



Journal of Economics and Business
Vol. XIII – 2010, No 2 (33-60)

A Dynamic Analysis of Country Clusters, the Role of Corruption, and Implications for Global Firms¹

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Abstract

Country clustering has been explored as a technique for reducing the complexity and exploring relationships between countries. Rather than examining country level indicators in isolation, clustering offers the opportunity to determine which countries are similar and explore the relationships between variables driving cluster membership. We examine 39 countries using economic, technological, cultural, demographic and quality of life variables. Corruption is captured using Transparency International's corruption perceptions index (CPI). The data cover the years 1995, 2000, and 2005. Principal components analysis reveals 3 factors, and the role of CPI (in terms of eigen weightings) is relatively stable over the period studied. Using factor scores for clustering, we observe cluster membership differences across

¹ An earlier version of this paper was presented at The Patterns of Corruption in the 21st Century, 6-7 September, 2008, Athens, Greece.

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years and note that diverging CPI scores are associated with countries that appear to be growing more similar.

Keywords: economic development, corruption country clustering

JEL classification: F23, M16, O17

Introduction

The global business environment has become increasingly competitive and complex. The enormous growth in international trade and investment flows has been accompanied by volatility in cross border movement of investment flows. There are huge new investments in physical plant and assets creating new manufacturing capacity in a number of industries ranging from such mature industries as automobiles to high tech-high growth industries such as electronics and telecommunications. And finally, certain distinct patterns in global competition have become more pronounced and rigid. These include, among others, plants in emerging economies that make use of low-cost labor to produce goods and services for selling in industrially advanced economies; local manufacture for primarily local consumption., e.g., in the case of mature industries; and, truly global industries where the location of manufacturing and selling operations are determined almost exclusively by the internal dynamics of the multinational corporation.

The economic considerations of global markets have been further complicated by the growth of regional trading blocs that eliminate barriers within the region while erecting barriers between the region and the outside world. They have also changed the dynamics of national governments' options in creating incentives supporting domestic firms while creating both tariff and non-tariff barriers for foreign firms.

Thirdly, the rise of the multinational corporation that uses emerging economies primarily as a source of cheap labor and manufacturing facilities has created its own set of unique problems. Emerging economies are confronted with increased competition from other countries but are attempting to foster the growth of their own MNC's with the goal of capturing more of the value-added chain. Political behavior by multinational corporations can create opportunities for firms in certain situations (Boddewyn, 1988) but corruption also poses difficulties for MNC's by introducing additional uncertainty in the business environment. Corruption reduces private investment (Mauro, 1995). It leads firms to carefully examine local entry decisions and business strategies in an effort to understand how corruption varies across markets and how to adapt to

this (Rodriguez *et al.*, 2005). Public pressure and scrutiny have led companies to adopt codes of conduct (Roth, 2005). MNC's are also confronted with consumer pressure in their markets due to concerns for human rights violations and environmental degradation in developing countries.

MNC managers are thus faced with complex issues that defy traditional analysis of markets based on economic and socio-political indices, and industry-based data. As an example, the discussion of "Asian Values" argued that East Asian economies' rapid growth was the result of characteristics like high savings rates, low and selective government intervention in the economy, flexible economies, long-term relationships, and skilled, educated labor forces (*Economist*, 1998.) Unfortunately, the severe economic difficulties that have arisen since 1996 have put these ideas very much in question. Because of the cultural influence on ethics, MNCs operating in diverse cultures will confront different conceptions of ethics (d'Irbane, 2004). The sheer diversity of countries and multitude of factors that must be considered makes it imperative that we develop approaches to analyze data that:

- (a) Reveal patterns of similarity and differences among different countries that lend themselves to creating strategic options for multinational corporations in developing their global strategies;
- (b) Identify those factors – both tangible and intangible - in a country or region's resource base, industrial policies, culture and traditions that would create unique set of challenges for the MNC. This is the country-of-origin effect or COE (Elango and Sethi, 2007);
- (c) Create a systematic approach whereby a country-region based COE factors can be combined with a company's own resources, organizational culture, and, propensity to take risk, to generate strategic options that are compatible with a company's global agenda; and
- (d) Examine the role of corruption, in particular, and how this positively or negatively influences the development of COE.

Scope of the paper

Clustering of country-markets serves to identify groups of countries with some degree of similarity, as well as explain what factors account for these similarities. Important reasons for doing this are to reduce the complexity of the many possible markets in the world economy, empirically determine what drives country development and what causes countries to be considered similar, and as a result, develop implications for both managers and country policy-

makers. Managers could use the results of cluster analysis to determine which strategies would be appropriate in different countries, and possibly to adopt more common strategies across countries which are members of the same cluster. Policy-makers could examine cluster membership, especially any changes over time, to determine whether their country had performed on a par with other countries in similar economic circumstances, and to determine which policy variables have the greatest degree of influence on country performance. Also, clusters of countries are important, because geographic regions appear to influence firm performance (Arregle *et al.*, 2009).

This research develops clusters of countries based on 39 countries (Table 1), including developing, newly industrialized countries and industrialized countries. Variables used cover aspects like a country's economic performance, quality of life issues (education, health, freedom), and the role of corruption (Table 2). Data have been gathered for three time periods, 1995, 2000 and 2005, so that changes in the driving forces and the composition of clusters can be observed over time.

Review of selected literature

A great deal of research has already considered aspects of this question. The earliest studies sought to simplify the grouping of countries or markets for the purposes managing operations within these groups. Often these studies considered a variety of economic variables, as well as social and demographic variables, as opposed to the earlier practice of grouping countries geographically. Sethi (1971) examines international marketing data including information on political conditions, trade, transportation, communications, and consumption. Using the BC Try system of analysis, this research identified clusters of explanatory variables and countries, demonstrating the relationships between variable clusters and country clusters. A later study confirmed some of the previous results while using a larger set of variables and countries (Sethi and Curry, 1972). The clusters of variables identified are aggregate production and transportation, affluence and life style, purchasing power of money, international trade, economic advancement, higher education, and political heterogeneity, and health and entertainment. Six clusters of countries were identified, and some countries could not be associated with a specific cluster. These findings demonstrate that obvious relationships between variables do not always hold, and that geographic proximity as a representation of similarity is misleading.

A second stream of research focused on clustering countries using cultural variables, work and managerial attitudes. This purpose of this research was to

determine how these were linked to decision making and managerial practices in foreign countries. This stream of research was reviewed by Ronen and Shenkar (1985), and they describe studies using variables classified as: (1) work goals importance; (2) need deficiency, fulfillment, and job satisfaction; (3) managerial and organizational variables; and (4) work role and interpersonal orientation (p. 437). This review enabled these authors to develop 8 clusters of countries which appear to be well supported by previous findings and which represent differences in work-related values.

An interesting study focuses on quality of life variables as the basis for cluster analysis (Peterson and Malhotra, 1997). Quality of life, being defined as the well-being of a society, encompasses economic conditions, people's health, the level of culture and entertainment, infrastructure conditions, the cost of living, the level of freedom, and environmental conditions. The emphasis is on reflecting consumption effects. This study identifies 12 clusters of countries, and it finds three dimensions of quality of life, namely the benefits, costs and sustainability (of the environment). The authors use their findings to make recommendations for both policy makers (such as paying more attention to environmental issues) and managers (such as transferring strategies between countries within a cluster).

Another approach is to examine country convergence or divergence over time without clustering countries (Douglas *et al.*, 1992). Countries' relative distance to each other was calculated using Euclidean distance measure and these relationships were plotted using multidimensional scaling (ALSCAL). The emphasis here was on explaining what leads to changes in countries position relative to each other, based on again economic, demographic and cultural variables, rather than developing clusters which would simplify marketing or managerial decisions. The findings in this case were somewhat surprising, in that countries (Western European, Japan and the United States) were diverging over the 28 year period. Both the geographic distance between countries and elements of national culture were found to be related to this divergence.

In addition, there has been considerable interest in determining what makes countries more successful economically, as traders, or in attracting foreign direct investment. Porter's theory (1990) develops a relationship between demand conditions, industry strategy, structure and rivalry, factor conditions, and suppliers (the "dynamic diamond") and an industry's ability to sell its products overseas. Porter's intriguing framework has generated many other studies as well as criticism for its focus on successful trading nations, its lack of predictive validity, and its inability to specify precise relationships between environmental conditions and outcomes (Grant, 1991). In a somewhat similar vein, there has been a call for a shift to comparative institutional research,

which would trace the development of institutions and firms' impact on the environment over a longer period of time, as well as covering many different sectors and regions (Iyer, 1997). Both Porter's work and Iyer's call for a more comprehensive form of analysis, highlighting the need to capture diverse aspects of societies, the interaction between firms and their environments, as well as the development of market environments over time. For example, firms may perform better by adopting a regional perspective, i.e., by managing subsidiaries regionally, and making strategic decisions both across and within regions (Arregle *et al.*, 2009).

More recent research has shown that the relationship between institutional factors and economic performance is probably even more complex than had been previously acknowledged. The home country appears to influence the development and performance of multinational firms as they internationalize (Elango and Sethi, 2007). For instance, developing country MNC's are more prevalent in the least-developed countries, presumably because they are more comfortable with operating in "difficult governance conditions" (Cuervo-Cazurra and Genc, 2008). The corruption perceptions index has been found to be highly significantly correlated with real gross domestic product per capita (Wilhelm, 2002). However, corruption is linked to both economic conditions (i.e., more bribery in poorer countries) and cultural values (such as high power distance) (Sanyal, 2005). Corruption is also linked to individual collectivism, human orientation and uncertainty avoidance (Seleim and Bontis, 2009), which then suggests specific institutional responses. The level of country institutional development affects foreign firm subsidiary performance in that countries with underdeveloped institutions show greater variation in subsidiary performance, whereas in countries with well-developed institutions, subsidiary performance is more firm-specific (Chan *et al.*, 2008). At a more general level, it appears that economic conditions, institutions and cultures evolve in parallel, necessitating a dynamic approach to studying these issues and adjusting research assumptions to evolving conditions (Tang and Koveos, 2008).

This review of the literature highlights the range of work that has been done in clustering countries, as well as the emerging issues regarding national competitiveness, the role of regions, institutional analysis, and in particular, corruption. There is considerable potential to expand the scope of clustering studies, thereby contributing to theory development as well as enhancing the usefulness of the findings.

Data and methodology

This study uses information on 39 countries (Table 1). These countries were selected based on country size, including population and economic size, as well as data availability. Countries were also selected to create a representative group containing developing, newly industrialized, and industrialized countries.

The variables, shown in Table 2, have been selected to encompass the economic, technological, cultural, demographic, and quality of life conditions in the countries. These variables are drawn from a wide variety of sources, including the *United Nations Statistical Yearbook*, *Transparency International*, and *Freedom House*. As can be seen from the variables selected, this research combines traditional economic and sociocultural variables with a variety of quality-of-life type indices which have recently become available. In this way, the analysis seeks to overcome the shortcomings of previous studies by incorporating far broader measurements. Data have been gathered for 1995, 2000, and 2005 so that changes over time can also be examined. There are no missing values in the data. The rationale for observing changes in countries' membership of clusters over time is quite clear, and dynamic analyses of this nature can have very interesting outcomes. For instance, Craig *et al.* (1992) found that countries were diverging, as opposed to the hypothesized convergence, and they then determined which forces appeared to be leading to this change.

Table 1 - Countries

Argentina	Greece	Philippines
Australia	India	Poland
Austria	Indonesia	Portugal
Belgium	Ireland	Russian Federation
Brazil	Israel	South Africa
Canada	Italy	Spain
Chile	Japan	Sweden
China	South Korea	Switzerland
Czech Republic	Malaysia	Thailand
Denmark	Mexico	Turkey
Finland	Netherlands	United Kingdom
France	New Zealand	United States
Germany	Norway	Venezuela

Table 2 - Variables

Economic	Technological	Cultural	Demographic	Quality of Life
Imports per capita	Personal computers	Mobile telephones	Infant mortality	Human development index
Exports per capita		Education enrollments	Life expectancy	
Aviation passengers		Mainline telephones	Population density	Immunization
GDP per capita (ppp)			Population increase	Corruption perceptions index (CPI)
GDP real growth rate			Urban population	Healthcare as % of government expenditures
Tourism				
Unemployment				
Trade freedom				

The modeling uses principal components analysis to eliminate multicollinearity, as well as examine the relationships between variables. The variables were initially converted to standardized z-scores. Next, principal components scores are used to compute a proximities matrix based on Euclidean distances. This is done for each year separately. Hierarchical clustering of the proximities is employed to examine the membership of clusters and determine the optimal number of clusters. The goal of this stream of research is to compare cluster membership for each time period, to determine how clusters of countries have changed over the 10 year period in question and examine the role of corruption in the principal components factors with implications for the effect of corruption on cluster membership.

Results

The Scree plots of the principal components analysis were examined to determine the optimal number of components. In each year, this was 3 components. Scree plots are shown in Figures 1, 2 and 3. The eigen weightings of the first 3 components is shown in Figures 4, 5 and 6.

Figure 1 - 1995 Eigen values

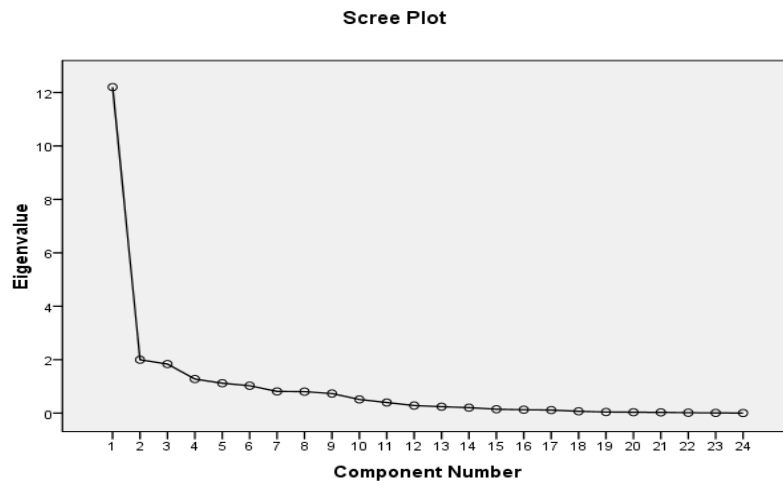


Figure 2 - 2000 Eigen values

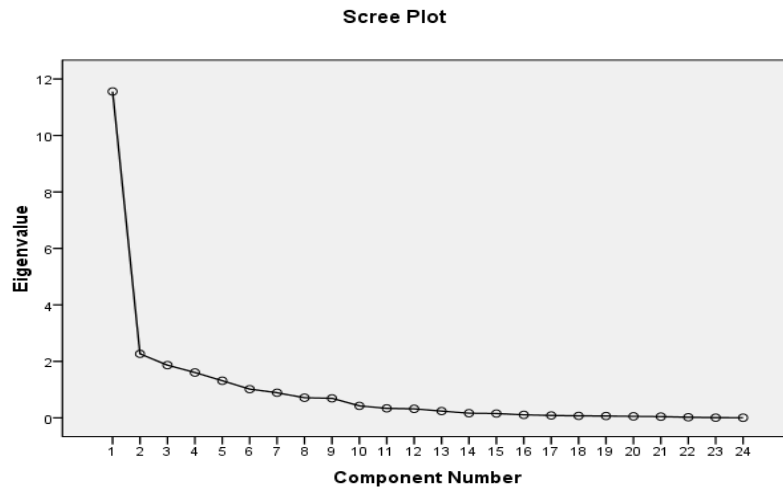


Figure 3 – 2005 Eigen values

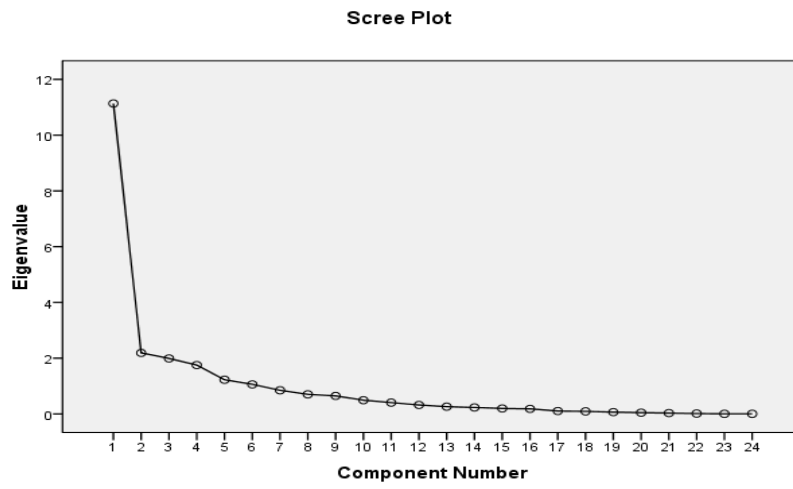


Figure 4 – 1995 Eigen weightings**Component Matrix ^{a,b}**

	Component ^c		
	1	2	3
Zscore: imports per capita	.765	.366	-.118
Zscore: PCs per 1000 pop	.876	.174	.328
Zscore: aviation pass/1000 pop	.723	.180	.456
Zscore: cell phones per 1000	.670	.084	.540
Zscore: education at 1st level per 1000	-.679	-.268	.413
Zscore: education at 2nd level per 1000	.602	.253	-.176
Zscore: education at 3rd level per 1000	.700	-.212	.234
Zscore: export per capita	.741	.358	-.086
Zscore: per capita GDP in US\$.954	.084	.008
Zscore: GDP real growth %	-.282	.539	.243
Zscore: health as % of government expenditure	.665	-.321	.000
Zscore: infant mortality per 1000 live births	-.892	.109	.116
Zscore: female life expectancy, years	.925	-.106	-.128
Zscore: male life expectancy, years	.873	.042	-.022
Zscore: population density	.035	.541	-.372
Zscore: annual % population increase	-.503	.038	.489
Zscore: % urban population	.583	-.440	.055
Zscore: telephone main lines in operation per 100	.948	.081	.056
Zscore: tourist arrivals per 1000	.470	.166	-.502
Zscore: unemployment, %	.332	-.584	-.274
Zscore: % of 1 year olds immunized	.351	-.116	.231
Zscore: Human Development Index	.880	-.330	-.050
Zscore: Corruption perceptions index	.868	.188	.287
Zscore: Trade Freedom	.833	-.194	-.103

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

b. Only cases for which year = 1995 are used in the analysis phase.

c. Cumulative variance explained: 1 = 50.8%; 2 = 59.2%; 3 = 66.8%

Figure 5 – 2000 Eigen weightings**Component Matrix ^{a,b}**

	Component ^c		
	1	2	3
Zscore: imports per capita	.757	.346	-.003
Zscore: PCs per 1000 pop	.848	.196	.126
Zscore: aviation pass/1000 pop	.711	.458	.279
Zscore: cell phones per 1000	.864	.216	-.080
Zscore: education at 1st level per 1000	-.610	.271	.520
Zscore: education at 2nd level per 1000	.164	-.378	.487
Zscore: education at 3rd level per 1000	.552	-.291	.031
Zscore: export per capita	.526	.658	.195
Zscore: per capita GDP in US\$.942	.112	.077
Zscore: GDP real growth %	-.204	.329	-.311
Zscore: health as % of government expenditure	.810	-.158	.234
Zscore: infant mortality per 1000 live births	-.893	.261	.103
Zscore: female life expectancy, years	.829	-.242	-.254
Zscore: male life expectancy, years	.826	-.098	-.213
Zscore: population density	.044	.027	-.542
Zscore: annual % population increase	-.486	.315	.475
Zscore: % urban population	.569	-.452	.400
Zscore: telephone main lines in operation per 100	.939	.071	-.061
Zscore: tourist arrivals per 1000	.575	.408	-.138
Zscore: unemployment, %	-.285	-.359	.388
Zscore: percentage of 1 year olds immunized	.328	-.421	-.107
Zscore: Human Development Index	.972	-.161	.048
Zscore: Corruption perceptions index	.840	.119	.257
Zscore: Trade Freedom	.816	-.117	.101

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

b. Only cases for which year = 2000 are used in the analysis phase.

c. Cumulative variance explained: 1 = 48.1%; 2 = 57.6%; 3 = 65.4%

Figure 6 – 2005 Eigen weightings**Component Matrix ^{a,b}**

	Component ^c		
	1	2	3
Zscore: imports per capita	.719	.223	.140
Zscore: PCs per 1000 pop	.815	.132	.098
Zscore: aviation pass/1000 pop	.482	.584	.180
Zscore: cell phones per 1000	.876	-.083	.094
Zscore: education at 1st level per 1000	-.145	-.167	.739
Zscore: education at 2nd level per 1000	-.579	.492	-.107
Zscore: education at 3rd level per 1000	.522	-.293	-.215
Zscore: export per capita	.358	-.117	.142
Zscore: per capita GDP in US\$.926	.142	.157
Zscore: GDP real growth %	-.671	.198	-.186
Zscore: health as % of government expenditure	.806	.061	.184
Zscore: infant mortality per 1000 live births	-.901	.098	.284
Zscore: life expectancy, females, years	.828	.061	-.448
Zscore: male life expectancy, years	.822	.235	-.383
Zscore: population density	.042	.005	-.361
Zscore: annual % population increase	-.345	.742	.091
Zscore: % urban population	.533	-.162	.063
Zscore: telephone main lines in operation per 100	.926	-.122	.153
Zscore: tourist arrivals per 1000	.549	.415	.238
Zscore: unemployment, %	-.398	-.348	.603
Zscore: percentage of 1 year old immunized	.398	-.601	-.203
Zscore: Human Development Index	.979	-.009	-.076
Zscore: Corruption perceptions index	.845	.157	.260
Zscore: Trade Freedom	.716	-.028	.273

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

b. Only cases for which year = 2005 are used in the analysis phase.

c. Cumulative variance explained: 1 = 46.4%; 2 = 55.5%; 3 = 63.8

The first and second vectors reveal a remarkably similar structure across the 10 year period being examined. The first vector appears to correspond to typical industrialized country variables. For instance, the number of personal computers and GDP per capita have strong positive relationships to this component. By contrast, GDP growth has a negative relationship. High weightings on the human development index, corruption index and trade freedom index (i.e., low corruption and greater trade freedom) also correspond to this vector. The second vector appears to represent rapidly industrializing countries. Many weightings are similar to those of the first vector but at lower levels. For example, imports are important but they are weighted at a much lower level than for the first vector. On the other hand, GDP growth is much more important (although it loses strength by 2005) and the percentage of urban population is negatively related to this vector, in contrast to the first vector. What is perhaps the most interesting is that the human development index, corruption index and trade freedom index have low or negative loadings on this vector. This suggests growth and economic development despite poor performance in trade openness, corruption and human development.

The third vector shows the most change over 10 years. It appears to reflect countries at the lowest level of development, which also change a great deal between 1995 and 2005. In 1995, the weightings suggest countries that are not really trading, have low GDP and moderate GDP growth, have low population density and a rapid increase in population. These countries may also be somewhat isolated given the negative weighting of tourist arrivals. In 2000 and 2005, however, imports and exports play more of a role, there is a greater focus on primary education, the population appears to be growing less rapidly, the population is gradually becoming more urban, and tourist arrivals have a stronger weighting. The corruption index has some weight for this vector, and it is consistent over the 10 year period.

Using the 3 vectors' Eigen scores from the principal components analysis, cluster analysis was performed. The cluster analysis dendograms are shown in Figures 7-9 and clustering maps are shown in Figures 10-12. Maps are plotted based on the scores of the first 2 Eigen vectors. The maps also show each cluster's average corruption score and the range of these scores. A table listing abbreviations for countries can be found in the appendix.

Figure 7 – 1995 Clustering dendrogram

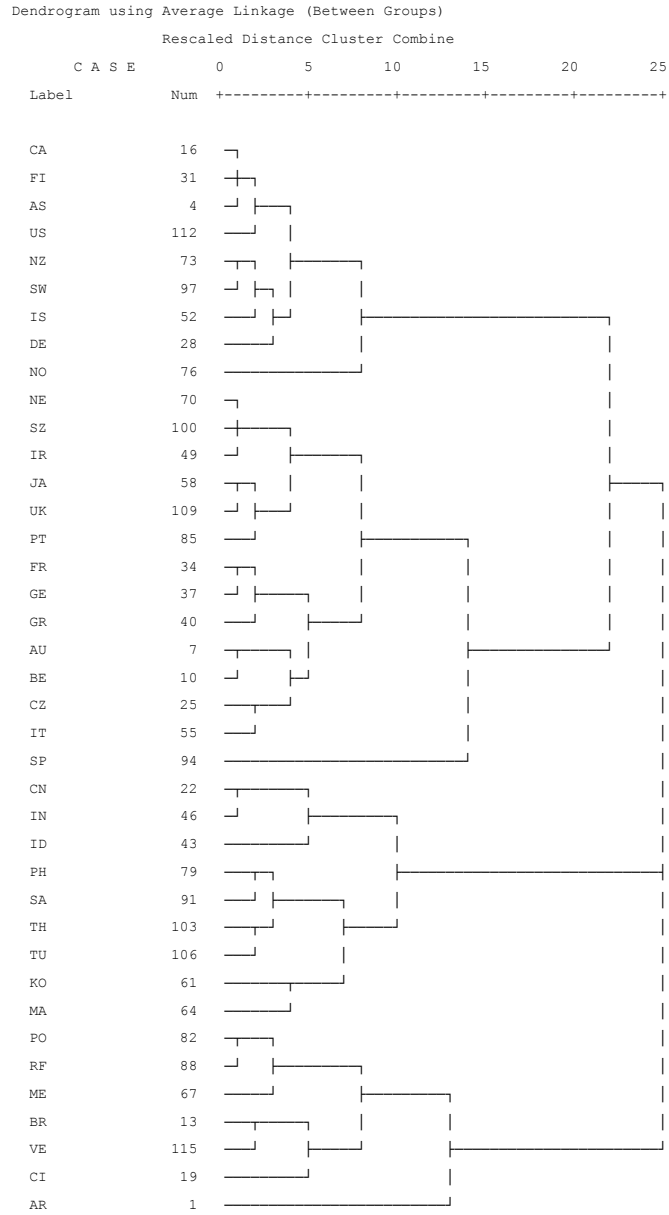


Figure 8 – 2000 Clustering dendrogram

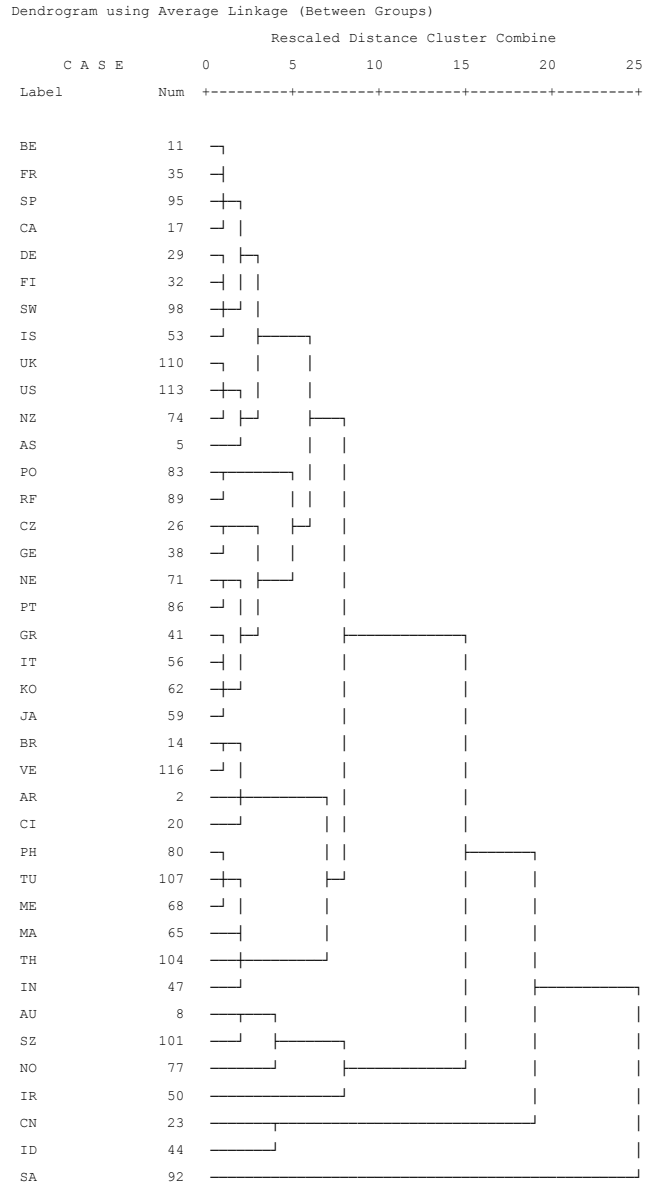


Figure 9 – 2005 Clustering dendrogram

Dendrogram using Average Linkage (Between Groups)

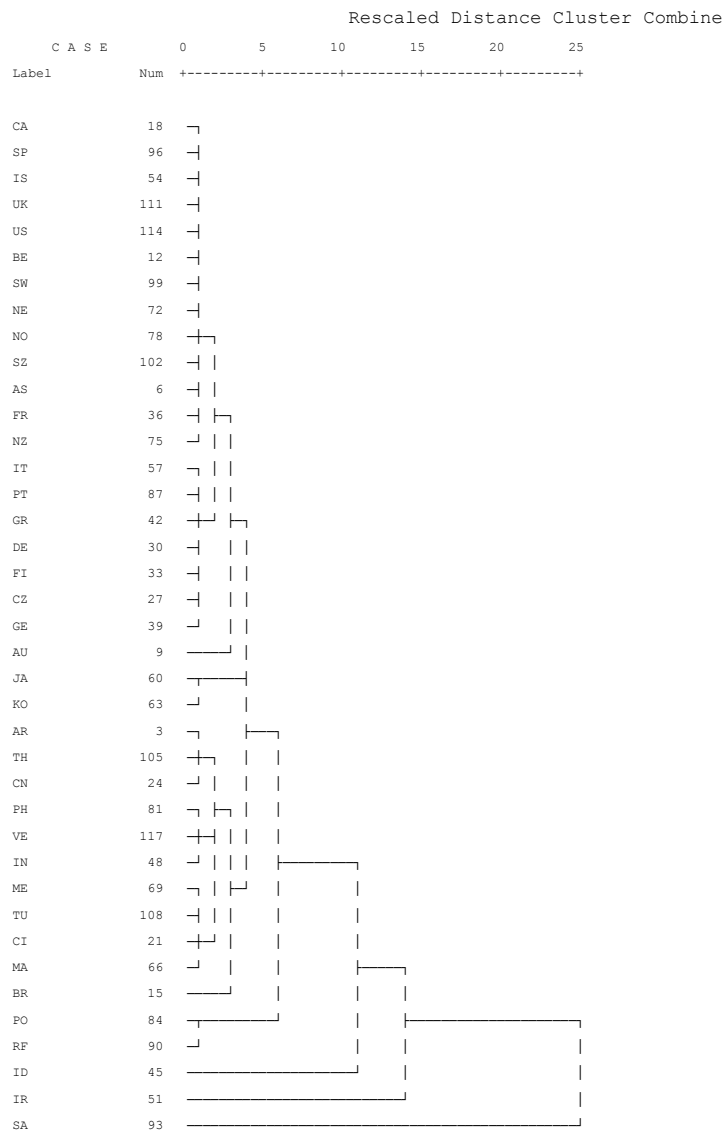
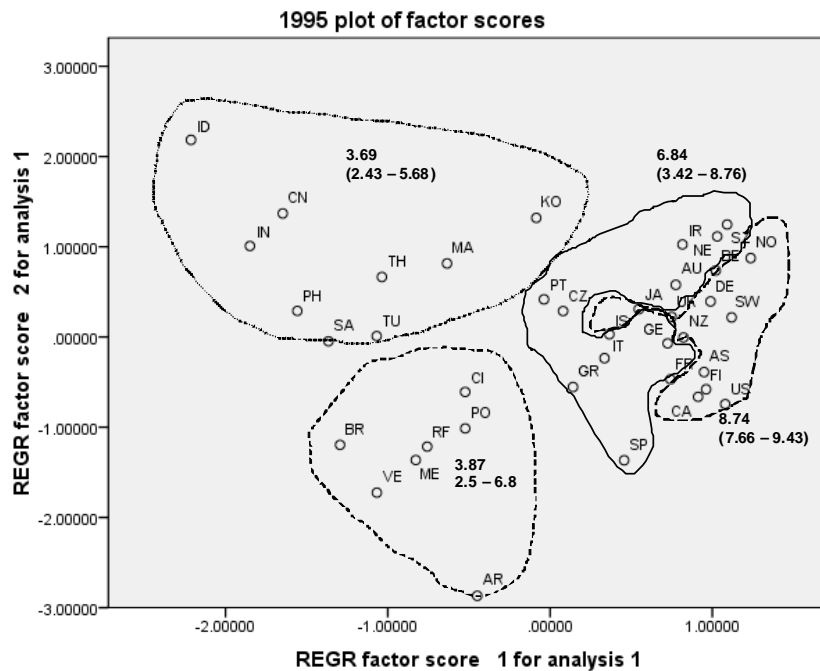


Figure 10 – 1995 Clustering map (also cluster CPI average and range)

The clustering analysis is very interesting in terms of showing how countries form groups based on similarity and also, how these groups change between 1995 and 2005. Figures 10-12 also show the CPI average for each cluster as well as the range of these values.

The analysis for 1995 suggests that there are 4 clusters. These seem to reflect geographic regions, although not perfectly. For instance, the Latin American countries (Argentina, Brazil, Chile, Mexico and Venezuela) form a cluster, but this cluster also includes Russia and Poland. It appears that regional similarities are important, but by the same token, Russia and Poland have sufficient similarity to the Latin American countries that they joined this cluster. In terms of the role of CPI, this group has a relatively low average CPI value (3.87), indicating a high level of corruption, but there is also quite a large range from Venezuela (CPI 2.5) to Chile (CPI 6.8). Although cluster members

are quite similar, and most are from the same region, there are large differences with respect to CPI. Clearly there are many factors which determine countries' similarity to each other, and corruption is only one among these factors.

Another cluster consists of Asian countries, including Turkey and South Africa. Again, the region appears to play a strong role in terms of explaining cluster membership. This cluster also has a relatively low CPI (3.69), and the range of CPI among members is almost as broad as that of the previous cluster. There is also a cluster of European countries, excluding Scandinavia but including Japan. This group has a much higher CPI (6.84) but an even wider range of CPI than the previous 2 clusters. The lowest CPI score, in this cluster is Italy (3.42) while the highest is Switzerland (8.76). The last cluster includes the Scandinavian countries (Denmark, Finland, Norway and Sweden) as well as non-European Anglo-Saxon countries (Australia, Canada, New Zealand and the United States) and Israel. This cluster has a high average CPI (8.74) and has a narrow range of CPI scores. In this cluster, the United States has the lowest CPI score (7.66) while New Zealand has the highest (9.43).

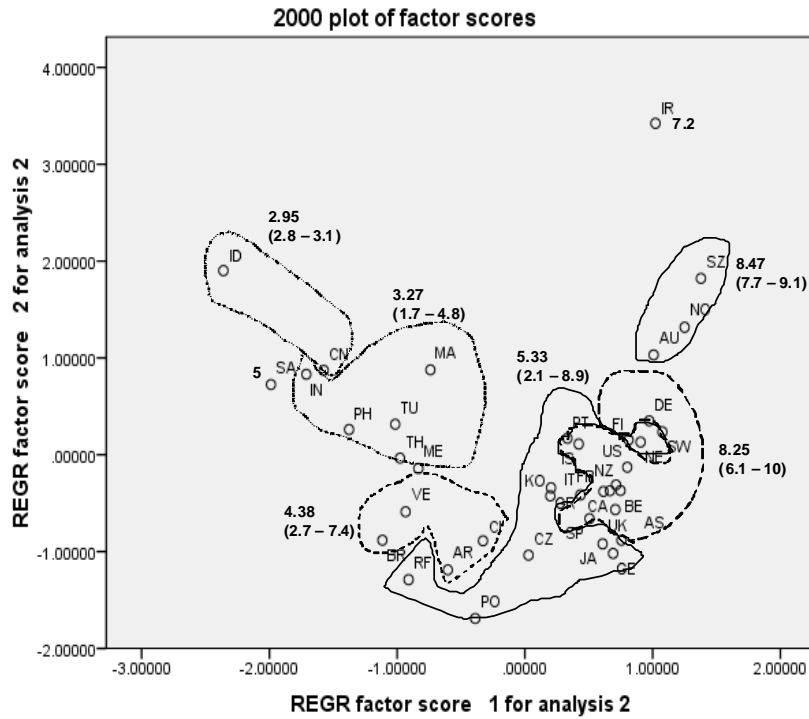
The 1995 country clusters reflect regional similarities, but intriguingly include countries from outside the region. The role of corruption is also confusing, in that some clusters have very broad ranges in terms of perceptions of the level of corruption. By looking at the 2000 clusters, we can see that the grouping of countries has changed, as has the role of CPI in terms of cluster membership. The Latin American countries continue as a cluster, but in contrast to 1995, Russia, Poland and Mexico have joined other clusters. The Latin American cluster has an average CPI of 4.38, with a range of 2.7, ranging from 2.7 (Venezuela) to 7.4 (Chile). Again, although one would expect the role of corruption to be quite clear, it is not at all clear how corruption influences the degree of similarity between these regional neighbors.

The Asian countries have also formed a cluster in 2000, although India and China have left this group to form a separate cluster. South Korea has left this group, and joined a cluster of European countries. South Africa has also left, and does not join any cluster in 2000. Mexico, by contrast, has joined the Asian countries in 2000. The Asian cluster has a low average CPI (3.27) and it ranges from Indonesia (1.7) to Malaysia (4.8). The cluster combining India and China has the lowest CPI values, but brings together the 2 very large Asian countries in a separate group.

The remaining countries have formed new clusters. Russia and Poland have left the Latin American group and joined with other European countries (the Czech Republic, Germany, the Netherlands, Greece, Italy and Portugal). South Korean and Japan are also part of this cluster. This group seems like a rather

odd collection of countries, although all are industrialized or developing rapidly.

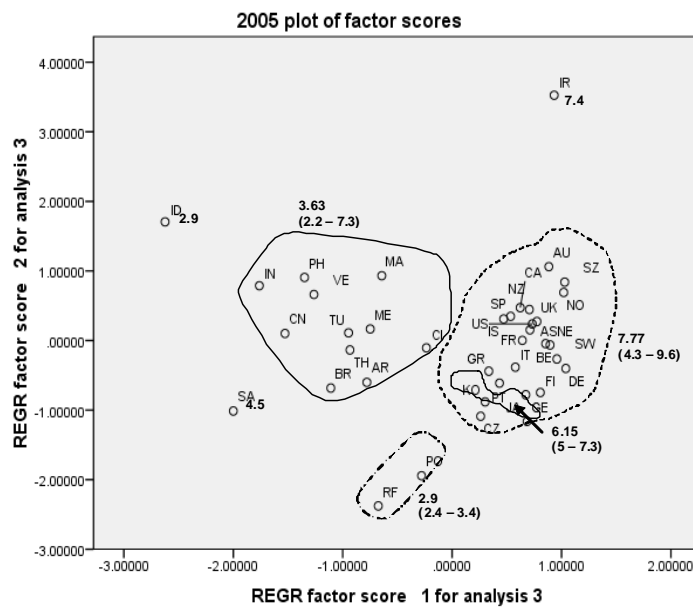
Figure 11 – 2000 Clustering map (also cluster CPI average and range)



This cluster has a CPI in the middle of the scale (5.33), ranging from Russia (2.1) to the Netherlands (8.9).

Another cluster combines European countries with the Anglo-Saxon countries and the Scandinavian countries, excluding Norway. Israel is also a part of this cluster. This group has a high average CPI (8.25) but the range is still quite broad, from Belgium (6.1) to Finland (10). These countries are similar, in many respects, but the CPI scores vary quite a bit and it is also not clear why Western European countries join different clusters. Another cluster consists of Austria, Norway and Switzerland. Among the 2000 clusters, this group has the highest average CPI (8.47), from Austria (7.7) to Norway (9.1). Finally, Ireland does not join a cluster in 2000, and as one can see from Figure 11, Ireland also appears to be quite far away from the other countries based on the scores for factors 1 and 2.

Figure 12 – 2005 Cluster map (also cluster CPI average and range)



7.4

7.77
(4.3 -

6.15
(5 - 7.3)

In 2005, there are fewer clusters, making the interpretation somewhat easier. Perhaps the most interesting change is that the Latin American countries have joined the Asian cluster. This is a very intriguing finding because the role of regions, in this case, appears to have diminished to the point that Asian and Latin American countries are broadly speaking similar. On the other hand, India is now alone, among Asian countries, and is further distinguished with a very low CPI score (2.9).

Russia and Poland have separated from the European group and now form a cluster which appears to reflect, among other things, the low values for CPI. Israel, the Anglo-Saxon countries and European countries have formed one cluster, with an average CPI of 7.77 but a very wide range, from Greece (4.3) to Finland and New Zealand (9.6). A separate cluster of Japan and South Korea has also formed. Finally, Ireland, India and South Africa have not joined any cluster.

For most countries, CPI values do not change much over time. Stable and predictable corruption could give firms the opportunity to form effective strategies for succeeding in such an environment (Rodriguez *et al.*, 2005). However, CPI has changed for some countries and Figure 13 lists those for which the change is greater than 1. Some countries' CPI scores improved while others deteriorated, but the direction of change in CPI does not consistently relate to cluster membership. For example, by 2005, Austria, the Czech Republic, Israel, Italy and Spain have all joined the same cluster, despite positive movement in CPI (Austria, Italy, and Spain) as well as negative movement (Czech Republic and Israel). On the other hand, Poland's decline in CPI does appear to be consistent with leaving the cluster of other European countries and joining a separate cluster with Russia. The CPI values for Ireland and South Africa have both declined, but the CPI score alone does not suggest why these countries should be separate from the other clusters. Given that the factor analysis and clustering uses multiple variables, it is not a surprising suggestion that other variables are also driving cluster membership. What is surprising, however, is that countries may become more similar (in terms of cluster membership) despite diverging trends in the country level of corruption.

Discussion

In a complex world, many variables affect the development and similarity of countries. These variables act and interact in a complicated fashion, so that it is difficult to determine what precisely is driving the economic or other performance of a country. Economic factors, institutions, culture and corruption are all believed to play a role. Corruption, and its measure, the

corruption perceptions index, have been strongly linked to real per capita gross domestic product (Wilhelm, 2002). As one would expect, a lower level of corruption is associated with higher GDP. However, it is very difficult to analyze how variables interact and how each variable individually affects country economic performance under specific conditions. The analysis described above takes a different approach, in that it explores the relationships between many variables over a long period of time. Principal components analysis is used to avoid imposing any structure on the data. The clustering technique permits the exploration of the influence of many variables on country similarity simultaneously. The results are intriguing, because corruption plays a significant role, but is definitely not the dominant force. To illustrate, countries with diverging CPI scores have nevertheless joined the same cluster, indicating that they are becoming more similar. Given that similarity and cluster membership are a function of many variables, one can conclude that other variables outweigh the influence of corruption, resulting in increasing similarity

**Countries with changes in corruption perception index > 1
between 1995 and 2005:**

Austria:	7.59 → 8.7
Czech Republic:	5.37 → 4.3
Ireland:	8.45 → 7.4
Israel:	7.71 → 6.3
Italy:	3.42 → 5
Poland:	5.57 → 3.4
South Africa:	5.68 → 4.5
Spain	4.31 → 7

Figure 13 – Changes in CPI scores

It would be incorrect to conclude that corruption does not negatively affect country economic development. However, the 2005 cluster map shows that 2 large clusters have formed (the Latin American + Asian cluster and the European + US, Canada, Australia and New Zealand cluster) and these clusters have a very wide range of CPI scores (in both clusters greater than 5.0 in a 10 point scale). Without doubt corruption is a culture, institution and context-specific variable in any country. It would be difficult to assume that CPI can fully capture corruption's complex effects, given its limitations in terms of the data gathering, analysis, and summarization in the index score. Firms also have the ability to cope with corruption through political behavior (Boddewyn, 1988)

and strategies based on corruption's pervasiveness and arbitrariness (Rodriguez *et al.*, 2005). The findings in this research suggest that certain groups of countries are indeed becoming more similar, and therefore broadly speaking firms could consider similar strategies in these groups of countries. Within these broadly similar strategies, country corruption may still require specific country-level adjustments to firm strategy.

The role of regions, by contrast, is still important, in terms of grouping similar countries. The regional influence is quite visible, although it can take surprising turns such as clustering the Latin American countries with the Asian countries in 2005. Despite the geographic and cultural differences, it is credible that these countries have become similar as a result of their economic growth as well as increasing openness to trade and investment. The advantage of the clustering technique is highlighted when it reveals unexpected clusters and changes in cluster membership.

Conclusion, recommendations and future research

It appears that the role of corruption, in terms of influencing country changes and similarities between countries, could be overstated if not examined in conjunction with the many other variables which represent a country's well-being. Although there appears to be a clear link between corruption and GDP, this research has not shown a clear link between corruption and country similarity, via cluster analysis. This seems similar to other research which has suggested that there is greater firm performance variability in countries that have a lower level of institutional development (Chan *et al.*, 2008). In other words, the lack of institutional development does not necessarily imply lower levels of firm performance. In terms of country similarity, countries can even join clusters with other countries that have much higher levels of corruption.

It is quite important, however, not to overstate the significance of this finding. The research approach is purely exploratory, and it requires detailed hypothesis development and testing in order to reach any firm conclusions. Without a doubt, it is beneficial to reduce corruption in any way. Countries, institutions and policy makers must evaluate which areas to tackle first, and with what means. This research suggests that some countries are becoming more similar over time even if the level of corruption appears to be diverging. It suggests that firms may be able to employ broadly similar strategies across similar countries while recognizing the need to specifically adapt to differences in corruption. Managers and firms will often be faced with the need to do business in corrupt environments, but these results suggest that they should not be unduly discouraged.

Conclusion and Future Research

A wide range of countries and variables, over a 10 year period, has nevertheless shown a remarkable degree of consistency in terms of factor structure. Countries do make economic progress and this may be happening despite a lack of change or even negative movement in terms of the corruption perceptions index. The clusters identified show important changes in cluster membership during the 10 year period. It is very intriguing to note that the larger clusters appear to have a very broad range of scores with respect to CPI. This suggests that corruption plays a role in shaping economies, but it is only one of many factors having an impact on a country. Indeed, countries that may be quite different with respect to corruption can still be similar enough to form part of the same cluster.

The results of this research suggest some very intriguing aspects about the role of corruption in societies. At the same time, CPI is a conceptual variable and based on the perceptions of institutions and country experts. It is important to examine the relationship between corruption and other variables (such as life expectancy) in more detail. There are numerous other variables which can be added to this dataset and other techniques that can be employed to provide more detailed understanding of the relationships between these variables. Future research can theoretically specify a more complete framework of the relationships, which could be used to test and refine theory about the forces of economic development, as well as provide a strategic tool for firms in terms of selecting countries and developing strategies to cope with different environments.

Appendix - Country Abbreviations

AR	Argentina
AS	Australia
AU	Austria
BE	Belgium
BR	Brazil
CA	Canada
CI	Chile
CN	China
CZ	Czech Republic
DE	Denmark
FI	Finland
FR	France
GE	Germany
GR	Greece
ID	India
IN	Indonesia
IR	Ireland
IS	Israel
IT	Italy
JA	Japan
KO	South Korea
MA	Malaysia
ME	Mexico
NE	Netherlands
NO	Norway
NZ	New Zealand
PH	Philippines
PO	Poland
PT	Portugal
RF	Russian Federation
SA	South Africa
SP	Spain
SW	Sweden
SZ	Switzerland
TH	Thailand
TU	Turkey
UK	United Kingdom
US	United States of America
VE	Venezuela

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