Do Logistics Managers in Quebec Differ in Risk Perception from their counterparts in Ontario? A Cross-Cultural Study

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Abstract

Cultural and institutional factors are known to bear influence on the decision making of individuals. In the business world, for instance, managers in the public sector are known to be more risk-averse than their counterparts in the private sector. This paper attempts to explore the risk perception of logistics managers in Ontario and Quebec as they evaluate risks in selecting the transport services for their shipments. Quebec's unique cultural and legal heritage distinguishes it in Canada. The cultural and legal diversity in Ontario and Quebec is assumed to have an impact on the decision-making of individuals in their professional and personal lives.

This paper compares the risk perception of shippers operating in Quebec and Ontario. Using data from a stated preference survey of 392 logistics managers in Ontario and Quebec, this paper explores how managers cope with various types of risks in selecting transport modes for their shipments. The logistics managers were offered hypothetical choices (truck only and intermodal) for their shipments where each

choice posed a unique level of risk for damage, security, and delay. Based on the attributes of the choices, shippers opted for one alternative.

Introduction

Risk perception and tolerance are key determinants of decision-making. Individuals with different risk perception and tolerance are likely to behave differently under similar circumstances. Consider for instance that high risk tolerance among young drivers is partially behind the higher rates of fatality among such drivers (Smith et al., 2006; Hanna et al., 2006).

Risk perceptions may differ between groups of individuals, while showing some similar trends in perception within the groups. A Norwegian study discovered significant differences in transport risk perception among the laypersons, politicians, and traffic safety experts (Rundmo & Moen, 2006). The study discovered that traffic safety experts were less demanding of risk reduction than the lay persons and politicians. Furthermore, the study found that the demand for risk mitigation was influenced more by the consequences of risky behaviour than by the probabilistic estimates of risk.

Apart from the institutional factors, culture does play a role in risk perception. Because countries have unique cultural heritage, risk perception also differs between countries (Bastide et al., 1989; Keown, 1989a). (Sjöberg et al., 2004) refer to (Keown, 1989b) who argue that "perceptions of risk were likely to vary between different countries dependent upon what the news media chose to report, what people chose to discuss, what cultural norms were viewed as important, and what technical and legal opportunities existed for control and regulation of risk."

The cultural differences in decision-making and risk perception have been studied in the business world as well. For instance, the relationship between risk perception and cultural background of e-consumers in Italy and the United States revealed that Italian consumers were less trustworthy and demonstrated higher risk sensitivity for privacy concerns than their American counterparts (Dinev et al., 2006).

While the cultural influences do matter, one can, at the same time, argue against the assumption that cultural influences play a larger role in determining the risk perception of professionals in a similar line of business. In a globalizing world, managers and other decision-makers in different countries could be assumed to be influenced by global trends, which may be strong enough to neutralize the impact of local culture. In a simulated study of executives hailing from China, Hong Kong, and Canada, home culture was found to have significant effect on the decision-making of executives from China and Canada (David K et al., 1988). However, the executives from Hong Kong were influenced "by a combination of Western and Chinese cultural norms."

Acceptance of risk is inherently tied to the perceived benefits of engaging in hazardous activities. Some commuters, for instance, may drive above the speed limit to avoid arriving late at the destination. Such individuals are accepting a higher risk for a perceived benefit. However, acceptance of risk is contextualized in a broader economic context that transcends beyond the trade-off between perceived risks and benefits. A comparative study of acceptance of environmental risk between Poles and Swedes revealed that Poles depicted higher risk tolerance for hazardous activities even when perceived benefits were low (Sokolowska

& Tyszka, 1995). Both economic and broader cultural influences were instrumental in the differences in risk tolerance between Poles and Swedes.

Evaluating perception of, and response to, risk could be a very complicated endeavour. It has been argued that the "response to risk is a highly social, emotive and symbolic entity" (Joffe, 2003). Joffee suggests that the "response to risk is not only complex but often contains contradictory elements, which are difficult to discern by way of scales and survey items." This poses serious constraints for empirical research where survey instruments have been used to gauge risk perception and tolerance. While this study also employs a survey to determine the risk perception of logistics managers in Quebec and Ontario, the authors certainly recognise the complexity in measuring risk perception and tolerance.

Realizing that risk perception and tolerance differs by culture, this study explores the differences in risk perception between decision-makers in Quebec and Ontario. Quebec is a francophone majority province in Canada with distinct culture and history that distinguishes it within the Canadian federation. Apart from the cultural diversity, Quebec also follows the Napoleonic legal tradition, whereas the rest of Canada follows the British Common Law. This study explores the existence of heterogeneity in risk perception and tolerance amongst the logistics managers in Quebec and Ontario.

The distinct traits in decision-making of Quebecers have been researched in the past. For instance, researchers have found that Quebecers differ significantly in their electoral choices. It was observed that while voters in the federal elections in

the rest of Canada considered the economic policies and achievements of the incumbent federal Liberal Party, voters in Quebec considered matters other than the economic performance of the incumbents (Godbout & Belanger, 2002; Guerin & Nadeau, 1998). While voting outcomes reflect the decision-making of adults, one may want to determine if differences in decision-making are observed amongst younger cohorts. Published research has shown difference in opinions even in younger cohorts of Francophones and Anglophones in Canada. A survey of 17-year old students about the impact of cultural norms(education, moral values, religion and politics) on science revealed significant differences of opinion on the influence of culture on science between Francophone and Anglophone students (Aikenhead, 1997).

Methodology & Data

This paper analyzes the mode choice decisions of logistics managers in the Québec City-Windsor corridor. Shipping managers have to choose the option that ensures their shipments reach the intended destinations on time, without any damage or theft, and for the minimum cost possible. In this regard, shipping managers would try to manage the trade-offs between service quality, measured as on-time delivery, safety and security risks, and the costs involved in shipping. One can resume that the mode offering guaranteed on-time delivery of safe and secure shipments would cost more than the rest. Therefore, the decision to go with a particular mode, i.e., truck versus rail versus intermodal, would end up being a trade off between the attributes of a particular mode in terms of on-time reliability and safety/security risks, and the shipping cost for that particular mode.

A stated preference (SP) survey was used to capture the decision-making of logistics managers in the corridor. In a SP survey, respondents are presented with alternatives differentiated by hypothetical but realistic attributes (Hensher, 1994). The respondents choose the alternative that maximizes their utility for that particular decision. In this study, respondents were presented with three choices for moving a shipment between an origin and destination within the corridor. The three hypothetical alternatives offered distinct damage, security and on-time risks, as well as distinct costs for moving the shipment within the corridor.

This study relies on discrete choice models to capture the trade-offs between costs and varying degrees of risk perception and tolerance amongst the logistics managers. Discrete choice models capture the utility for a particular alternative of a decision-maker, who is choosing between various alternatives (Ben Akiva & Lerman, 1985; 1984). The underlying assumption in this methodology is that the decision-maker, being a rational person, would opt for the alternative that would maximize his or her utility.

The data were collected from 392 logistics managers in the Québec City-Windsor corridor in 2005. Initially, 7004 possible respondents were contacted, of which 680 agreed to participate in the survey. However, only 392 respondents provided complete information. The survey collected information about the attributes of the firm, such as type of business number of employees, etc. The stated preference part of the survey asked the respondents to express their preference for a particular alternative (mode) to ship a particular shipment within the corridor.

Table 1 presents the description of key variables used in the model. The risk and cost variables were also interacted with the provincial dummies to capture the hypothesized variance in risk-averseness between logistics managers hailing from Québec and Ontario.

Table 1: List of variables and their descriptions

Variable Name	**Variable Description**
drisk	Damage risk of carrier presented to respondent: % of all shipments.
fprice	Price in dollars for the shipment presented to the respondent.
ontime	On-time reliability of carrier presented to respondent: % of all shipments.
srisk	Security risk of carrier presented to respondent: % of all shipments
train	If the shipment was identified as being carried intermodally (rail) by the given carrier: 1=yes, 2=no

Empirical Findings

The mean price for shipping services in the data set was around $811.12. The mean damage risk was around 1.45% of the shipments, varying between 0.5% and 3%. The security risk (referring to theft) was around 1% of the shipments, while varying between 0.5% and 1.5%. The on time reliability was around 91.6%, while varying between 85% and 98%.

The purpose of this research is to determine if the logistics managers in Quebec and Ontario differ in

their perception and tolerance of risk as it pertains to their shipping decisions. A discrete choice model can capture the perception and tolerance for risk of logistics managers as they choose between the modes (truck only and intermodal service involving trucks and long-haul service by rail). The estimated model could be presented as follows:

Pr(mode)= f(damage risk, security risk, on time reliability, price, rail (dummy))

The probability of a mode being selected is given by the trade off between different types of risks and the price or cost for the service. The trade off between different risks and the price of shipping service are such that one needs the ceteris paribus characteristics of the model to isolate the impact of a particular type of risk while evaluating the influence of another type of risk. Three unique models are estimated to capture the differences in risk perception and tolerance of the logistics managers in Quebec and Ontario. One model is estimated by pooling together the data from shippers in Quebec and Ontario. Afterwards, individual models are developed for Quebec and Ontario to see if the estimated parameters reveal any differences. The results of the initial three models are presented below in Table 2.

Table 2: Estimates of the Logit models for the entire data set and provincial samples

Variable	Full Sample	Ontario	Quebec
ontime	.11487649***	.11050578***	.11678468***
srisk	-.09207812**	-0.04122784	-.11129049**
drisk	-.39739951***	-.35836012***	-.41255543***
fprice	-.0044083***	-.0041406***	-.00451845***
train	-.71520767***	-.91978783***	-.64131601***
Pseudo Rho ^{2}	0.218	0.221	0.219
legend: * p<0.05; ** p<0.01; *** p<0.001			

The estimated parameters return *apriori* results. The results are reported for the full sample, Ontario only, and Quebec only segments of the data. The results are by and large similar with some differences between Ontario and Quebec. The paper first discusses the results for the full sample. The positive coefficients for on-time reliability (0.11487) suggests that with a percentage increase in on-time reliability, the odds of selecting that mode increase by 12% (100*(exp(.11487)-1)), all else being equal. With a unit increase in the security risk, the odds of choosing that mode decline by 9%. A comparison with damage risk reveals that a unit increase in damage risk is associated with a 33% decline in the odds of that mode being chosen. These results suggest that all else being equal, shippers are more sensitive to the damage risk than they are to the security risk. As for price, a unit increase in price of shipment reduces the odds for that mode by 0.43%. Finally, the odds for intermodal service are 51% (100*(1-exp(-0.715))) lower than for a truck only service, all else being equal.

While the results are similar for Quebec and Ontario only samples, there are some differences. For instance, the coefficient for security risk for logistics managers in Ontario did not return a statistically significant coefficient, while the sample for Quebec

returned a statistically significant coefficient. This implies that the logistics managers in Ontario are less sensitive to security risks than their counterparts in Quebec, all else being equal. Similarly, the odds for choosing an intermodal service are 60% lower than a truck only service in Ontario and 47% lower in Quebec.

The coefficients presented in Table 2 give credence to the underlying hypothesis that the logistics managers in Quebec perceive risks associated with shipping decisions differently from their counterparts in Ontario. However, these results are not sufficient to suggest that the differences in estimated parameters are statistically significant. The model should be parameterized in a way that would permit testing the statistical validity of the differences. One way to accomplish this is to interact the explanatory variables with the binary variable for Quebec and then test the joint significance of the coefficients for Quebec. The results presented in Table 3 offer the alternative parameterization.

Table 3: Conditional Logit model with variables interacted with Quebec

Variable	**Estimates**
ontime	.11050578***
srisk	-0.04122784
drisk	-.35836012***
fprice	-.0041406***
train	-.91978783***
Quebec_time	0.0062789
Quebec_security	-0.07006265
Quebec_damage	-0.05419531
Quebec_price	-0.00037785
Quebec_train	.27847181***
Pseudo Rho ^{2}	***0.22***

legend: * p<0.05; ** p<0.01; *** p<0.001

Table 3 presents essentially the same results as the ones presented in Table 2. However, this particular parameterization tests the joint significance of the coefficients interacted with the binary variable for Quebec, which are identified by the Quebec prefix in Table 3. The estimated parameters in Table 3, which have not been interacted with the Quebec binary variable are essentially the estimates for the sample for Ontario. The estimates in Table 3 reveal that all but one interacted variables for Quebec are statistically insignificant. However, this result is not of much significance. This paper is interested in testing the joint significance of the Quebec interacted variables using the Wald Test. The hypothesis that taken together, the Quebec interacted variables are not statistically different from 0 returns a Chi^2 (5) value of 24.55 with p-value of 0.0002, which is sufficient to reject the null hypothesis. Therefore, this paper concludes that taken together, the Quebec interacted variables are statistically different from zero, confirming that the risk perception and risk tolerance of logistics managers in Quebec is statistically different from that of their counterparts in Ontario.

Conclusions

The purpose of this research was to determine if the logistics managers in Quebec differ in their treatment of risks involved in shipping decisions. Quebec enjoys a distinct cultural and political place in the Canadian federation. The francophone culture and the adherence to the Napoleonic legal traditions set Quebec apart from the rest of Canada. Previous research on the unique cultural heritage and political aspiration of Quebeckers has informed on their distinct decision-making behaviour. However, previous comparisons between Quebec and the rest of

Canada have largely focussed on social, cultural and political norms. Research on the perceived differences in the decision-making of economic agents in Quebec and the rest of Canada is rare. This study explored the differences in decision-making of logistics managers in Quebec and Ontario to determine any heterogeneity in their risk perception and tolerance.

The study used a data set of 392 logistics mangers in Quebec and Ontario who were asked to choose a mode for their shipment. The available modes were truck only and an intermodal service involving rail. The attributes of the mode were price of the shipping service as well as three unique risk associated with each alternative. These were: damage risk, security or theft risk, and on-time reliability. The results presented in this paper confirm our hypothesis that the shippers in Quebec and Ontario are unique in their treatment of risk involved in shipping decisions. For instance, logistics managers in Quebec were more sensitive to security risk than their counterparts in Ontario. Furthermore, logistics managers in Quebec were more sensitive to damage risk than their counterparts in Ontario. On the other hand, logistics managers in Ontario were more reluctant to use intermodal services than their counterparts in Quebec.

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