of aggregating different aspects of internationalisation (assets, sales, and employees) persists unsolved. An arbitrarily weighted summation cannot be satisfactory because the elements represent different dimensions of internationalisation. Treating them as equal is doubtful, and summing them up leads to irreversible information losses.

Hassel et al. (2000) forego aggregating their three indicators of internationalisation for exactly that reason. They keep the percentage of foreign revenues and employees to the total as well as a categorisation of the international spread separately in so-called "bundles" of internationalisation indicators. Germann, Raab, and Setzer (1999) follow a very similar approach. Their idea is easy to justify but does not solve the problem. A bundle of numbers cannot meet the requirements of a clear measure. Though mathematics have much more to offer than simple summation, multiplication, and bundles of indicators in order to reduce the multidimensional phenomenon of internationalisation to an explicit indicator. Some of these opportunities are picked up in the subsequent section.

3 The Complex Spread and Diversity Measure as an Innovative Concept

3.1 Geographical Spread of Activities

Letto-Gillies (1998) points out that the geographical spread of foreign activities consists of two components which are the volume of foreign activities and the number of countries they are spread over. Instead of mixing these two measures in a multiplication, it is more adequate to capture them jointly in a single measure of spread. Bühner (1987) uses the Herfindahl-type index

$$D = 1 - \sum_{i=1}^n p_i^2$$

in order to measure international diversification. Similarly, Hitt, Hoskisson, and Kim (1997) employ an entropy measure

$$PDT = \sum_{i=1}^n p_i \cdot \ln \frac{1}{p_i}.$$

Both the extent of international activities and the number of related countries are represented by the Herfindahl index and the entropy. This property is also shared by the Gini coefficient. It reflects the area between the Lorenz curves of equal distribution and actual distribution and thus measures concentration rather than dispersion. Since a concentration measure can be quickly inverted into a dispersion measure and the Lorenz curves supply a much more meaningful picture of the international spread than the Herfindahl index and the entropy measure do, a geographical spread measure based on Gini coefficients appears most favourable and is by far superior to common internationalisation measures.

The n countries with the running index i are sorted by their rising contribution x_i to the total economic activity in the world. Let l_i be the share of the joint economic activity of all countries j up to the country i :

$$l_i = \frac{\sum_{j=1}^i x_j}{\sum_{j=1}^n x_j}.$$

The Lorenz curve is given by the connecting lines between l_i on the horizontal axis and the corresponding cumulative country count k_i on the vertical axis:

$$k_i = \frac{1}{n} \sum_{j=1}^i j$$

The Gini coefficient g is calculated from

$$g = \sum_{i=1}^n \left((k_{i-1} + k_i) \cdot \frac{x_i}{\sum_{j=1}^n x_j} \right) - 1$$

and results in a number in the interval of $[0, 1]$. Now recall the definition of globalisation stated in the first section. The economic activities of an MNC are considered globalised if their geographical spread equals the geographical spread of the whole world's economic activities. Note that equality of spread does not necessarily mean exactly the same international distribution. The Gini coefficient of the international distribution of the gross national product (GNP) is called g_{GNP} and serves as a universal reference to the Gini coefficients g_{MNC} of the MNCs whose degree of globalisation is to be measured. The Gini coefficients g_{MNC} are preferably derived from the international distribution of sales of the respective MNCs. The sales on the company level correspond to the GNP on the country level and Sullivan's correlation tables show that they are closely related to the international characteristics of other financial measures.

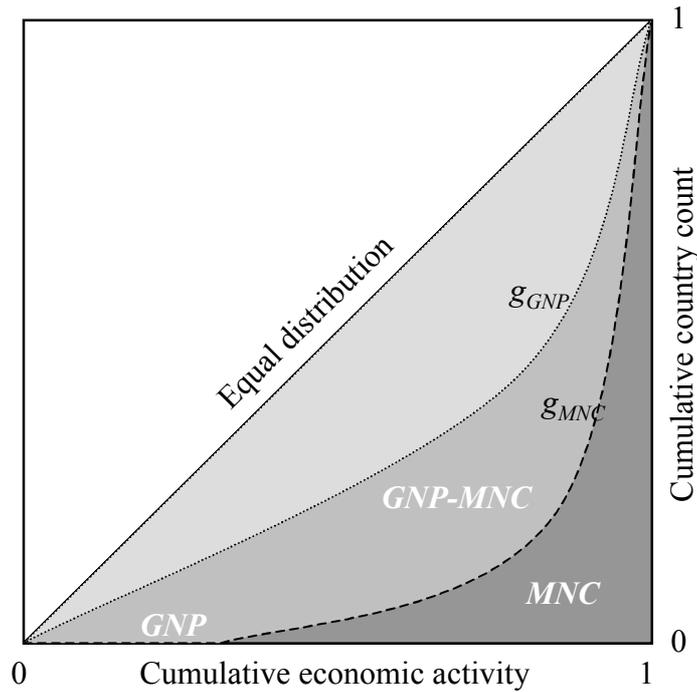


Figure 1: Analysis of areas below Lorenz curves to calculate the geographical spread measure

The globalised geographical concentration can be defined as the area GNP below the Lorenz curve related to g_{GNP} , see Figure 1. Accordingly, the actual geographical concentration of an MNC can be defined as the area MNC below the Lorenz curve related to g_{MNC} . Hence, the complement to 1 of the area $GNP-MNC$ between the two Lorenz curves related to g_{GNP} and g_{MNC} divided by the area GNP below the Lorenz curve related to g_{GNP} delivers the geographical spread measure

$$gs' = 1 - \frac{g_{MNC} - g_{GNP}}{1 - g_{GNP}}$$

which happens to be a number in the interval $[0, 1]$. What it makes unique compared to all traditional measures of the degree of internationalisation is that it actually indicates the degree of globalisation. Other measures allow for an ordinal assessment only: One MNC is more internationalised than another. The geographical spread measure, by contrast, is based on the globalisation of the world's economy as a reference so it can furthermore tell to what extent an MNC is globalised. A gs' of 0 means that it is not globalised at all. A gs' of 0.5 means that

it is 50% globalised. A *gs'* of 1 is unlikely to be reached but would mean that an MNC is 100% globalised with respect to its economic activities.

3.2 Cultural Diversity in Activities

The geographical spread of economic activities represents the “hard” side of globalisation in MNCs. Research into national culture has shown that part of the truth of international management is overlooked by a pure bookkeeping figure-based perspective because many problems of communication and understanding arise in the co-ordination of international operations (Hofstede, 1993; Morrison, Conaway, and Borden, 1996). Therefore, for the modern manager, the understanding and dealing with cultural differences is a major prerequisite of globalised business. According to the picture of the global village, enabled through better communication techniques and effected closer interdependent relations, even managers who never leave their headquarters or subsidiary will get in touch with markets and workforces whose cultural background is different from their own.

Although there is more and more a discussion on the globalisation of culture as well, mainly interpreted as the “Americanisation of Culture” or the “Ronald McDonald Culture” (Belk, 1996), still important forces do exist which favour a resistance to cultural homogenisation. Besides the respective influence of national governments, trying to protect national industries, some human beings seem to enrol also a natural need to live their life in their usual, i. e. traditional cultural way. As long as those forces are alive, the economic globalisation can be both expanded and exploited successfully only then when the problems stemming from cultural diversity can be mastered. Therefore on the first glance it looks like a paradox when we say that the globalisation of a firm is higher the more it is doing business in different cultural contexts.

Sullivan (1994) chooses a quite straightforward way to measure cultural or psychic dispersion of international operations. He calibrates the dispersion of the subsidiaries of an MNC among the cultural zones of the world as identified by Ronen and Shenkar (1985). They cluster the countries of the world into eight specific cultural groups and one “independent” group. Sullivan expects that the greater is the dispersion of an MNC’s subsidiaries across those cultural zones, the greater is the psychic dispersion. The suggested relationship is linear. Table 1 shows the countries assigned to the nine clusters.

Nordic	Germanic	Anglo	Latin European	Latin American	Far Eastern	Arab	Near Eastern	Independent
Finland	Austria	Australia	France	Argentina	Malaysia	Bahrain	Turkey	Brazil
Norway	Germany	United States	Belgium	Venezuela	Singapore	Abu-Dhabi	Iran	Japan
Denmark	Switzerland	Canada	Italy	Chile	Hong Kong	United Arab Emirates	Greece	India
Sweden		New Zealand	Portugal	Mexico	Philippines	Kuwait		Israel
Netherlands		United Kingdom	Spain	Peru	South Vietnam	Oman		
		Ireland		Colombia	Indonesia	Saudi Arabia		
		South Africa			Thailand			
					Taiwan			

Table 1: Country clusters according to Ronen and Shenkar (1985)

Sullivan’s cultural measure will certainly not meet all demands of validity (Ramaswamy and Kroek, 1996) but is the most practicable one available to date. Furthermore it reveals sufficiently independent of the financial measures so it can be considered as an additional dimension of the “soft” side of globalisation. Thus in absence of a better option the cultural diversity measure in this research shall be defined as:

$$cd' = \begin{cases} 0.0; & \text{operations in the home country only} \\ 0.1; & \text{operations in the same cultural zone only} \\ 0.2; & \text{operations in two different cultural zones} \\ (...) & \\ 1.0; & \text{operations in all zones plus the residual countries} \end{cases} .$$

Just like the geographical spread measure, the cultural diversity measure is a number in the interval of [0,1]; its scale owns a clear reference of globalisation at the maximum 1. An MNC with a cd' of 0 is a pure national company and therefore not globalised whatsoever. An MNC with a cd' of 0.5 runs operations in half of the world’s cultural zones. An MNC with a cd' of 1 has to cope with all cultural diversities and is therefore considered 100% globalised in this respect.

3.3 Integration in a Complex Number

The deficiency that all traditional internationalisation measures have in common is that they do not solve the problem of their components' numerical treatment. The elements are either mixed up or kept separately so any comparison of MNCs in more than one dimension of internationalisation turns out highly questionable. The solution which is suggested here is to combine the geographical spread measure gs and the culture diversity measure cd in a complex number dog (degree of globalisation).

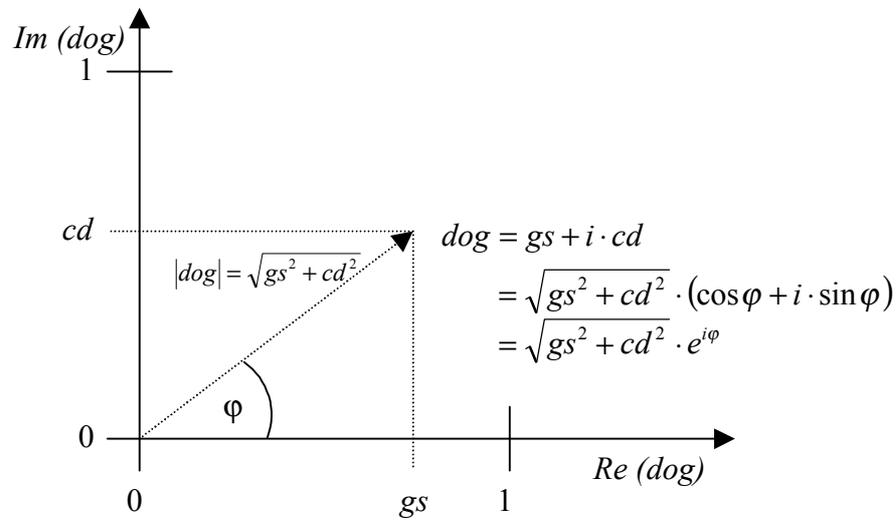


Figure 2: Real (geographical spread) and imaginary (cultural diversity) part of the degree of globalisation

A complex number consists of a real part and an imaginary part. The unity of the real part is 1 which everyone is familiar with. The unity of the imaginary part is i which is defined as

$$i = \sqrt{-1}.$$

As one can see from Figure 2, there are several notations of complex numbers. In the additive notation, dog is the sum of the real part gs (geographical spread) and the imaginary part cd (cultural diversity):

$$dog = gs + i * cd.$$

It takes to calculate the absolute value (length)

$$|dog| = \sqrt{gs^2 + cd^2}$$

and the argument (angle)

$$\arg(dog) = \varphi = \arctan \frac{cd}{gs}$$

of dog in order to come to the more compact exponential notation

$$dog = \sqrt{gs^2 + cd^2} \cdot e^{i\varphi}.$$

In this notation, the square root reflects the degree of globalisation as a real number, and the angle φ means the tendency of an MNC towards cultural diversity. If φ is greater than 45° , the influence of cultural diversity is stronger than the influence of geographical dispersion and vice versa.

If dog consisted of gs' and cd' both of which have the maximum 1, the maximum absolute value of dog indicating full globalisation would be

$$|dog'_{\max}| = \sqrt{gs'^2 + cd'^2} = \sqrt{1+1} = \sqrt{2} \approx 1.41.$$

To avoid these 141% at full globalisation with respect to both dimensions ($dog = 1.41 * e^{i 45^\circ}$), the two components gs and cd of dog are finally defined as

$$gs = \frac{gs'}{\sqrt{2}}; \quad cd = \frac{cd'}{\sqrt{2}}.$$

The complex spread and diversity measure dog is slightly more complicated than traditional measures of internationalisation. The clear advantages of this innovative concept, however, are that dog

1. measures globalisation instead of simple internationalisation,
2. effectively combines three common measures (share of foreign activities, number of countries, cultural diversity) in one single measure and

3. is ready for whatever numerical operations.

There is a precise answer to the question of globalisation. Comparisons can be easily done by subtraction of the *dogs* related to different MNCs. Figure 3 shows in the upper part a comparison of the *dogs* of the MNCs A and B. The difference is the complex number $dog_A - dog_B$ that is also to be interpreted as shown above. Furthermore, globalisation paths can be displayed and fed into arbitrary calculations, e. g. the development of profits over time as a function of *dog*. See Figure 3, lower part, to follow the individual globalisation paths of the MNCs 1, 2, and 3 over which integrals or any other functions might be calculated.

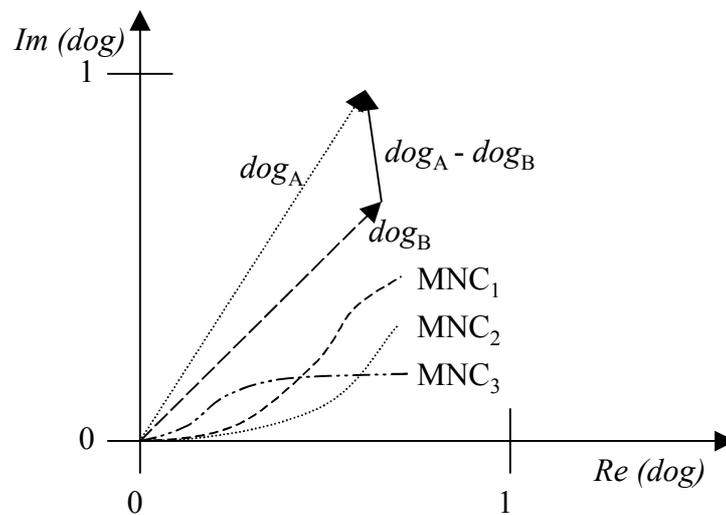


Figure 3: Comparison of degrees of globalisation and analysis of globalisation paths with the complex spread and diversity measure

3.4 Supplementary Measures

Globalisation is not only a question of spread and diversity in the configuration of downstream activities such as production. It is also incorporated in factors which are not directly related to product markets. To fully measure globalisation as a gestalt consisting of various elements therefore requires the definition and empirical collection of additional data. This data should reflect the less “extrinsic” side of globalisation.

The term “extrinsic” is used to describe the fact that a globalised configuration of downstream activities could be a direct result of market pressures leaving an MNC no other option than to internationally spread its production and sales; in this respect the process of globalisation is a passive one. The extrinsic measures should be accompanied by intrinsic measures to picture the outcomes of an internalised or “intrinsic” globalisation approach. Such an approach is based on voluntary or proactive activities preparing the firm for future challenges of the international economy.

Some examples may help to describe the intrinsic dimension more closely. Up to now most MNCs – especially those of German origin - rely on a purely national top-management team. This situation contradicts the concept of globalisation developed in the introduction of this paper. Globalisation in that sense means the neutralisation of national and especially home country peculiarities and a proportional representation of the different economic regions of the world. In contrast to this, one will hardly find a German MNC led by a foreigner or employing a foreigner within its top-management team, though most German top managers have been expatriates during their career (Welge and Holtbrügge, 1998). In the terminology of Howard Perlmutter (1965), they thereby follow an ethnocentric and not a geocentric or global approach. An empirical analysis of top management team structure would therefore not foster the impression of globalised firms. Almost the same situation can be found in the geographical location of their headquarters; most MNCs herein still rely on their home country.

An additional type of globalisation criterion could be placed between the extrinsic and intrinsic measures discussed before. It refers to the way in which a firm acquires financial resources. In times of “global” financial markets, globalisation of firms should also be measured by the internationalisation of their ownership structure and the geographical distribution of their external financial pools.

To know that additional measures of globalisation do exist should suggest to make use of them. However, in the following sections it will be sufficient to rely on the complex spread and diversity measure which allows for concrete evaluation of at least two globalisation dimensions.

4 Measuring Globalisation in German MNCs

4.1 Data

The United Nations publish the annual World Investment Report which presents statistics about the “The World’s Top 100 Transnational Corporations” that are based on the transnationality index mentioned in section 2.2. The latest ranking (UNCTAD, 1999) comprises 11 German MNCs, see Table 2.

<i>Ranking by TI</i>	<i>MNC</i>	<i>Industry</i>	<i>Foreign Assets</i>	<i>Total Assets</i>	<i>Foreign Sales</i>	<i>Total Sales</i>	<i>Foreign Empl.</i>	<i>Total Empl.</i>	<i>TI in %</i>
9	Bayer AG	chemicals	n/a	30.3	n/a	32.0	n/a	144.600	82.7
16	Hoechst AG	chemicals	29.0	34.0	24.3	30.0	n/a	137.374	76.5
38	BMW AG	automotive	20.3	31.8	26.4	35.9	52.149	117.624	60.7
41	BASF AG	chemicals	n/a	26.8	23.9	32.2	n/a	104.979	59.5
50	Volkswagen AG	automotive	n/a	57.0	42.7	65.0	133.906	279.892	56.8
53	Robert Bosch GmbH	automotive	9.0	19.5	17.7	27.0	11.849	179.719	53.8
55	Viag AG	diversified	17.4	32.7	15.9	27.6	n/a	95.561	53.3
56	Siemens AG	electronics	25.6	67.1	40.0	60.6	201.141	386.000	52.1
67	Mannesmann AG	engineering	n/a	16.4	12.6	22.5	41.290	120.859	45.7
71	Daimler-Benz AG	automotive	30.9	76.2	46.1	69.0	74.802	300.608	44.1
92	Veba AG	diversified	10.4	45.0	16.0	46.2	32.178	129.960	27.5

Table 2: German MNCs among the 1997 world’s top transnational corporations (billions of dollars, number of employees, ti = transnationality index)

The average transnationality index of these German MNCs is 55.7% while the average transnationality index of all 100 MNCs in the list is 55.3% so the sample can be considered representative of the total with respect to its internationalisation. Information about these MNCs were gathered from annual reports of the years 1980, 1985, 1990, 1995, and 1999. However, some MNCs have not published country breakdowns of their international activities through all of these years. BMW, Viag, and Mannesmann give regional breakdowns only which are useless for the calculation of *dog*. They had to be eliminated from the sample; the transnationality index of the remaining eight MNCs is 56.6%.

The geographical spread of economic activities of MNCs was measured by the domestic sales and the sales of the foreign subsidiaries named in the annual reports. Information on the cultural diversity according to Ronen and Shenkar (1985) was gained from the subsidiaries lists as well. These lists contain the meaningful subsidiaries only and might therefore be not complete.

Data on the geographical spread of economic activities in the world were taken from GNP statistics published by the World Bank (2000). The range of relevant countries was limited to those which contributed at least 1% to the world's total GNP of 28,835 billion dollars in 1998. The number of these countries is 55; their joint share accounts for 95.8% of the total GNP.

4.2 Actual States of Globalisation

According to the present debate on globalisation and the expressed self-understanding of the companies one could expect that the 100 most internationalised MNCs (here measured by the German sample) are working on a global scale. Consequently we formulate

Proposition 1: The top 100 transnational corporations are globalised.

The complex spread and diversity measure is used to test this proposition. Because data of 1999 were not available from all MNCs, data of 1995 had to be used. Figure 4 shows the geographical spread of the MNCs' economic activities along Lorenz curves. Obviously their distribution is much more concentrated than the world's distribution. The geographical spread measures gs' are presented in Table 4.

The cultural diversity in the MNCs can be read from Table 3, the related cultural diversity measures from Table 4. Most of the cultural zones are covered by the MNCs but none of them shows a full degree of cultural diversity.

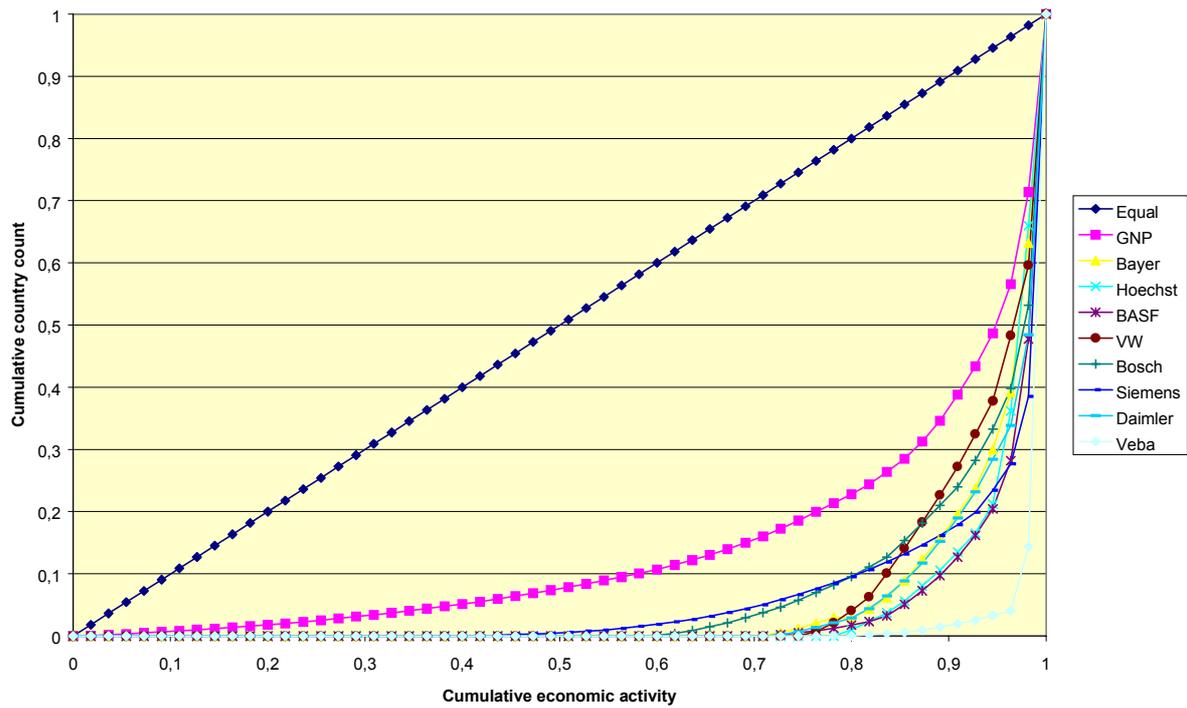


Figure 4: Geographical spread of economic activities of German top 100 transnational MNCs as compared to the distribution of the world's GNP

<i>Cultural zone</i>	<i>Bayer</i>	<i>Hoechst</i>	<i>BASF</i>	<i>VW</i>	<i>Bosch</i>	<i>Siemens</i>	<i>Daimler</i>	<i>Veba</i>
<i>Nordic</i>								
<i>Germanic</i>								
<i>Anglo</i>								
<i>Latin European</i>								
<i>Latin American</i>								
<i>Arab</i>								
<i>Near Eastern</i>								
<i>Far Eastern</i>								
<i>Independent</i>								
<i>Others</i>								
Total	5	5	6	6	9	9	7	6

Table 3: Cultural diversity in German top 100 transnational MNCs

The degree of globalisation as built by geographical spread and cultural diversity can be displayed in the complex plane as shown in Figure 5. All MNCs in the sample are placed on the left hand side in the diagram; their average *dog* is $0.23 + i 0.48 = 0.54 e^{i 65^\circ}$ and by far smaller than the *dog* of a fully globalised MNC which would be $1.00 e^{i 45^\circ}$. Obviously globalisation in the dimension of cultural diversity is more advanced than in geographical spread but does not reach a full extent in any of the MNCs.

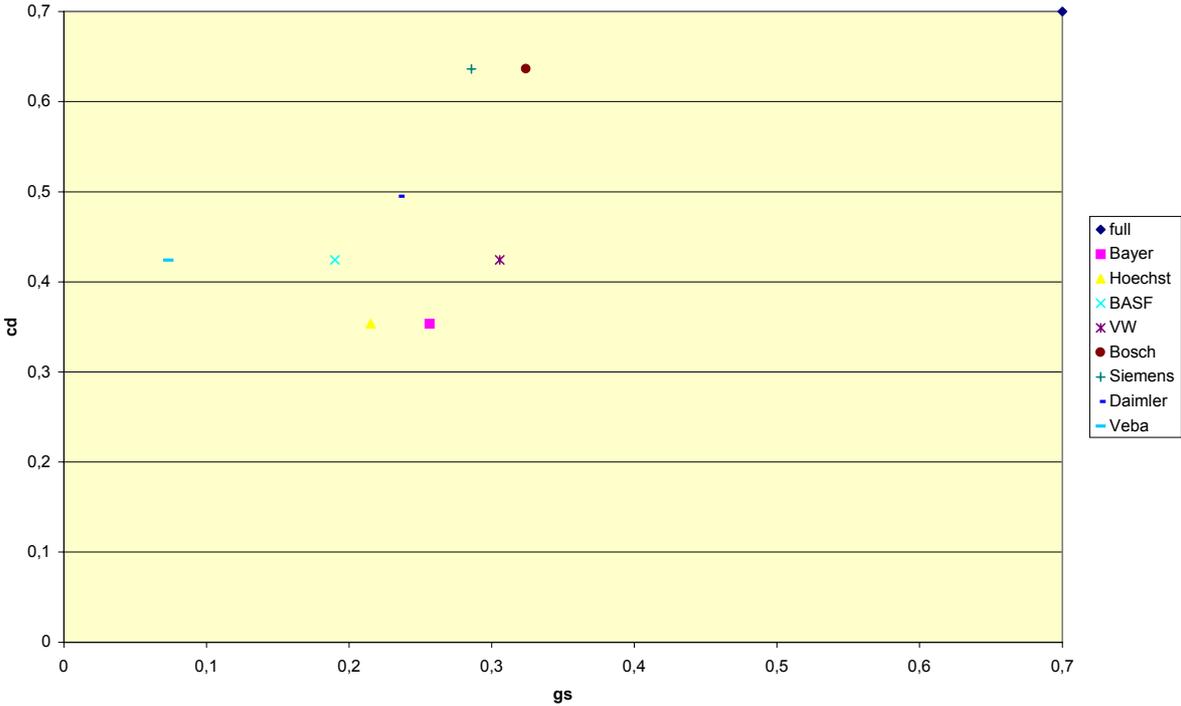


Figure 5: Globalisation states of German top 100 transnational MNCs

One must state that none of the MNCs in the sample is globalised. Therefore Proposition 1 has to be rejected. The most internationalised (German) companies in the world are believed to be globalised but in fact are not.

	<i>Bayer</i>	<i>Hoechst</i>	<i>BASF</i>	<i>VW</i>	<i>Bosch</i>	<i>Siemens</i>	<i>Daimler</i>	<i>Veba</i>
gs'	0.36	0.30	0.27	0.43	0.46	0.40	0.33	0.10
cd'	0.50	0.50	0.60	0.60	0.90	0.90	0.70	0.60
dog	$0.44 e^{i 54^\circ}$	$0.41 e^{i 59^\circ}$	$0.46 e^{i 66^\circ}$	$0.52 e^{i 54^\circ}$	$0.71 e^{i 63^\circ}$	$0.70 e^{i 66^\circ}$	$0.55 e^{i 65^\circ}$	$0.43 e^{i 80^\circ}$

Table 4: *The complex spread and diversity measure applied to the German top 100 transnational MNCs*

Nevertheless the complex spread and diversity measure allows for precise, quick, and meaningful comparisons between the *dogs* of different MNCs (compare also Figure 3). Depending on which notation is used one can stress the two separate components of *dog* (additive notation) or their joint meaning (exponential notation). For instance, the exponential notation makes clear at a glance that Bosch ($dog_{Bosch} = 0.71 e^{i 63^\circ}$) is the most globalised MNC of the sample and by a difference

$$dog_{Bosch} - dog_{Hoechst} = 0.30 e^{i 69^\circ}$$

or a factor

$$dog_{Bosch} / dog_{Hoechst} = 1.73 e^{i 4^\circ}$$

more globalised than Hoechst ($dog_{Hoechst} = 0.41 e^{i 59^\circ}$) while their tendencies towards cultural diversity are similar (63° vs. 59°). The additive notation points out that Bosch and Siemens as well as Bayer and Hoechst differ by a similar amount in their geographical spread but equal in their cultural diversity:

$$dog_{Bosch} - dog_{Siemens} = 0.038 + i 0,$$

$$dog_{Bayer} - dog_{Hoechst} = 0.041 + i 0.$$

Such comparative analysis will be useful in deeper investigations of internationalisation issues. Here we merely focus on whether the globalisation of MNCs is a matter of fact or not.

4.3 Globalisation Paths

Globalisation of MNCs is frequently called a recent development of the past decade. We therefore formulate

Proposition 2: The process of globalisation in the top 100 transnational corporations has been accelerating in the last decade.

<i>dog</i>	<i>Bayer</i>	<i>Hoechst</i>	<i>BASF</i>	<i>VW</i>	<i>Bosch</i>	<i>Siemens</i>	<i>Daimler</i>	<i>Veba</i>
1980	$0.52 e^{i 72^\circ}$	$0.57 e^{i 61^\circ}$	$0.52 e^{i 73^\circ}$	$0.40 e^{i 61^\circ}$	n/a	n/a	$0.60 e^{i 71^\circ}$	n/a
1985	$0.38 e^{i 68^\circ}$	$0.63 e^{i 63^\circ}$	$0.38 e^{i 69^\circ}$	$0.55 e^{i 64^\circ}$	n/a	n/a	$0.62 e^{i 65^\circ}$	n/a
1990	$0.47 e^{i 66^\circ}$	$0.64 e^{i 61^\circ}$	$0.39 e^{i 66^\circ}$	$0.48 e^{i 61^\circ}$	n/a	n/a	$0.54 e^{i 66^\circ}$	n/a
1995	$0.44 e^{i 54^\circ}$	$0.41 e^{i 57^\circ}$	$0.46 e^{i 66^\circ}$	$0.52 e^{i 54^\circ}$	$0.71 e^{i 63^\circ}$	$0.70 e^{i 66^\circ}$	$0.55 e^{i 65^\circ}$	$0.43 e^{i 80^\circ}$
1999	$0.56 e^{i 61^\circ}$	n/a	n/a	n/a	$0.66 e^{i 59^\circ}$	$0.73 e^{i 61^\circ}$	$0.60 e^{i 71^\circ}$	$0.59 e^{i 74^\circ}$

Table 5: Globalisation steps in the German top 100 transnational MNCs from 1980 until 1999

The data given by Table 5 and the corresponding globalisation paths depicted in Figure 6 are not complete for every MNC but enable an assessment of this proposition. The globalisation path of Bayer draws a “W”. After a decline in globalisation during the 1980s Bayer comes back to a *dog* in 1999 which is not much greater than it was 20 years ago. Daimler reaches the same level of globalisation with Chrysler’s help that it used to hold on its own in 1980. In this process, the globalisation path reveals a circular shape. Interestingly, the merger with Chrysler led to a lower level of geographical spread in the economic activities although both MNCs stem from different countries. The reason is Chrysler’s past focus on the US. DaimlerChrysler’s new engagements in Japan and South Korea, however, will later be reflected in higher levels of *dog*.

Hoechst’s *dog* rose during the 1980s and sharply fell back by the mid 1990s. Unfortunately there are no detailed data available from Aventis after the merger with Rhône-Poulenc. Also data of 1999 are missing for VW but one can observe a recovery of its *dog* in 1995 after a

decline in 1990. Neither the globalisation path of Hoechst nor the one of BASF which is U-shaped and ends in 1995 at a lower *dog* than in 1980 suggest a boost in globalisation during the last decade. Veba, Siemens, and Bosch show a clear growth in *dog* during the 1990s. Earlier data, however, were not published in required detail. It is enlightening to recall Figure 3 for a comparison with “ideal” globalisation paths of MNCs.

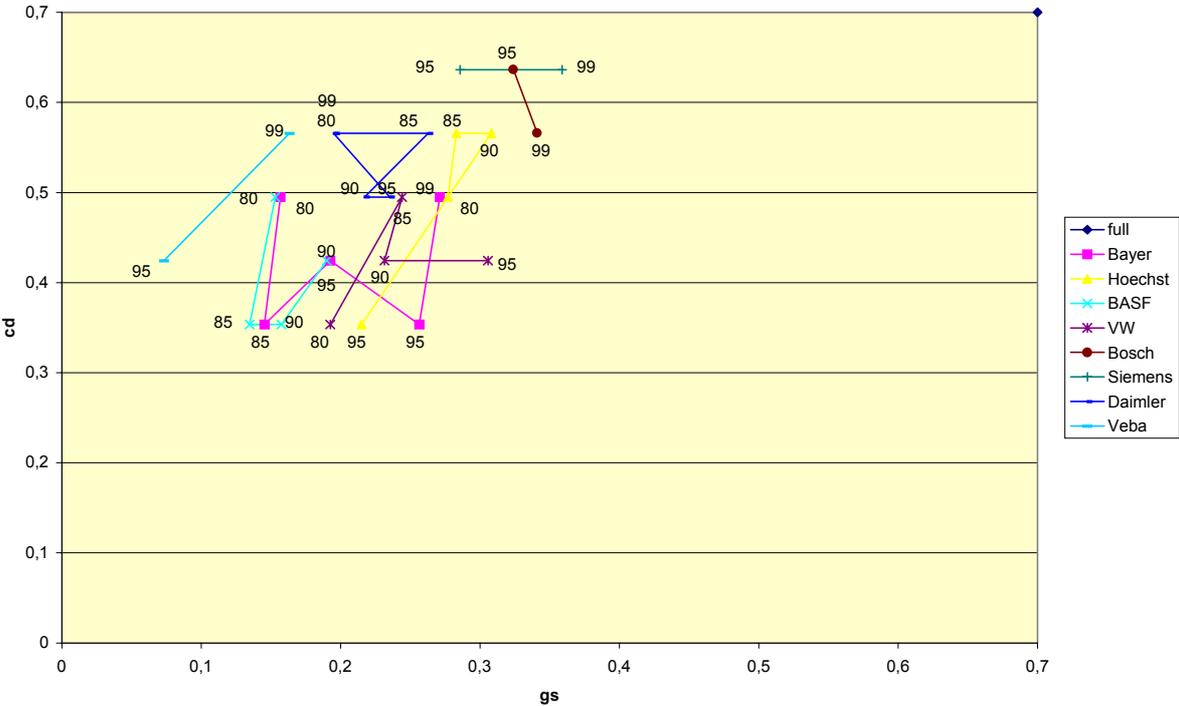


Figure 6: Globalisation paths in the German top 100 transnational MNCs from 1980 until 1999

In spite of the lively discussion on the current globalisation of transnational MNCs, an accelerating progress on their globalisation paths can hardly be identified by the complex spread and diversity measure. There is not even a consistent pattern of a positive trend. Bosch, Daimler, and Hoechst were de-globalising in the 1990s; neither do the data allow us to call the globalisation processes of the MNCs with presently rising *dog* “accelerating” as compared to the 1980s. Hence, Proposition 2 must be rejected as well. Assuming that the German top 100 transnational corporations are a representative sample of the world’s top 100 transnational corporations, we observe that the globalisation of MNCs is neither advanced nor accelerating for the time being.

5 Discussion and Implications for Future Work

The contribution of this research needs to be discussed with respect to the progress made in methodology and empirical knowledge about the globalisation of MNCs. On the methodological side we presented a new measurement concept of the degree of internationalisation. Its outstanding property is that it measures globalisation instead of simple internationalisation. Changing the viewpoint from an incremental to a global perspective enables to derive a quantitative reference of globalisation which is lacking in all existing measures of internationalisation. The complex spread and diversity measure carries more information in a single number than any other known measure and - unlike many of them - offers all mathematical opportunities needed in empirical research.

The first component delivers precisely condensed information about the spread of all economic activities of MNCs and is thereby much more valid than common ratios of international activities. However, its calculation requires full data availability; the comparably high numerical effort is no obstacle in the presence of powerful PC tools. The second component captures the number of cultural zones the MNC works in. Given the fact that this information is easy to gather and more refined concepts are still to be developed one must accept that the cultural diversity measure is rather rough and sensitive to changes in the circle of countries considered. Improvements can possibly be achieved by different weights for the cultural similarity between the clusters.

The two components cover both the “hard” and the “soft” side of globalisation so their joint validity reaches a remarkable degree. The integration of more than two dimensions as suggested in section 3.4 is hardly possible within the concept of complex numbers, but depending on the research question at hand one could enhance or replace the two dimensions suggested in this paper. Consequently the complex spread and diversity measure could be a highly useful and flexible methodological base for future empirical research in the field of international management.

The results of this paper on the empirical side supply novel input to the fashionable but little profound debate on the globalisation of MNCs. While many scholars, practitioners, and politicians already draw first consequences from the globalisation of MNCs, we must further

realise that it in fact does not exist. The most internationalised MNCs of the world have merely reached an intermediate state of globalisation. The process of globalisation as supposed to be the final stage of internationalisation occurring in the last decade could not be observed. In most of the MNCs, globalisation rose in recent years, but this short-term upward trend is frequently part of a long-term circular or alternating development.

Though there remains a caveat about the globalisation paths described above. Data were collected from annual reports which display a selection of the MNCs' most meaningful subsidiaries. Variable publication policies of the MNCs might have biased the findings in the interorganisational and timely dimension. The exact shape of the observed globalisation paths could possibly differ. But the results from the annual reports data are no doubt reliable enough as to falsify the assumptions of straightforwardly globalising or even globalised MNCs. The same is true for the restriction to two valid dimensions of globalisation in our measure. It does not take consideration of all possible dimensions to find non-globalisation in MNCs.

Future research on MNCs will firstly have to be more careful with the term globalisation; speaking about globalisation instead of internationalisation presents itself as highly misleading (Rugman, 2000). Secondly, deeper work will have to be done on the question precisely what facets of globalisation are most meaningful in the context of MNCs. Thirdly, the economic consequences of globalisation are to be investigated in more detail. Our observation that globalisation has not occurred yet in MNCs does not at all imply that full globalisation is economically desirable for them. Good to know that there will be sufficient time to research these issues until globalisation will some day - if ever - be reality.

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