

CA' FOSCARI UNIVERSITY OF VENICE

Department of Economics



Master's Degree programme – Second Cycle (*D.M. 270/2004*) - in
Economics and Finance

Final Thesis

The effects of uncertainty on horizontal, vertical and conglomerate cross-border acquisitions

Supervisor:

Prof. Roberto CASARIN

Graduand:

Kadiata SY

Matriculation Number 872114

Academic Year 2017 – 2018

Abstract

This master thesis is the culmination of my course in higher education. It was written to fulfil the graduation requirements for the award of the joint double degree of master's in economics econometrics and finance to the University of Aix-Marseille and University Ca' Foscari of Venice.

In this master thesis, fixed-effects and mixed-effects Poisson models are used to examine the factors drive strategies of the CBA deals. Based on a sample from 31 sources and 58 host countries over the period 1955-2010, the results indicate that cultural proximity has a positive and significant impact on the volume of CBAs deals. Geographic distance and corporate tax variables have negative and significant effects on the CBAs. Furthermore, market size has a positive and significant effect with horizontal motives for multinational integration. The skilled wage premium variable has a significant and positive effect on the vertical and conglomerate CBAs. Corruption variable is a determinant factor for the conglomerate strategies and has a negative impact on the operations of the conglomerate CBAs.

Second, the relationship between uncertainty and the different strategies of CBAs has been studied, using the volatility index as a proxy of uncertainty. The results show that the rise in uncertainty variable decreases the volume of CBA deals. While the rise in the uncertainty variable causes the increase in the volume of the horizontal CBA deals.

Third, this master thesis investigates the link between political risk and the volume of the CBA deals; using data from 31 sources and 18 host countries during the period 1996-2010. Six political risk variables (voice & accountability, political stability, and absence of violence, government effectiveness, regulatory quality, rule of law and prevention of corruption) have been used in the study. The results show that the increase in the political risks; "rule of law" in the host country increase the volume of CBA deals. While "regulatory quality" and "voice & accountability" cause the volume of CBA deals to decrease in the host country.

Keywords: Cross-Border Acquisitions, Horizontal Acquisitions, Vertical Acquisitions, Conglomerate Acquisitions, Uncertainty, Political risk, Nonlinear panel models for counts data, Fixed-effects Poisson model, Mixed-effects Poisson model, Maximum likelihood estimation, Dynamic panel data, GMM estimation, Random-effects model, FGLS estimator

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ABBREVIATIONS AND ACRONYMS

CBA	Cross-border acquisitions
MNE	Multinational firms
FDI	Foreign direct investment
MENA	Middle East and North Africa
ICERG	International Country Risk Guide
NIE	New Institutional Economics
SDC	Securities Data Company
SIC	Standard Industry Classification
M&A	Mergers & Acquisitions
ARCH	AutoRegressive Conditional Heteroskedasticity
GARCH	Generalized AutoRegressive Conditional Heteroskedasticity
APEC	Asia-Pacific Economic Cooperation
GMM	Generalized method of moments
FE	Fixed-effects
RE	Random-effects
LM	Lagrange multiplier
DW	Durbin Watson
FGLS	Feasible generalized least squares

Chapter 1

Introduction

Faced with the phenomenon of globalization of industry and markets, companies took continuously expansions, extending their branches into the international market. This expansion has led companies to modify in many ways their mode of operation. In fact, to reach an international scale, companies expand their activities across national borders, this made cross-border acquisitions (CBAs) more and more popular, and this in spite of the uncertainty face in which the companies they are acquirers or targets are at the moment confronted.

In contrast to domestic investments, CBAs are exposed to uncertainty in both acquirer and target countries. In periods of uncertainty, companies become cautious and reduce their spending, especially for CBAs that tend to be important and risky. As such, potential acquirers will delay CBAs until the uncertainty in the home country resolves itself.

CBAs are also exposed to the uncertainty of the target country. When multinational firms (MNEs) decide to acquire in the host country, they consider a lot of country-related factors into consideration and political risk is one of the factors. Political risk refers to the risk that a government will alter its policies in a way that is detrimental to the profits of a company, especially for foreign companies. This type of risk involves an uncertainty about potential changes in government policies regarding the treatment of foreign firms and the impact of these policies on future economic conditions. Political instability can expose companies to the risk of decisions made by new governments, which could affect the company's ability to continue operations in the host country. Given the growing importance of CBAs and Concerns of companies in the face of heightened uncertainty, it is therefore relevant to examine how uncertainty affects these decisions, especially for the different strategies of CBAs.

(N.Herger and S.McCorriston, 2016) built a study using the data from 31 source and 58 host countries covering the years between 1995 and 2010 in order to specify the determinants of horizontal, vertical and conglomerate CBAs by using fixed-effects Poisson model. Their study stresses several important elements. Firstly, this study highlights the characteristics of the different strategies that MNEs can follow when they acquire companies established abroad. Secondly, it highlights the significant share of conglomerate strategies in global activity and the less volatile share attributable to horizontal and vertical strategies of CBAs. To my knowledge, it is the only literature paper in the international trade that has looked at conglomerate CBAs as a foreign direct investment (FDI). Thirdly, the authors concluded that the size of the market is an important determinant factor for horizontal and vertical CBAs.

The motivation behind this master thesis is to evaluate the effect of uncertainty on these different strategies of CBAs. Indeed, since the financial crisis of 2008, investors do not know where to turn to, and their decisions are largely guided by news macroeconomy even political.

Several studies have been conducted to determine the impact of uncertainty on investments. It is generally recognized that uncertainty has a negative effect on investments. In their studies, (G. L. Noria and J. J. Z. Fernández, 2018) they evaluate the effect of uncertainty on FDI flows into Mexican manufacturing sector over the period 2007-2015. The authors use an uncertainty

measures closely related to the microeconomies Behavior and show that uncertainty is negatively associated to investment.

(C. Cao & X. Li and G. Liu, 2015) investigate on the impact of political uncertainty on the volume of CBA deals, by using a sample of national elections in 47 countries over the period 2001-2013. The authors concluded that political uncertainty affects the volume of CBA deals. In particular, the volume of inbound CBA deals decreases significantly in the year prior to a target country national election. Whereas, the volume of outbound CBA deals increases significantly in the year prior to an acquirer national.

(Sedik and Seoudy, 2012) offered a study within 20 MENA¹ countries over the period 1999-2010. This study aims to explain the relationship between country risk by using International Country Risk Guide (ICERG) index and its ability to attract FDI flows and to explain whether the New Institutional Economics (NIE) defined as both by the quality of business climate and the quality of institutions has a significant effect on FDI in the MENA region or not. The results indicated that low level of economy and financial risk had a positive but insignificant effect on FDI flows whereas high level of political risk had unexpectedly-a positive and significant effect on FDI. NIE measures also have complicated results. "Investment freedom", "financial freedom" and "regulatory quality" have positive and significant effects on FDI flows while "business freedom" and "voice & accountability" have negative and significant effects on FDI.

(H. Erkekoglu and Z. Kilicarslan, 2016) investigate the link between political risk and FDI inflows to host countries, using a sample of 91 countries during the period 2002 to 2012. The results indicate that an increase in the variables of the "political stability and absence of violence" and "government effectiveness" has a significant and negative effect on FDI whereas a rise in the variable "regulatory quality" has a significant and positive effect on FDI.

This study will use three databases to answer the following questions, namely: what factors drive horizontal, vertical and conglomerate CBAs? Does uncertainty affect the horizontal, vertical and conglomerate CBAs? And does political risk discourage these different strategies of CBAs?

In order to treat the subject and answer the questions asked above, a research plan has been drawn. It consists, firstly to evaluate the determinants of the different strategies of the CBAs as (N.Herger and S.McCorriston, 2016), by defining the vertical link at the 1 percent cut-off, using fixed-effect and mixed-effects Poisson regression. This empirical study aims a robustness check the findings of the previous study.

To study the relationship between uncertainty and these different strategies of CBAs, we will use the volatility index measured by the daily stock returns as a proxy of uncertainty on 8 countries over the period 1995-2010. Concerning the link between political risk and CBAs, we will use a sample from 31 source and 18 host countries which covers the year 1996-2010. Independent variables are "voice & accountability"; "political stability & absence of violence"; "government effectiveness", "regulatory quality"; "rule of law" and "prevention of corruption".

The present study differs from previous studies in several ways: Firstly, unlike the majority of previous studies, we study the determining factors for each strategy of CBAs, we use panel data

¹ Countries MENA: Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunis, United Arab Emirates.

covering multiple countries over a significant period of time. We will also check the conclusions of previous authors with respect to the traditional determinants of CBAs as a whole and especially for each strategy of CBAs. Secondly, we study the impact of uncertainty on these different strategies, both in the source and host countries.

This study has five chapters. The following chapter presents CBAs and their classification. The literature review is the subject of Chapter 3. This review presents, on the one hand, the state of knowledge on the traditional determinants of CBAs as FDI and on the other hand, the impact of uncertainty and political risk on investment. The fourth chapter presents the methodology as well as the data used. The fifth chapter presents an analysis of the econometric results obtained. The last chapter summarizes the results obtained and makes it possible to state a number of conclusions that emerge from this study.

Chapter 2

Classification of CBAs

It is useful at first to present some definitions necessary for the understanding of the analysis presented in the thesis. This chapter gives a definition of the CBAs, it describes the classification of CBA deals and documents of the high shares of the conglomerate transactions in the total number of deals and it also explains an important part of CBA deals, it is not always clear if a deal is driven by a horizontal strategy, vertical or both (N.Herger and S.McCorrison, 2016).

2.1 Definition of CBAs

CBAs appears when a company acquires another company based in a different country. Most of the time this operation appears when a company based in a particular country wants to multiple their operations in different countries and to have a local business in that country. CBAs permit companies to expand their operations around the world and to have a local business in a particular country without having to start from the beginning.

Depending on the degree of similarities between the sectors and the products offered by companies that make deals, we distinguish between horizontal, vertical and conglomerate CBAs. In the case of CBA horizontal acquirer firm replicate the production in the same industry and on the same stage of the supply chain. Whereas CBA vertical permits the acquirer firm to fragment the production in different industry and production stage located within the same value chain. And CBA conglomerate groups companies are neither vertically related through the supply-chain nor are horizontally linked through sharing the same industry. Companies engaged in CBAs conglomerate are primarily seeking to diversify their product portfolios².

2.2 Baseline classification

CBAs transactions are classified among four mutually exclusive categories, namely horizontal, vertical, conglomerate and complex. Deals are categorized using the relationship between the parent firm and the foreign subsidiary where an investment takes place. Vertical links between industries are defined as (N.Herger and S.McCorrison, 2016), based on Securities Data Company (SDC) Platinum reports the standard industry classification (SIC) codes of the acquiring and target firm.

A classification of our CBAs deals needs the specification of a cut-off value, denoted by \bar{v} . In the benchmark specification, a given pair of industries i, j is linked vertically if sales of one

² “is the collection of all the products or services offered by a company”, Investopedia: <https://www.investopedia.com/terms/p/product-portfolio.asp#ixzz5I4LqwsM>

industry sent to the other are above this cut-off value. Industry pairs are defined as horizontal if they share the same 6-digit SIC codes ($SIC_i^\alpha = SIC_j^t$).

Explicitly, denote the six industries of the acquiring firm with $\alpha = \{1, 2, 3, 4, 5, 6\}$ and the industries of the target firm with $t = \{1, 2, 3, 4, 5, 6\}$, which give 36 pairs to establish a horizontal strategy, that is $SIC_i^\alpha = SIC_j^t$ or vertical relationship, that is $v_{ij}^{\alpha t} > \bar{v}$.

Accordingly, deals classified as horizontal if, among all the possible combinations of acquirer and target standard industry classification, they share at least one horizontal link and no vertical links. Inversely, vertical deals are those that include at least one industry pair of SIC codes that are vertically related with no horizontal pairs. The Conglomerate deals regroup deals which neither horizontal nor vertical links were found among all the 36 possible combinations of the acquirer and target SIC codes. Finally, the complex category regroups deals where both horizontal and vertical pairs are found. Table 1 provides a formal definition of the four categories.

Table 1: Classification of CBA deals

Strategy	Horizontal Relatedness	Vertical Relatedness
Horizontal	$\exists i, j SIC_i^t = SIC_j^\alpha$	$v_{ij}^{\alpha t} < \bar{v} \quad \forall i, j$
Vertical	$SIC_i^t \neq SIC_j^\alpha \quad \forall i, j$	$\exists i, j v_{ij}^{\alpha t} > \bar{v}$
Conglomerate	$SIC_i^t \neq SIC_j^\alpha \quad \forall i, j$	$v_{ij}^{\alpha t} < \bar{v} \quad \forall i, j$
Complex	$\exists i, j SIC_i^t = SIC_j^\alpha$	$\exists i, j v_{ij}^{\alpha t} > \bar{v}$

Notes: i, j - standard industry classification codes. α - acquiring firm, t - target firm. $\bar{v}_{i,j}$ defined in (N.Herger and S.McCorrison, 2016), based on SDC Platinum reports the SIC codes of the acquiring and target firm.

Table 2 presents the distribution of the deals among these four categories. Vertical CBAs appears by far as the largest category, representing 56.31% of all deals. The second biggest category corresponds to conglomerate deals, with 19.56%, followed by complex and horizontal deals. Due to data restrictions, the reported distribution relies only on the count data.

Table 2: Classification baseline -CBAs

	Horizontal	Vertical	Conglomerate	Complex	Total
# deals	9,820	71,219	24,735	20,707	126,481
Percentage	7.76%	56.31%	19.56%	16.37%	100

Notes: CBAs, 1995-2010. 1% cut-off for vertical linkages.

2.3 Robustness

(N.Herger and S.McCorrison, 2016) define vertical linkages at a 5 percent cut-off as (L. Alfaro and A. Charlton, 2009) and the horizontal by shared 6-digits SIC code. This definition may be considered to be too restrictive and as such at the origin of the reported high shares of conglomerate deals. Table 3 reclassifies deals into the four categories using 1, 5 and 10 percent cut-off values of vertical linkages. The proportion of conglomerate deals for 1 percent cut-off shrinks but remains important compared to horizontal and complex deals. Also, when using the 5 percent cut-off for \bar{v} , the proportion of vertical deals falls while conglomerate deals account for over 35.78% of the total sample of CBAs. In particular, when using 10 percent cut-off value, 43.84% of the deals are considered to be conglomerate.

Our baseline results will consider a lenient 1 percent cut-off for \bar{v} as (Joseph P. H. Fan and V. Goyal, 2006).

Table 3: Different thresholds for vertical links

Cut-off value (%)	Horizontal (%)	Vertical (%)	Conglomerate (%)	Complex (%)
1%	9,820	71,219	24,735	20,707
	7.76%	56.31%	19.56%	16.37%
5%	24,138	36,334	45,251	20,758
	19.08%	28.73%	35.78%	16.41%
10%	44,911	14,178	55,453	11,939
	35.51%	11.21%	43.84%	9.44%

Chapter 3

Literature review

3.1 CBAs as FDI

The literature on international trade regularly studied the motives for FDI from a horizontal and vertical point of view. According to this organization scheme, MNEs invest abroad either to benefit from lower production costs (vertical FDI) or to market access (horizontal FDI). While ignoring the hypothesis that these FDI do not follow always these two strategies. Indeed, the globalization has changed many ways the mode of exploitation of companies, this emerged new streams of research in the international trade.

Particularly, one stream of recent research has focused on CBAs as the instrument via which firms establish control of affiliates in different countries. Various theoretical contributions such as (J. P. Neary, 2007) and empirical contributions: (J. Di Giovanni, 2005), (A. Hijzen & H. Görg and M. Manchin, 2008) and, (N. Coeurdacier & R. A. De Santis and A. Aviat, 2009) stress the important role of CBAs. But these studies ignore the potential significance of CBAs implying conglomerate deals. (A. Hijzen & H. Görg and M. Manchin, 2008) and, (N. Coeurdacier & R. A. De Santis and A. Aviat, 2009) they have only considered the distinction between horizontal and nonhorizontal CBAs. However, the present study documents that nearly twenty percent of CBAs done by MNEs is classified as a conglomerate. This surprising stylized fact disputes the functional vision of MNEs organization. Firms seem to frequently buy activities that are not directly related to their own activities. The concept of conglomerate FDI was quasi-inexistent on international trade literature. Indeed, until recently it was assumed that Mergers & Acquisitions (M&A) flows are mainly horizontal. (L. Alfaro and A. Charlton, 2009) shows that the share of vertical FDI is larger than the previously thought especially between developed countries.

While international trade literature put very little emphasis on conglomerate M&A, business and law literature analyse the concept from various angles. Next, the economies of scale and scope, these studies point to the enhancement of market power, diversification motives and multimarket contact (J. T. Scott, 1982). In the portfolio theory, the consequences of conglomerate M&A are also studied. And the portfolio effect of conglomerate M&A corresponds to the risk of anti-competitive outcomes, the latter be generated either by the increase of acquirer market power or the fact that the acquirer can gain control over complementary products.

Recent literature exploring firm-level data sheds light on M&A decisions with a notable contribution from (K. Head and J. Ries, 2008). An extensive literature in international economics, finance and business analyses determinants of FDI flows. The studies highlight the importance of, inter alia, market size, governance and quality of institutions, corporate tax or distance and cultural proximity, for instance, share the same language.

3.2 The effect of uncertainty on investment

The effect of uncertainty on investment has been widely discussed in the literature. But the majority of these studies were made in a microeconomics framework and most of them found a negative impact of uncertainty on investment. Indeed, these results have been reached by using either aggregate data for instance (A. Episcopos, 1995) or disaggregate with (J. Leahy and T. Whited, 1996), (L. Guiso and G. Parigi, 1999) and (N. Bloom et al., 2007).

In the literature, there are three main approaches to measure the uncertainty. The most common approach consists of the computation of volatility of the stock market (the volatility of stock prices or returns) or exchange rates to proxy uncertainty. For instance, (J. Leahy and T. Whited, 1996) use the variance of firms' daily stocks returns as a measure of uncertainty on a panel of 600 American manufacturing firms over the period 1982-1987 and show that uncertainty has a negative effect on investment. While (N. Bloom et al., 2007) use the volatility of manufacturing firms' daily stock returns as a measure of uncertainty on British manufacturing firms over the period 1972-1991 to analyse the impact of uncertainty shock on investment measured as gross industry investment at the beginning of the period. The authors show a nonlinear impact of real sales growth on investment and a weaker impact of sales growth on investment when the levels of uncertainty are higher. (H. Sharifi-Renani and M. Mirfatah, 2012) evaluate the determinants of FDI flows particularly volatility of exchange rate as a measure of uncertainty in Iran over the period 1980Q2-2006Q3 and, show that volatility of exchange rate has a negative impact on FDI.

A second approach consists to use AutoRegressive Conditional Heteroskedasticity (ARCH) or Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) estimates of the conditional variance of prices, interest rates, exchange rates or inflation rate to proxy uncertainty. For instance, (A. Lemi and S. Asefa, 2001) use the unconditional standard deviation of the exchange rate and the inflation rate as a measure of uncertainty and, the conditional variance of these variables, generated from the GARCH models to evaluate the impact of economy and political uncertainty on FDI flows to African countries, over the period 1987-1999. The authors show that the effect of uncertainty on FDI flows is not statically significant. Inflation and exchange rate uncertainties have an effect on FDI flows in the American non-manufacturing sector, whereas political instability has an effect on FDI flows from the American manufacturing sector.

Finally, the third approach resides on data provided by surveys on investment or entrepreneurs' expectations about the future demand for their firms' product price changes. (L. Guiso and G. Parigi, 1999) study the relationship between investment and demand uncertainty by using survey on investment in manufacturing Italia as an uncertainty measure in 1993. Based on each entrepreneur's probability of his future demand for the firm's product, they found that uncertainty has a bigger effect on investment when we considered firms with more irreversible investment and more market power.

3.3 The effect of political risk on investment

(B. Tallman, 1988) study the effect of political risk of home country on FDI in the case of Western industrial countries and the USA from 1974 to 1980. The statistical results show that investment activity in the countries studied is dependent on home country political conditions. meaning that, the political risk in the home country may affect and reduce the FDI in the host country.

(R. Grosse and L. J. Trevino, 1996) did a study on the factors that contributes to the explanation of FDI in the United States by country of origin, over the period 1980 to 1991. This study shows that the political risk in the home country has significant effect on the FDI.

(H. Zhao, 2003) evaluates the determinants of FDI to china, by using 21 source countries over the period 1983 to 1999. The study concluded that the political risk in China inhibited the flow of FDI. Indeed, the home countries with lower level of political risk compared to China made less investment in china while home countries with higher level of political risk made more investment to China on the same period.

(J.Trevino and G.Mixon Jr, 2004) exanimated the link between political risk and FDI within Latin American over the period 1988-1999. Their study conclude that political risk is a significant indicator of FDI to Latin America.

(H.H. Lee and R.S. Rajan, 2009) studied determinants of intra-Asia-Pacific Economic Cooperation (APEC) FDI flows in order to determine if APEC members³ tend to invest more intra-regionally than extra-regionally and another aim of this paper is to evaluate the effect of three types of country risks, namely: political, economy and financial risks on FDI flows for the destination country by using 60 source and 60 target countries from APEC member countries over the period 2000-2005. Their findings showed that among the political, economy and financial risks, political risk is the most important, its deterrent of FDI inflows since the latter creates uncertainty.

(K. Schneider and Matei, 2010) did a study on the relationship between political risk, business climate and FDI flows, by using data sample of 48 countries from the year 2003 to 2010. Based on fixed effect model and dynamic panel model, this study concluded that the business climate is a significant determinant for the FDI flows but the political risk affects the business climate. A lower level of political risk lead to an increase for the FDI flows this means a better working atmosphere for investors.

(K. Baek and X. Qian, 2011) investigate the impact of the political risk on FDI in the both developing and developed countries, using the 12 political risk category indexes on 22 industrialized and 94 developing economies over the period 1984-2008. They obtain the following conclusion: Firstly, political risk is a significant determinant of FDI in both industrialized and developing countries. Secondly, not all aspects of political risk impacted FDI stocks in the industrialized and developing economies in the same way. Thirdly, since the 9/11

³ APEC members: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; The Philippines; Russia; Singapore; Chinese Taipei; Thailand; The United States; Viet Nam

attacks, political risk has become a more significant and important determinant of FDI flows, especially in the developed nations.

(A. P. D. Aguiar et al., 2012) offered a study based on the factors explain FDI in Brazil by country of origin. They are using a sample of 180 countries with political risk in order to analyse the effect of political risk in the home country on FDI flows. They concluded that political risk in the home country reduced the FDI flows to host country, namely Brazil.

Chapter 4

Empirical methodology

The previous chapters allowed us to show the scope of the CBAs phenomenon as well as to do an overview of the literature on the subject. In this chapter, we will present the empirical models, describe the variables and the data sources used for the analysis, and discuss the econometric methodology. Following (N.Herger and S.McCorrison, 2016), we use the fixed-effects Poisson regression to evaluate the determinants of horizontal, vertical and conglomerate CBAs considering 1 percent cut-off for \bar{v} and we will use the mixed-effects Poisson regression in the second time for a robustness check of their results.

Our methodology will be composed of four different econometric models that will allow us to answer the three questions raised in the introduction above.

4.1 Nonlinear panel models for counts data: the determinants of horizontal, vertical and conglomerate CBAs

We use fixed-effects Poisson regression and mixed-effect regression to evaluate the determinants of the location choice of horizontal, vertical and conglomerate CBAs. Using the same database that in the Herger and McCorrison's (2016) study, covers 126,481 CBA deals from 31 source and 58 host countries listed in Appendix 1 during the period 1995-2010.

4.1.1 Presentation models

Suppose a company has decided to acquire a company abroad. The localization decision process of this company can then be described as follows:

Consider a company established in the country s . this firm can acquire a company established in one of the countries h with $s, h = 1, \dots, H, s \neq h$.

We apply to the data of CBAs the methods of fixed-effects Poisson regression and mixed-effects Poisson regression.

4.1.1.1 Fixed-effects Poisson regression

In the fixed-effect Poisson model one assumes that the variable is generated by a Poisson distribution of the form:

$$p_R(y_{sh,t} | \lambda_{sh,t}) = \frac{e^{-\lambda_{sh,t}} (\lambda_{sh,t})^{y_{sh,t}}}{y_{sh,t}!} \quad (1)$$

With source country $s = 1, \dots, S$; target firm in host country $h = 1, \dots, H$ and year

$t = 1, \dots, T$. Where $\lambda_{sh,t}$ is the Poisson parameter, and $y_{sh,t}$ is the number of CBAs at period t .

We know that $E[y_{sh,t}] = \lambda_{sh,t}$ see Appendix 2, and as a number $y_{sh,t}$ cannot take a negative value, Poisson regression employs an exponential mean transformation to relate the Poisson parameter with the explanatory variables $X_{sh,t}$, δ_s the source country, δ_h host country and δ_t year specific constant. We obtain:

$$E[y_{sh,t}] = \lambda_{sh,t} = e^{(\delta_s + \delta_h + \delta_t + x'_{sh,t}\beta)} \quad (2)$$

Let $y_{sh,t}$ be Poisson distributed and $e^{(\delta_s + \delta_h + \delta_t + x'_{sh,t}\beta)}$ the conditional mean function, and write:

$$E[y_{sh,t}] = \alpha_{s,t} e^{(\delta_h + x'_{sh,t}\beta)}, \quad (3)$$

where $\alpha_{s,t} = \ln(\delta_s + \delta_t)$, as in the paper's (N.Herger and S.McCorrison, 2016), absorbs the heterogeneity between pairs source country s and year t . As shown by (P. Guimarães & O. Figueirido and D. Woodward, 2013), the source country and year specific effects have to be treated as a fixed effect. Consequently, the log likelihood for the fixed-effects Poisson model equals

$$\ln Lp^{FF} = \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T (-\lambda_{sh,t} + y_{sh,t} \ln(\lambda_{sh,t}) - \ln y_{sh,t}!) \quad (4)$$

Substituting the value of $\lambda_{sh,t}$ in (4) we obtain

$$\begin{aligned} \ln Lp^{FF} = & -\alpha_{s,t} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)} + \ln \alpha_{s,t} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} + \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} (\delta_h + x'_{sh,t}\beta) \\ & - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T (\ln y_{sh,t}!) \end{aligned} \quad (5)$$

From the first-order condition with respect to the $\alpha_{s,t}$ with 0, we obtain:

$$\frac{\partial \ln Lp^{FF}}{\partial \alpha_{s,t}} = - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)} + \frac{1}{\alpha_{s,t}} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} = 0$$

solving for $\alpha_{s,t}$ yields the maximum likelihood estimator $\hat{\alpha}_{s,t}$ of $\alpha_{s,t}$

$$\hat{\alpha}_{s,t} = \frac{\sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t}}{\sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)}} \quad (6)$$

Substituting (6) into (5), yields the log-likelihood function of the fixed-effects Poisson regression

$$\begin{aligned} \ln Lp^{FF} = & \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} (\delta_h + x'_{sh,t}\beta) - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T [y_{sh,t} \ln \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)}] \\ & + C \end{aligned} \quad (7)$$

Where $C = \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T (\ln y_{sh,t}!)$ is constant, the δ_h appear as dummy variables in the fixed effects Poisson regression and concern the specific conditions in each host country. To facility the interpretation of the coefficients, Herger and McCorrison (2016) transformed all explanatory variables into deviations from their mean, that is $x_{sh,t} = \frac{x_{sh,t}}{E(x_{sh,t})}$, such that coefficients estimates reflects an elasticity $\frac{\partial E(y_{sh,t})}{\partial x_{sh,t}} \frac{x_{sh,t}}{E(y_{sh,t})} = \beta$, whereby β denotes the coefficient pertaining to $x_{sh,t}$.

4.1.1.2 Mixed-effects Poisson regression

As in the fixed-effect Poisson model, in the mixed-effects Poisson, we assume that the variable is generated by a Poisson distribution defined in the equation (1).

The mixed-effects Poisson regression model indicates the expected number of counts in $\alpha_{s,t}$ as in the equation (3) and:

$$\ln(\lambda_{sh,t}) = \ln(\alpha_{s,t}) + (\delta_h + x'_{sh,t}\beta) \quad (8)$$

Where $\ln(\alpha_{s,t})$ is an offset variable. The log likelihood corresponding to equations (1) and (8) is :

$$\begin{aligned} \ln Lp^{MF} = & -\alpha_{s,t} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)} \\ & + y_{sh,t} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T \ln(\alpha_{s,t}) + y_{sh,t} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T (\delta_h + x'_{sh,t}\beta) \\ & - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T (\ln y_{sh,t}!) \end{aligned} \quad (9)$$

From the first-order condition with respect to the $\alpha_{s,t}$ with 0, we obtain:

$$\frac{\partial \ln Lp^{MF}}{\partial \alpha_{s,t}} = - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)} + \frac{1}{\alpha_{s,t}} \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} = 0$$

solving for $\alpha_{s,t}$ yields the maximum likelihood estimator of

$$\alpha_{s,t} = \frac{\sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t}}{\sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)}} \quad (10)$$

Substituting (10) into (9), yields the log-likelihood function of the mixed-effects Poisson regression

$$\ln L_p^{MF} = \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T y_{sh,t} (\delta_h + x'_{sh,t}\beta) - \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T [y_{sh,t} \ln \sum_{s=1}^S \sum_{h=1}^H \sum_{t=1}^T e^{(\delta_h + x'_{sh,t}\beta)}] + C \quad (11)$$

4.1.2 Description of the variables used

Dependent variables

CBA_{sh,t}: We denote CBA_{sh,t} the number of CBA deals between the source country s and host countries h during year t.

CBA_{h,sh,t}: Horizontal CBAs.

CBA_{v,sh,t}: Vertical CBAs.

CBA_{c,sh,t}: Conglomerate CBAs.

Covariates

GDp_{h,t}: The market size that companies can access is approximated by sectoral output. A large market size, in addition to the significant opportunities it offers companies, also facilitates economies of scale. Market size variable should thus have a positive effect on CBAs.

swp_{h,t}: This variable represents the skilled wage premium in the host country. Wages of skilled and unskilled workers refer to the hourly salaries of, respectively, department heads and factory workers as paid in the capital city or the financial center of a country, it provides an indication of the production cost of companies. Other things being equal, an increase in the production cost of companies should discourage a foreign company from acquiring a company in this country. However, this variable may also reflect the sectoral structure of employment. An increase in the proportion of skilled workers in a given sector raises the average wage per worker. Therefore, if firms are seeking to locate in countries and sectors with a highly skilled population, an increase in the cost of labour can paradoxically attract CBAs. The expected effect of this variable may, therefore, be partly ambiguous.

D_{sh}: This variable measures the geographical distance between Washington DC and the capital city of the host country in terms of logarithmically transformed thousand Km. The effect of distance is ambiguous. On the one hand, a greater distance between two countries, and thus additional export costs, encourages companies to invest abroad rather than export. On the other

hand, an increase in distance increases coordination and information costs in foreign markets, which hampers CBAs.

L_{sh}: Variable for source and host countries sharing a common official language.

CU_{sh,t}: Variable for source and host countries that are a member of a customs union.

TF_{h,t}: The variable of trade freedom represents an index of freedom of international trade of the host country that is, tariff and nontariff barriers on a scale from 10 to 90. A higher value means more freedom.

IF_{h,t}: This variable represents the index of freedom of investment. This indicator includes five dimensions: namely whether there is a foreign investment code that defines the country's investment laws and procedures; whether the government encourages foreign investment through fair and equitable treatment of investors; whether there are restrictions on access to foreign exchange; whether foreign firms are treated the same as domestic firms under the law whether the government do not impose restrictions on payments, capital transactions, and transfers; and whether specific industries are closed to foreign investment. A higher value means more freedom.

C_{h,t}: The variable of Corruption represents an index on a scale from 10 to 90 and a higher value mean more corruption. According to (B. K. Smarzynska and S-J. WEI, 2000), corruption reduces the FDI, which mean that more the coefficient of corruption is higher, more the FDI flows decrease.

CT_{h,t}: The corporate tax variable is an indicator of business taxation. It represents the average tax rate on corporate profits. All other things being equal, an increase in the tax rate should reduce the expected gains of CBAs, and thus the number of domestic firms bought back.

ERR_{sh,t}: This variable represents exchange rate real. An increase of this variable means an appreciation of the source country currency (depreciation).

EURO_{sh,t}: Variable for source and host countries sharing the Euro as a common currency.

4.1.3 Data description

Figure 1 shows that horizontal CBAs has been relatively constant over the whole period. There were 413 horizontal deals per year at the beginning of the 1995 and the corresponding number deals stood at around 611 deals in 2010. Conglomerate deals grew from around 1,100 per year to around 1,600 during the period under consideration and reached a higher peak in 2007 with

⁴ For Belgium, Finland, Netherlands, and Norway the values of 1996 have been used for the year 1995 because its values are not available.

⁵ For Belgium, Finland, Netherlands, and Norway the values of 1996 have been used for the year 1995 because its values are not available.

⁶ For Belgium, Finland, Netherlands, and Norway the values of 1996 have been used for the year 1995 because its values are not available.

⁷ $\frac{NER_{sh,t} * PPP}{GDP}$ Calculated from by dividing the nominal exchange rate with the purchasing power parity (PPP) factor over GDP.

more than 2,100 deals. Conversely, vertical acquisitions doubled from around 2,800 deals to around 5,000. In particular, at the end of the 1990s, they increased to more than 4,00 deals per year but at beginning of the 2000s, they start to decrease at less than 3,500 deals per year and they begin to increase in 2004 and reached a higher peak in 2007 with more 6,500 deals before to start fall at 2008.

Figure 1: CBAs over time and their composition:1995-2010

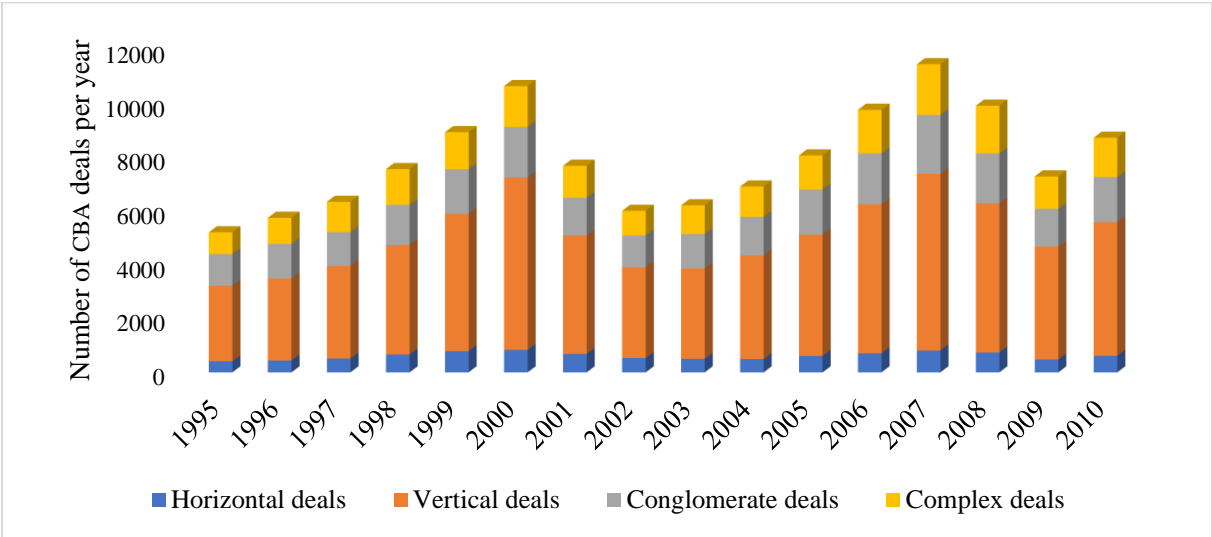


Table 4: Summary statistics for horizontal CBAs by Acquirer and Target Industry, 1995-2010

Acquirer\Target	Primary sector	Manufacturing	Transport	Distribution	Finance	Services	Total
Primary sector	1,287	18	23	8	3	16	1,355
Manufacturing	44	2,053	62	23	5	91	2,278
Transport	21	38	1,585	38	3	34	1,719
Distribution	3	9	41	592	0	13	658
Finance	12	8	16	3	1,282	44	1,365
Services	20	46	39	22	20	2,298	2,445
Total	1,387	2,172	1,766	686	1,313	2,496	9,820

Table 4 focuses on horizontal CBAs, we have 9,820 horizontal CBAs. It provides details on the number of deals by broad industrials category. Services are the largest acquisition industry, followed by the Manufacturing sector.

Table 5: Summary statistics for vertical CBAs by Acquirer and Target Industry, 1995-2010

Acquirer\Target	Primary sector	Manufacturing	Transport	Distribution	Finance	Services	Total
Primary sector	7,074	866	793	54	128	201	9,116
Manufacturing	777	19,303	3,209	125	251	1,404	25,069
Transport	661	1,837	5,347	37	184	1,121	9,187
Distribution	53	89	57	15	109	104	427
Finance	313	602	464	238	10,254	664	12,535
Services	194	729	714	104	298	12,846	14,885
Total	9,072	23,426	10,584	573	11,224	16,340	71,219

Table 5 presents the descriptive statistics for 71,219 vertical CBAs. It provides details on the number of deals by host industry category. Manufacturing is the largest acquiring industry, followed by the service sector. Manufacturing is, also, by far the most important target industry for acquisitions. More precisely, manufacturing accounts for more 30% of vertical CBAs acquirers and targets. This dominance of manufacturing sector in CBAs may be explained by the strong pressure in developed countries to restructure its manufacturing activities due to increased technological progress or foreign competition.

Table 6: Summary statistics for conglomerate CBAs by Acquirer and Target Industry, 1995-2010

Acquirer\Target	Primary sector	Manufacturing	Transport	Distribution	Finance	Services	Total
Primary sector	781	399	255	91	208	195	1,929
Manufacturing	508	2,926	544	196	378	1,360	5,912
Transport	294	453	823	147	225	507	2,449
Distribution	48	99	119	115	39	75	495
Finance	1,477	2,944	1,607	475	2,038	2,243	10,784
Services	197	687	478	87	375	1,342	3,166
Total	3,305	7,508	3,826	1,111	3,263	5,722	24,735

Table 6 concentrates the conglomerate CBAs, we have 24,735 conglomerate CBAs. It provides details on the number of deals by host industrials category. Finance is the largest acquiring industry, followed by the Manufacturing sector.

Table 7: Summary statistics CBAs by Region, 1995-2010

Acquirer\Target	AP	EU	NA	SA	SA&EA	WA	Total
AP	9,295	3,545	4,002	335	210	128	17,515
EU	6,983	42,300	13,191	1,953	600	790	65,817
NA	7,835	17,835	12,474	2,669	341	688	41,842
SA	28	111	148	134	3	7	431
SA&EA	221	404	199	26	12	14	876
Total	24,362	64,195	30,014	5,117	1,166	1,627	126,481

Table 7 reports the number of CBA deals by the regional origin of acquiring and target firms. The dataset distinguishes the following regions: Asia-Pacific (AP), Europe (EU), North America (AM), South America (SA), South-East Africa (SA&EA) and West Asia (WA). From the data, it follows that by and large, the majority of CBAs activity occurs within the same geographic region. This is confirming the idea of (J. Di Giovanni, 2005), whether FDI decreases with distance. We also find, however, that an important number of European firms acquire US firms and vice versa. Finally, it is apparent that most CBAs takes place between developed economies. Roughly, 80% of all CBA deals involve only Europe and North America.

4.2 Dynamic panel data (DPD): The effects of uncertainty on horizontal, vertical and conglomerate CBAs

The second objective of this study is to examine the relationship between uncertainty and the different strategies of CBAs, using the volatility index measured by the daily stock returns as a proxy of uncertainty on 8 source countries⁸ over the period 1995-2010.

4.2.1 Presentation model

We estimate an econometric specification where CBAs is the dependent variable and, its lag, a proxy for uncertainty, an index of freedom of investment, the corporate tax, an index of freedom of international trade, exchange rate real and interest rate are the main independent variables. The estimated specification can be written as follows:

$$CBA_{sh,t} = \beta_0 + \beta_1 CBA_{sh,t-1} + \beta_2 uncertainty_{s,t} + \beta_3 IF_{h,t} + \beta_4 CT_{h,t} + \beta_5 TF_{h,t} + \beta_6 ERR_{sh,t} + \beta_7 IT_{s,t} + U_h + \varepsilon_{h,t} \quad (12)$$

⁸ Canada, France, Germany, Hong Kong, Italy, Japan, the Netherlands, and the United States

4.2.2 Description of the variables used

Dependent variables

CBA_{sh,t}: We denote CBA_{sh,t} the number of CBA deals between the source country s and host countries h during year t.

CBA_{h,sh,t}: Horizontal CBAs.

CBA_{v,sh,t}: Vertical CBAs.

CBA_{c,sh,t}: Conglomerate CBAs.

Covariates

For the covariates: IF_{h,t}, CT_{h,t}, TF_{h,t}, and ERR_{sh,t} see the section 4.1.2.

IT⁹_{s,t}: This variable represents the interest rate in the source country

Uncertainty: We used the volatility index measured by the daily stock returns (the market indices used are listed in Appendix 3) to compute the uncertainty as following:

Firstly, we calculate the log returns: $R_t = \log\left(\frac{p_t}{p_{t-1}}\right)$

Annual volatility: $\hat{\sigma}_t^2 = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (R_{t-i} - \bar{R}_t)^2}$ where: $\bar{R}_t = \frac{1}{n} \sum_{i=1}^n R_{t-i}$; $n=252$

4.2.3 Data description

Figure 2 shows the evolution of these five uncertainty measures in which VIX represents the volatility index for the United States, Eurostoxx for Europe (Germany, France, Italy and the Netherlands), VXJ for Japan, HIS for Hong Kong, and GSPTSE for Canada.

As we can see, VIX and VXJ indices have higher values than the other indices, and more volatile also. They behave different face the crisis periods from 2002 and 2008. On this regard, it seems interesting to know how the uncertainty affects the different strategies of CBAs.

⁹ Source: Organisation for Economic Co-operation and Development (OECD)

Figure 2: Evolution of index volatility as uncertainty measure

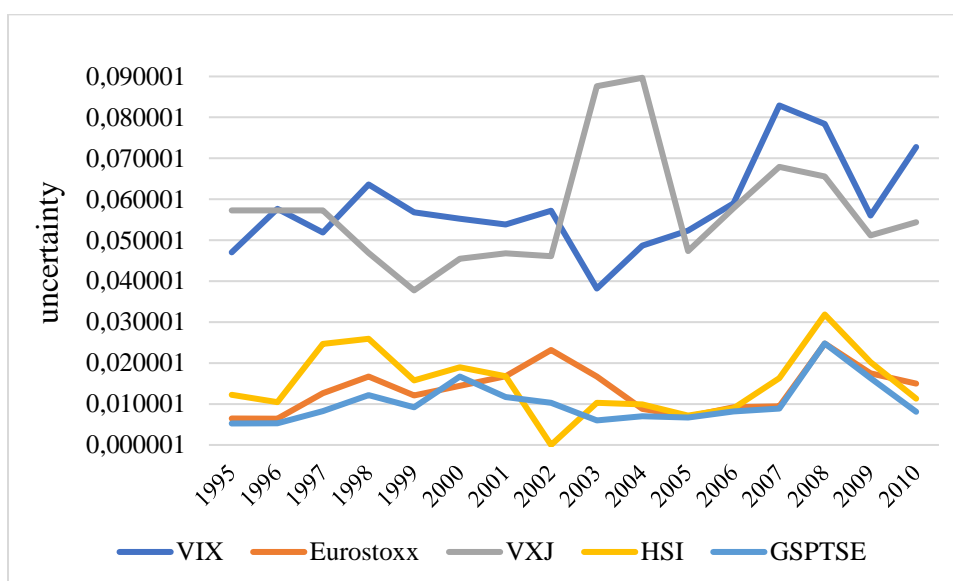


Table 8 reports the number of CBA deals by source country over the period 1995-2010. We can see, the United States account more CBA deals during this period compared the other countries with 31,453 deals, followed by Canada and Germany with 9,969 and 9,047 deals respectively.

Table 8: CBA deals by source country, 1995-2010

Country	CBA	Horizontal	Vertical	Conglomerate	Complex
Canada	9,969	624	5,539	1,848	1,958
Germany	9,047	5,168	1,535	744	1,600
France	8,251	1,028	4,453	1,314	1,456
Hong Kong	3,597	133	2,046	1,044	374
Italy	2,649	284	1,406	436	523
Japan	4,554	210	2,915	740	689
The Netherlands	5,861	524	3,277	1,036	1,024
The United States	31,453	1,963	18,110	6,547	4,833

4.3 Random- effects model: The effects of political risk on CBAs

The third objective of this study is to investigate the link between political risk and the volume of the CBA deals. Using the six political risk¹⁰ category indexes on 31 source and 18 host¹¹ countries during the period 1996-2010.

4.3.1 Presentation model

$$CBA_{sh,t} = \beta_0 + \beta_1 VA_{h,t} + \beta_2 PV_{h,t} + \beta_3 GE_{h,t} + \beta_4 RQ_{h,t} + \beta_5 RL_{h,t} + \beta_6 PC_{sh,t} + \varepsilon_{h,t} \quad (13)$$

4.3.2 Description of the variables used

Dependent variables

CBA_{sh,t}: We denote CBA_{sh,t} the number of CBA deals between the source country s and host countries h during year t.

CBA_{h,sh,t}: Horizontal CBAs.

CBA_{v,sh,t}: Vertical CBAs.

CBA_{c,sh,t}: Conglomerate CBAs.

Covariates

VA_{h,t}: The Voice & Accountability refers the idea which the citizens of a country are able to participate in the election of their government, freedom of expression, association, and a free media. This political risk has been used to measure the human, political rights, civil liberties and democratic accountability.

PV_{h,t}: Political Stability and Absence of Violence, measures perceptions' probability of political violence and terrorism. Many factors such as unequal distribution of revenue, religious and ethnic tensions in the country can be the source of political instability and violence.

GE_{h,t}: Government Effectiveness (GE) measures the quality of civil services, the quality of public services and its level independence from political pressures, its ability to implement influential and stable policies.

RQ_{h,t}: Regulatory Quality relates the capacity of the government to define sound policies and implement them in order to support the private sector development. The fields that these policies focus are for instance investment freedom, financial freedom, and price controls.

¹⁰ Source : ICERG, the PRS GROUP; for 1997, 1999 and 2001 the mean value has been used their values are not available for all countries.

¹¹ Argentina, Bahrain, Brazil, China, Colombia, India, Indonesia, Kenya, Korea, Malaysia, Mexico, Philippines, Russia, South Africa, Thailand, Turkey, United Arab Emirates, and Venezuela.

$RL_{h,t}$: Rule of Law refers to the application of the rules of society and implementing of safety; it also refers to the quality of judgment mechanism in the country.

$PC_{sh,t}$: Prevention of corruption permit to avoid the abuses of the public powers for the purpose of private benefits.

4.3.3 Data description

Table 9: CBA deals by host country, 1996-2010

Country	CBA	Horizontal	Vertical	Conglomerate	Complex
Argentina	1,234	111	655	212	256
Bahrain	19	1	10	5	3
Brazil	2,052	142	1156	367	387
China	5,038	224	2916	1214	684
Colombia	458	19	232	83	124
India	2,684	119	1491	594	480
Indonesia	922	35	447	242	198
Kenya	47	6	29	7	5
Korea	1,083	44	604	224	211
Malaysia	1,043	54	621	255	113
Mexico	1,548	84	984	189	291
Philippines	521	20	308	115	78
Russia	1,541	127	729	298	387
South Africa	1,025	47	551	190	237
Thailand	877	66	491	157	163
Turkey	656	75	322	119	140
United Arab Emirates	168	15	97	32	24
Venezuela	211	13	97	35	66

Table 9 reports the number of CBA deals by host country over the period 1996-2010. We can see, China registered more CBA deals during this period compared the other countries with 5,038 deals, followed by India and Brazil with 2,684 and 2,052 deals respectively.

Chapter 5

Empirical Results and Discussion

This chapter presents the econometric results obtained as well as the analysis of the latter. First, we will present the results obtained one after the other, then we will examine these results obtained. For the sake of brevity, the details related to the programming of the methodology on the Stata econometrics software are presented in appendices.

5.1 Determinants of horizontal, vertical and conglomerate CBAs: A Robustness check

The first objective of this study was to assess the determinants of different strategies of CBAs using panel data from 31 source and 58 host countries over the period 1995-2010 as in the Herger and McCorrison's (2016) study.

Table 10 and 11 present the results of fixed-effects Poisson regression and mixed-effects Poisson regression respectively. As specified in the previous chapter, in the first column we estimate the full sample of CBAs as the dependent variable for 1 percent value of \bar{v} , columns (2)-(4) contain only the number of deals associated with respectively, the horizontal, vertical and conglomerate CBAs as the dependent variable.

Table 10 reported the results of fixed-effects Poisson regression estimated by maximum likelihood method. Let us now look at variable by variable the results we reach. The market size variable, first of all, holds our attention. This variable displays the expected positive sign for horizontal CBAs and it is also significant at 1 percent. Conversely, it is significant at 10 percent for conglomerate CBAs but displays a negative sign. Look now the skilled wage premium variable. This variable is significant at 5 percent (except for horizontal CBAs where the coefficient is not significant) and positive.

The distance variable is significant at 1 percent for all and its sign is negative. Geographic proximity encourages CBA deals. Conversely, the fact that source and host countries sharing a common language act positively on CBAs. The corporate tax and exchange rate have positive and significant effects on companies' location choices.

These first results show that the geographical distribution of CBAs depends well on traditional variables of FDI location.

The customs union variable is significant and positive except the horizontal CBAs. Conversely, the corruption variable is negative and significant at 5 percent for the full sample of CBAs and conglomerate and at 10 percent for vertical. Finally, the euro variable displays the expected positive sign. It is also significant for the full sample of CBAs, horizontal and vertical CBAs. Indeed, the monetary union has many advantages, such as the elimination of intra-zone exchange rate volatility, a reduction in the risk premium, increased credibility of monetary policy and greater coordination of other policies. In view of these advantages, it could then have a significant impact on CBAs as it reduces the costs to firms considering acquiring a business abroad.

Table 10: Determinants of CBAs via the fixed-effects Poisson regression

Type of Deals:	All	Horizontal	Vertical	Conglomerate
	(1)	(2)	(3)	(4)
Market size	0.011 (0.020)	0.117*** (0.036)	0.005 (0.022)	-0.037* (0.022)
Skilled wage premium	0.781*** (0.159)	0.290 (0.298)	0.915*** (0.181)	0.760*** (0.194)
Distance	-1.101*** (0.034)	-1.347*** (0.054)	-1.073*** (0.035)	-1.107*** (0.041)
Language	0.092*** (0.003)	0.104*** (0.005)	0.090*** (0.003)	0.095*** (0.004)
Customs Union	0.056*** (0.009)	0.015 (0.014)	0.059*** (0.010)	0.090*** (0.012)
Trade Freedom	0.034 (0.047)	-0.004 (0.074)	0.031 (0.051)	0.050 (0.046)
Investment Freedom	0.008 (0.084)	-0.102 (0.106)	0.051 (0.093)	0.007 (0.108)
Corruption	-0.156** (0.066)	-0.093 (0.092)	-0.132* (0.069)	-0.213** (0.094)
Corporate tax	-0.329*** (0.083)	-0.511*** (0.122)	-0.354*** (0.091)	-0.309*** (0.117)
Exchange Rate	-0.438*** (0.059)	-0.501*** (0.107)	-0.453*** (0.060)	-0.365*** (0.066)
Euro	0.006** (0.002)	0.013*** (0.004)	0.005* (0.003)	0.000 (0.004)
CBAs	126,481	9,820	71,219	24,735
Obs	25,446	22,806	25,210	24,696
Log likelihood (Ln L)	-49,116	-10,745	-34,705	-18,626

Notes: The dependent variable is the number (count) of CBAs ($y_{sh,t}$); Estimation of the fixed-effects Poisson regression. The 1 percent cut-off level is used for \bar{V} to define CBA strategies. Obs is the number of observations, block bootstrapped robust standard errors are reported in parentheses; 100 replications (blocks defined by $\alpha_{s,t}$). * significant at 10%; ** significant at 5%; *** significant at 1% level, for industry i in acquisition country s , and industry j in target country h .

Table 11: Determinants of CBAs via mixed-effects Poisson regression

Type of Deals:	All	Horizontal	Vertical	Conglomerate
	(1)	(2)	(3)	(4)
Market size	0.082*** (0.022)	0.135*** (0.028)	0.078*** (0.023)	0.034 (0.024)
Skilled wage premium	1.491*** (0.230)	0.501* (0.264)	1.645*** (0.245)	1.488*** (0.264)
Distance	-0.903*** (0.038)	-1.095*** (0.047)	-0.869*** (0.038)	-0.918*** (0.044)
Language	0.144*** (0.004)	0.140*** (0.005)	0.142*** (0.004)	0.153*** (0.004)
Customs Union	-0.017 (0.012)	0.005 (0.013)	-0.026** (0.013)	-0.001 (0.014)
Trade Freedom	-0.119 (0.077)	-0.162* (0.087)	-0.132 (0.083)	-0.081 (0.090)
Investment Freedom	-0.386** (0.164)	-0.642*** (0.186)	-0.337* (0.172)	-0.369** (0.182)
Corruption	-0.107 (0.112)	-0.118 (0.127)	-0.046 (0.119)	-0.206* (0.125)
Corporate tax	-1.531*** (0.081)	-1.635*** (0.082)	-1.532*** (0.087)	-1.431*** (0.085)
Exchange Rate	0.857*** (0.042)	1.021*** (0.067)	0.893*** (0.044)	0.716*** (0.048)
Euro	-0.016*** (0.004)	-0.002 (0.005)	-0.014*** (0.005)	-0.031*** (0.005)
CBA	126,481	9,820	71,219	24,735
Obs	25,446	25,446	25,446	25,446
Log pseudolikelihood	-119,201	-16,667	-75,981	-34,525

Notes: The dependent variable is the number (count) of CBAs ($y_{sh,t}$); Estimation of the mixed-effects Poisson regression. The 1 percent cut-off level is used for \bar{V} to define CBA strategies. Obs is the number of observations, block robust standard errors are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1% level, for industry i in acquisition country s , and industry j in target country h .

The mixed-effects Poisson model results reported in table 11 differ quite significantly from that of the fixed-effects Poisson model. Although the relative market size variable is significant at the 1% for the full sample of the CBAs, horizontal and vertical. Skilled wage premium is

significant for all and positive. This result appears at first sight counter-intuitive. Other things being equal, an increase in the cost of labour should deter foreign companies from setting up in the host country. However, some studies on FDI also lead to this conclusion such as (D. F. Smith and F. Richard, 1994) and (P. Guimarães et al., 2000). This positive sign may come from a correlation between the cost of labour and the structure of employment and qualifications at sectoral level. An increase in the proportion of skilled workers in a given sector raises the average skilled wage premium per worker. Finally, we observe that the value of the coefficients is higher for the vertical CBAs. As in the fixed-effects Poisson model, the distance, corporate tax, and language variables are negatives and positive respectively, significant at 1 percent whatever the specification is chosen. In contrary, customs union and corruption variables are negatives and significant only for vertical at 5 percent and conglomerate at 10 percent respectively.

The exchange rate variable is significant as in the fixed-effects Poisson model but displays a positive sign. This underlines that impact of the exchange rate on the CBAs is a priori ambiguous. The euro variable is significant except the horizontal but to the great surprise, it displays a negative sign. This result appears at first sight counter-intuitive. The investment freedom is significant and negative, the trade freedom variable is also significant for the horizontal and has a negative impact on the CBAs.

5.2 The effects of uncertainty on horizontal, vertical and conglomerate CBAs

The second objective of this study was to assess the relationship between uncertainty and different strategies of CBAs, estimated by dynamic panel data using system Generalized method of moments (GMM). Table 12 shows the results from estimating equation (12), in the first column we estimate the full sample of CBAs as the dependent variable for 1 percent value of \bar{v} , columns (2)-(4) contain only the number of deals associated with respectively, the horizontal, vertical and conglomerate CBAs as the dependent variable. We mainly find that the coefficient of the uncertainty is negative and statistically significant for the full sample of the CBAs, which suggest that an uncertain economic environment discourages CBA deals into the source countries. The results show that the volume of CBA deals in the source countries becomes less attractive if insecurity levels increase. But the results show that the coefficient of uncertainty is positive and statistically significant for the CBA horizontal deals, this means that an uncertain economic environment supports CBA deals into the source countries.

Table 12: Effects of uncertainty on horizontal, vertical and conglomerate CBAs via DPD

Type of Deals:	All (1)	Horizontal (2)	Vertical (3)	Conglomerate (4)
CBA. L1	0.463*** (0.063)	0.114 (0.076)	0.479*** (0.063)	0.175** (0.079)
Uncertainty	-0.234** (0.113)	0.391** (0.174)	-0.193 (0.123)	0.141 (0.139)
Investment Freedom	-4.608*** (0.555)	-4.264*** (1.146)	-4.687*** (0.619)	-4.284*** (0.857)
Corporate tax	-0.930*** (0.315)	0.203 (0.617)	-0.682* (0.368)	-0.818** (0.405)
Trade Freedom	0.224 (0.392)	1.386* (0.783)	0.067 (0.424)	1.259** (0.567)
Exchange rate	-0.640 (0.990)	-3.271* (1.663)	0.095 (1.059)	-3.805*** (1.355)
Interest rate	-0.031 (0.081)	-0.181 (0.188)	0.058 (0.105)	-0.152 (0.125)

Notes: The dependent variable is the number (count) of CBAs ($y_{sh,t}$); Estimation of the DPD using system GMM. The 1 percent cut-off level is used for \bar{v} to define CBA strategies. Obs is the number of observations, block standard errors are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1% level, for industry i in acquisition country s , and industry j in target country h .

5.3 The effects of political risk on horizontal, vertical and conglomerate CBAs

The fixed-effects (FE) or random effects (RE), which is better than the others? Does the model have entity effect? If the model has entity effect, is this effect fixed or random? First of all, these are going to be determined.

Fixed effects are tested with F test and random effects are tested with Lagrange multiplier (LM) test which was developed by (T. S. Breusch and A. R. Pagan, 1980). Hausman specification test is used to compare the fixed effects model and random effects model. If the null hypothesis can't be rejected in the model which includes fixed effects, the random model is considered better than the fixed model. If the null hypothesis can be rejected in F test, it is determined that fixed effects model is decided to be better.

Table 13: Effects of political risk on horizontal, vertical and conglomerate CBAs

Type of Deals :	All	Horizontal	Vertical	Conglomerate
	(1)	(2)	(3)	(4)
VA	-31.953 (40.926)	1.182 (2.282)	-21.166 (23.896)	-18.905* (9.774)
PV	-31.641 (64.487)	-0.050 (3.595)	-5.652 (37.653)	-8.874 (15.400)
GE	18.81538 (42.377)	-2.587 (2.363)	24.149 (24.743)	8.071 (10.120)
RQ	-31.199 (31.566)	-3.370* (1.760)	-15.257 (18.431)	-5.571 (7.538)
RL	104.906*** (32.369)	6.046*** (1.805)	53.676*** (18.870)	27.855*** (7.730)
PC	19.127 (50.328)	1.575 (2.806)	0.422 (29.385)	2.699 (12.019)

Notes: The dependent variable is the number (count) of CBAs ($y_{sh,t}$); **Estimation of the fixed-effects Poisson regression. The 1 percent cut-off level is used for \bar{V} to define CBA strategies. Obs is the number of observations, block standard errors are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1% level, for industry i in acquisition country s , and industry j in target country h .

According to results of all of these tests (shown in Appendix 4), H_0 hypothesis is rejected. In other words, the existence of entity effects is rejected. Moreover, according to Hausman test's results, H_0 hypothesis can't be rejected. And it is determined that random-effects model is consistent.

Also, in Appendix 4; various tests that identify the existence of assignment from econometric assumptions can be seen. In unbalanced panel model, in order to test the existence of heteroskedasticity, Wald test is used and in order to test the autocorrelation, Durbin Watson (DW) test and Wooldridge test are used. According to the results that are shown in appendix 4, it can be seen that there are both autocorrelation and heteroskedasticity in the model. Because there are these two problems in the model, resistant estimators will be acquired.

In table 13, the resistant estimator takes place. According to the Feasible Generalized Least Squares (FGLS) model, it was seen that "rule of law" is positive and statistically significant for all, which suggest that the increase of rule of law in the host country increase the volume of CBA deals. While "regulatory quality" and "voice & accountability" variables are negative and statistically significant for horizontal and conglomerate CBAs respectively. Results show that the increase in the political risks; "regulatory quality" and "voice & accountability" causes the volume of CBA deals to decrease in the host country for the horizontal and vertical CBA deals respectively.

Chapter 6

Conclusion

CBA's play an important role in the countries' development. When the MNEs decide to acquire, they take various factors into consideration. Among them, uncertainty, political risk, cultural proximity, corporate tax etc. In the study, the definition of CBA's and the classified distinction between different strategies of CBA's have been presented initially. After that, an overview of the literature on the subject, the empirical models, and the study data has been put forward.

First, to evaluate the determinants of the different strategies of the CBA's according to (N.Herger and S.McCorrison, 2016), we defined the vertical link at the 1 percent cut-off, using maximum likelihood nonlinear system estimation using a sample of 31 source and 58 host countries, over the period 1995-2010. It emerges from this study, Herger and McCorrison-2016 as well, that cultural proximity has a positive impact on CBA's operations, regardless of the chosen strategy. Geographic distance and corporate tax variables have negative effects on the CBA's. On the one hand, as it has been said previously, more the distance between two countries is great, more information costs on the foreign market increases which hamper the CBA's. On the other hand, theoretically, an increase in corporate tax should deter companies from acquiring a firm abroad. Furthermore, market size is a determinant factor in the choice of horizontal CBA's location, and moreover, it has a positive impact on the latter. Which suggest that large countries have a large number of potential acquiring and target firms. The skilled wage premium variable has a significant and positive effect on the vertical and conglomerate CBA's.

Table 14: Summary

	All	Horizontal	Vertical	Conglomerate
Market size		+		
Skilled wage premium	+		+	+
Distance	-	-	-	-
Language	+	+	+	+
Customs union			+/-	
Corruption				-
Corporate tax	-	-	-	-
Exchange rate	+/-	+/-	+/-	+/-
Euro	+/-		+/-	

Conversely to the Herger and McCorrison's 2016 study, exchange rate variable produces here an ambiguous effect on CBA's. Indeed, for a firm considering acquire abroad in order to sell its products on the host market (horizontal CBA's), this variable should appear as a favourable factor for the CBA's. The underlying idea is that since uncertainty is detrimental to trade, it can be expected that high volatility in the exchange rate will encourage firms to acquire on the market they wish to sell rather than export. However, if firms acquire in order to re-export towards other markets (vertical CBA's), exchange rate volatility can slow CBA's. The corruption variable is a determinant factor for the conglomerate strategies and has a negative impact on the operations of the conglomerate CBA's. Finally, the customs union and euro variables are influential factors for the vertical strategies, but they have ambiguous effects on these operations; table 14 summarizes this.

Second, to study the relationship between uncertainty and the different strategies of CBAs, we have used the volatility index measured by the daily stock returns as proxy of uncertainty on 8 host countries over the period 1995-2010. It was concluded that the rise in uncertainty variable decreases the volume of CBA deals. It can be said that 1 percent rise in the uncertainty variable causes the decrease of about 23.4 percent in the volume of the CBA deals. While 1 percent rise in the uncertainty variable causes the increase of about 39.1 percent in the volume of the horizontal CBA deals. This result suggests that the source countries with higher level of uncertainty compared to particular host countries make more horizontal CBAs to these host countries with the lower level of uncertainty. Indeed, at uncertainty period the companies search to protect itself against the risk, it is the reason why, when the uncertainty in the source countries increases 1 percent, the number of horizontal CBA deals increase of about 39.1 percent. Since the horizontal acquisition permits the acquirer company to acquirer also the existing customers in the host country, this permits the latter to expand its product range and to increase its revenue by selling more products.

Third, the study data covering the years between 1996-2010 and 31 source and 18 host countries has been put forward. Six political risk variables (voice & accountability, political stability, and absence of violence, government effectiveness, regulatory quality, rule of law and prevention of corruption) have been used in the study. In order to test the existence of the unit root, F test for fixed-effect, and Breusch-Pagan LM test were done. The results of these tests showed that unit root effect exists. After that, some tests were done in order to identify the deviations from the econometric hypothesis. So, these tests showed that there are autocorrelation and heteroscedasticity in the model. Because of the existence of these was identified, using GLS random effect model was considered more suitable. In the model, “political stability and absence of violence”, “government effectiveness” and “prevention of corruption” variables are not statistically significant. The results show that the increase in the political risks; “rule of law” in the host country increase the volume of CBA deals. While “regulatory quality” and “voice & accountability” causes the volume of CBA deals to decrease in the host country; table 14 summarizes this.

Table 15: Summary

	All	Horizontal	Vertical	Conglomerate
Uncertainty	–	+		
Voice and Accountability				–
Regulatory Quality		–		
Rule of Law	+	+	+	+

This master thesis provides empirical evidence for the impact of uncertainty on horizontal, vertical and conglomerate CBAs. The results concluded that, on the one hand, the uncertainty measured by the daily stock returns of the volatility index impact significantly and negatively the all of CBAs, and positively for the horizontal CBAs. On the other hand, the political risk, particularly, “rule of law” has a positive impact on the CBAs, “voice & accountability” and “regulatory quality” have negative on the conglomerate and horizontal CBAs respectively. This study is far from answering all questions about CBAs. On the contrary, it raises even more. Uncertainties have a negative impact on all CBAs, it will be necessary, for future research to analyse the effect of systemic risk on the different strategies of CBAs.

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Appendices

Appendix 1

Source countries: Australia, Austria, Belgium, Brazil, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Indonesia, Ireland, Italy, Japan, Mexico, the Netherlands, Norway, Poland, Portugal, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Host countries: Argentina, Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Korea, Latvia, Lithuania, Luxembourg, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Panama, Peru, Philippines, Poland, Portugal, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Arab Emirates, the United Kingdom, and the United States, and Venezuela.

Appendix 2

$E[y_{sh,t}] = \sum y_{sh,t} p_{sh,t}$ $= \sum_{y=0}^{\infty} y_{sh,t} \frac{e^{-\lambda_{sh,t}} \lambda_{sh,t}^{y_{sh,t}}}{y_{sh,t}!}$ $= \sum_{y=1}^{\infty} y_{sh,t} \frac{e^{-\lambda_{sh,t}} \lambda_{sh,t}^{y_{sh,t}}}{y_{sh,t}!}$ $= \lambda_{sh,t} \sum_{y=1}^{\infty} \frac{e^{-\lambda_{sh,t}} \lambda_{sh,t}^{y_{sh,t}-1}}{(y_{sh,t}-1)!}$ $= \lambda_{sh,t} \sum_{x=0}^{\infty} \frac{e^{-\lambda_{sh,t}} \lambda_{sh,t}^x}{x_{sh,t}!}$ $= \lambda_{sh,t} \sum p_{sh,t}$ $E[y_{sh,t}] = \lambda_{sh,t}$	<p>where $\sum p_{sh,t} = 1$</p> <p>as the value is zero at $y = 0$</p> <p>Take out factor of $\lambda_{sh,t}$ cancel $y_{sh,t}$ as $y_{sh,t}! = y_{sh,t} (y_{sh,t} - 1)!$ Substitution of $x = y_{sh,t} - 1$</p>
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Appendix 3

Country	Volatility index	Source
Canada	GSPTSE	Yahoo Finance
Germany, France, Italy, the Netherlands	Eurostoxx 50	Yahoo Finance
Hong Kong	HSI	Yahoo Finance
Japan ¹²	VXJ	MMDS ¹³
The United States	VIX	Yahoo Finance

Appendix 4

ALL CBAs

=====

* MLE Random-Effects Panel Data Regression (Normal Distribution)

=====

cba = VA + PV + GE + RQ + RL + PC

Sample Size	=	270		Cross Sections Number	=	18
Wald Test	=	0.0163		P-Value > Chi2(6)	=	1.0000
F-Test	=	0.0027		P-Value > F(6 , 246)	=	1.0000
(Buse 1973) R2	=	0.0001		Raw Moments R2	=	0.3035
(Buse 1973) R2 Adj	=	-0.0934		Raw Moments R2 Adj	=	0.2384
Root MSE (Sigma)	=	106.9535		Log Likelihood Function	=	-1395.1226

- R2h= 0.0001 R2h Adj=-0.0934 F-Test = 0.00 P-Value > F(6 , 246) 1.0000

- R2v= 0.0323 R2v Adj=-0.0582 F-Test = 1.46 P-Value > F(6 , 246) 0.1921

Hausman test: Ho: difference in coefficients not systematic

$$\begin{aligned}
 \text{chi2}(6) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\
 &= 1.85 \\
 \text{Prob}>\text{chi2} &= 0.9327
 \end{aligned}$$

¹² The mean value for VXJ have been used for the years 1995,1996 and 1997 because their values are not available.

¹³ Center for Mathematical Modeling and Data Science, Osaka University

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 17) = 481.741
Prob > F = 0.0000

=====
* Panel Groupwise Heteroscedasticity Tests
=====

Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity

- Lagrange Multiplier LM Test = 9.31e+04 P-Value > Chi2(17) 0.0000
- Likelihood Ratio LR Test = 282.9694 P-Value > Chi2(17) 0.0000
- Wald Test = 7.29e+05 P-Value > Chi2(18) 0.0000

Horizontal CBAs

=====
* MLE Random-Effects Panel Data Regression (Normal Distribution)
=====

cbahor = VA + PV + GE + RQ + RL + PC

Sample Size = 270 | Cross Sections Number = 18
Wald Test = 1.2804 | P-Value > Chi2(6) = 0.9727
F-Test = 0.2134 | P-Value > F(6 , 246) = 0.9723
(Buse 1973) R2 = 0.0048 | Raw Moments R2 = 0.3568
(Buse 1973) R2 Adj = -0.0882 | Raw Moments R2 Adj = 0.2966
Root MSE (Sigma) = 5.7997 | Log Likelihood Function = -727.2408

- R2h= 0.0048 R2h Adj=-0.0882 F-Test = 0.21 P-Value > F(6 , 246) 0.9723
- R2v= 0.0147 R2v Adj=-0.0774 F-Test = 0.66 P-Value > F(6 , 246) 0.6856

Hausman test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
= 0.96
Prob>chi2 = 0.9872

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 17) = 17.305
Prob > F = 0.0007

=====
* Panel Groupwise Heteroscedasticity Tests
=====

Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity

- Lagrange Multiplier LM Test = 3.70e+04 P-Value > Chi2(17) 0.0000
- Likelihood Ratio LR Test = 151.8259 P-Value > Chi2(17) 0.0000
- Wald Test = 1.26e+05 P-Value > Chi2(18) 0.0000

Vertical CBAs

=====
* MLE Random-Effects Panel Data Regression (Normal Distribution)
=====

cbaver = VA + PV + GE + RQ + RL + PC

Sample Size = 270 | Cross Sections Number = 18
Wald Test = 0.8350 | P-Value > Chi2(6) = 0.9911
F-Test = 0.1392 | P-Value > F(6 , 246) = 0.9909
(Buse 1973) R2 = 0.0032 | Raw Moments R2 = 0.2739
(Buse 1973) R2 Adj = -0.0900 | Raw Moments R2 Adj = 0.2061
Root MSE (Sigma) = 62.4008 | Log Likelihood Function = -1259.3718

- R2h= 0.0032 R2h Adj=-0.0900 F-Test = 0.14 P-Value > F(6 , 246) 0.9909
- R2v= 0.0403 R2v Adj=-0.0494 F-Test = 1.84 P-Value > F(6 , 246) 0.0914

Hausman test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
= 2.07
Prob>chi2 = 0.9132

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 17) = 17.305
Prob > F = 0.0007

=====

* Panel Groupwise Heteroscedasticity Tests

=====

Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity

- Lagrange Multiplier LM Test = 9.59e+04 P-Value > Chi2(17) 0.0000
- Likelihood Ratio LR Test = 282.5508 P-Value > Chi2(17) 0.0000
- Wald Test = 6.75e+05 P-Value > Chi2(18) 0.0000

Conglomerate CBAs

=====

* MLE Random-Effects Panel Data Regression (Normal Distribution)

=====

cbacon = VA + PV + GE + RQ + RL + PC

Sample Size	=	270		Cross Sections Number	=	18
Wald Test	=	3.9559		P-Value > Chi2(6)	=	0.6826
F-Test	=	0.6593		P-Value > F(6 , 246)	=	0.6826
(Buse 1973) R2	=	0.0148		Raw Moments R2	=	0.2818
(Buse 1973) R2 Adj	=	-0.0773		Raw Moments R2 Adj	=	0.2147
Root MSE (Sigma)	=	24.6950		Log Likelihood Function	=	-973.6782

- R2h= 0.0148 R2h Adj=-0.0773 F-Test = 0.66 P-Value > F(6 , 246) 0.6826
- R2v= 0.0127 R2v Adj=-0.0796 F-Test = 0.56 P-Value > F(6 , 246) 0.7599

Hausman test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
= 3.56
Prob>chi2 = 0.7353

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 17) = 31.511

Prob > F = 0.0000

=====

* Panel Groupwise Heteroscedasticity Tests

=====

Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity

- Lagrange Multiplier LM Test	= 1.10e+05	P-Value > Chi2(17)	0.0000
- Likelihood Ratio LR Test	= 328.8460	P-Value > Chi2(17)	0.0000
- Wald Test	= 1.04e+06	P-Value > Chi2(18)	0.0000
