

CLUSTER ANALYSIS OF ENTREPRENEURSHIP PROXIES

Kate Brown

University of Maryland Eastern Shore

Princess Anne, MD USA 21853

Email: kbrown@umes.edu

Diane Li

University of Maryland Eastern Shore

Princess Anne, MD USA 21853

Abstract

The purpose of this paper is to analyze the entrepreneurial climates of member countries of the Organization for Economic Cooperation and Development (OECD) using cluster analysis with respect to variables suggested by Casson and operationalized by Brown, Thakur and Li (2008). Casson developed a taxonomy of characteristics that he believed indicated a country's cultural support base for entrepreneurial activities. He assigned subjective scores to these variables, and created a ranking system for seven countries. This research is an attempt to classify the entrepreneurial climates of the 23 members of the OECD using proxy variables developed by Brown, Thakur and Li (2008) to quantify Casson's subjective rankings. Cluster analysis was used to determine whether the macroeconomic characteristics would sort the OECD into groups that paralleled Casson's groups. Support is found for the joint hypothesis that Casson's taxonomy as quantified by the selected macroeconomic factors is a useful approach to describing cultures in entrepreneurial terms.

Introduction

Since the 1980s a series of entrepreneurial research projects have been undertaken to study the role of culture in entrepreneurial activity. The definition of entrepreneurial culture has not been consistent, however. The longitudinal study published as the *Global Entrepreneurship Monitor* begun in 1999 defines entrepreneurial culture on the basis of one survey question (Turro, et. al., 2013). Other work (Kline et. al., 2012; Al-Mubarak and Busler, 2012; Foreman-Peck and Zhou, 2010) also relies on survey results to measure entrepreneurial culture. Another body of work, surveyed by Hayton, et. al. (2013), attempts to measure the entrepreneurial impacts of the four cultural dimensions identified by Hofstede (1980). Casson (1990) confined his work to theoretical discussions of the impact of culture on entrepreneurial activity. He argues it is best to forego attempts to identify which members of society are entrepreneurs, and instead concentrate on identifying the level of entrepreneurial content within a society, as well as determining how it may be fostered. Brown, Thakur and Li (2008) proposed a group of macroeconomic proxies for the theoretical cultural constructs offered by Casson (1990).

Entrepreneurial Culture

As well as delving in entrepreneurial theory and examining how a country's economic climate and social values may affect potential entrepreneurs, Casson (1990) has attempted to compare the overall entrepreneurial climate in several nations. His method has been open to criticism, largely due to its extremely high level of subjectivity. Casson first settled upon several characteristics he thought may influence the level of entrepreneurial content within a society, such as voluntarism and commitment. He then proceeded to assign scores of 0, 1 or 2 to each characteristic for the respective country based solely on his own beliefs (Casson, 1990a:91-97). Casson acknowledged the limitations of using subjective measures, but claimed they were necessary due to the extreme levels of difficulty associated with quantifying what in some instances remain little more than national stereotypes. Casson further believed that a nation's culture may be used to its long-term competitive advantage.

The Proxies

Brown, Thakur and Li (2008) proposed macroeconomic ratios to serve as proxies for Casson's characteristics. Their goal was to find a set of data points that were consistently reported over many years that represented the spirit of Casson's characteristics. Proxies for the **technical variable** characteristic of scientific attitude identified by Casson

were based on research and development activities: the amount of Research and Development (R&D) as a percent of GDP (rdgdp), together with the percentage of R&D financed both by industry (rdindustry) and the government sector (rdgovern).

Casson's third technical variable, systems view, which Casson identified as the part of a culture that fosters development, was proxied by the percent of the workforce employed in industry (indusworkforce), the number of researchers per 10,000 employed people (researcher) and the number of domestic patents issued annually per capita (patent). Again, the goal was a consistent variable that might be associated with private economic development in contrast to government activities.

Moral variables are seen by Casson as the collective attitudes and actions of the people in a given country taking responsibility for themselves rather than relying on their governments. Brown, Thakur and Li (2008) used variables that represented private expenditures compared to public expenditures as the basis for their proxies. Voluntarism was proxied by the ratio of public to total health expenditure (publichealthratio), and both employee (employee) and employer (employer) social security contributions.

Casson discussed his remaining two moral variables, commitment and achievement, as characteristics of motivated, independent people who do not need coercion to do the right thing. These characteristics lead to more trust in society and lower agency and transaction costs. Brown, et al (2008) argue that it is reasonable to assume, and in keeping with the spirit of Casson's theory, that both of these variables would be more prevalent in the private than public sectors. Private sector remuneration is at least theoretically tied to outcomes rather than process, which should reflect commitment and especially achievement. From the OECD statistics available, the most suitable proxy for the size of the public sector was taxes as a percent of GDP (taxgdp). Government employment as a percent of total employment was also used as negatively correlated to the characteristics of commitment and achievement (governmentratio). It is worth noting that both Casson and Harper explicitly identified a large public sector as detrimental to the level of entrepreneurial content, which possibly further warrants the inclusion of these ratios.

Results

The cluster analysis on the OECD data divided the 23 countries in the sample into three clusters based on the factors listed in the table below. The numbering of the clusters does not imply any preferences in the analysis.

Clusters

Input (Predictor) Importance
 1.0 0.8 0.6 0.4 0.2 0.0

Cluster	1	2	3
Size	37.5%	18.8%	43.8%
Inputs	Country	Country	Country
	governmentratio	governmentratio	governmentratio
	taxgdp	taxgdp	taxgdp
	patent	patent	patent
	rdgdp	rdgdp	rdgdp
	rdgovern	rdgovern	rdgovern
	rdindustry	rdindustry	rdindustry
	researcher	researcher	researcher
	publichealthratio	publichealthratio	publichealthratio
	employer	employer	employer
	employee	employee	employee
	indusworkforce	indusworkforce	indusworkforce

Table 2: Cluster Components

	Cluster 1	Cluster 2	Cluster 3
Casson	France, Sweden	USA, Japan	UK, Canada, Italy
OECD proxies	Sweden, Norway, France, Finland, Denmark Belgium	USA, Netherlands, Japan.	UK, Turkey, Spain, Portugal, Italy, Ireland, Canada

The most important variables in determining the clusters were the government employment ratio (relative size of the public versus private sector), the tax base as a proportion of GDP, and the number of patents. The first two factors here were used as proxies for commitment and achievement in the moral characteristic category, while the number of patents was used as a proxy for systems view in the technical characteristic category. The next most important group of variables in the cluster analysis are the three research and development variables, all of which were used to proxy Casson's scientific attitude technical characteristic. Of less importance were the second proxy for system's view, researchers, followed by the three volunteerism proxies of public health ratio and the two social security contribution ratios.

Discussion

Researchers continue to look for ways to define and explain entrepreneurial behavior and success in all economies. Casson suggested that the culture of a country that provided a foundation for entrepreneurial activity was as important as the individual characteristics of entrepreneurs. He provided a set of characteristics that might suggest the foundation of entrepreneurial cultures, but stopped short of suggesting any way to measure these characteristics. The aim of this paper is to further Casson's study into entrepreneurial culture and the existence of differences between countries. While Casson's approach has been qualitative, this research is designed to incorporate actual statistics to describe the differences in the level of entrepreneurial culture between OECD countries.

Brown, et al, (2008) suggested a set of proxies to move the discussion of country culture and entrepreneurship forward. This paper uses those proxies and a large data set from 23 OECD countries to partition those countries into clusters. Clearly, this paper is testing the joint hypothesis that the proxies are valid and that Casson's original theoretical model was valid. Looked at from another perspective, however, using cluster analysis on macroeconomic variables to partition the OECD indicates that there are differences that can be explored in the context of entrepreneurial culture. The three most important ratios for the creation of the three clusters were the relative size of the public versus private sector, the tax base as a proportion of GDP, and the number of patents. Assuming for the sake of the discussion that Casson's fundamental premise that countries have different entrepreneurial climates is correct, the question becomes one of asking whether these three ratios measure factors that contribute to entrepreneurial cultures.

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