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MARCIN PĘKSYK
EYVIND AVEN
LIV MARIT KLAUSEN

ACCOUNTING FOR COUNTRY RISK IN FOREIGN DIRECT INVESTMENT APPRAISAL – COMPARABLE ANALYSIS BASED ON STATOIL CASE

Introduction

Business organisations have grown into large divisional and often internationally diversified enterprises, where mechanisms for ensuring that corporate goals are achieved have become a major concern to management. The view often expressed by decision-makers about the investment appraisal techniques typically taught at universities and business schools is that, whilst they might be suitable for formal analysis, they do not actually drive the investment decisions of their organisations and, more importantly, do not build confidence in the decisions taken. Strategic and other non-financial considerations are talked about by these managers as being equal to, or even more important, than the financial returns predicted for potential business projects.[1]

One of the practical problems faced by managers when choosing between alternatives (including whether or not to invest in a particular foreign project), is how to deal with the uncertainty of the outcome(s). In their discussions about Foreign Direct Investment (FDI), appraisal managers often use the term 'Country Risk' and either make subjective judgements about the riskiness of an investment opportunity or try to rely on one, or several, parallel methods, usually lending their rationale from portfolio theory. Unfortunately, these methods very rarely have any solid scientific base and their applicability, constrained to capital markets only, cannot be fully justified.

Differences in risks, lack of understanding of how foreign market returns are influenced by advanced markets and vice-versa, as well as a lack of statistically reliable historical data are factors that all international managers and investors have to contend with. From a public policy point of view, determining the appropriate investment decision rules is cru-

[1] See for example: G. Donaldson: *Strategic hurdle rates for capital investment*, "Harvard Business Review" 1972, 50(2); R.R. Ellsworth: *Subordinate financial policy to corporate strategy*, "Harvard Business Review" 1983, 61(6); R.W. Adler: *Strategic Investment Decision AppraisalTechniques: The Old and the new*, "Business Horizons" 2000, 43(6).

cial in lowering the uncertainty that multinational enterprises (MNEs), local companies and public sector organisations face when conducting their cross-border activities.

All the above-mentioned has been confirmed from our observations over thirteen years of professional work in the field of capital budgeting with focus on FDIs. During our work with domestic and foreign investors around Europe, we have observed a certain regular pattern of disagreement about the prospective FDIs. Foreign investors could agree with local agents (investors) upon every element of a project appraisal model (e.g. Free Cash Flow forecasts, competitive advantage period, etc), yet fail to agree on the relevant discount rate. Foreign investors would always have higher rates than local partners. There used to be one explanation given to this phenomenon, which was Country Risk.

This research was prompted by a desire to unpick the rhetoric about Country Risk and investigate what methods are available to account for this particular risk, in a process of FDI appraisal, and which one of them may be regarded as the most efficient. A particular interest or focus of attention was the concept of interchangeability, as financial management literature usually deals with this from a theoretical perspective, but rarely from an empirical managerial perspective. This research set out to review the majority of the methods allowing for risk in project appraisal and to explore whether the interchangeability concept is valid in the context of Country Risk in FDI.

The majority of textbooks split the methodology into three main streams. These can be summarized in the following way: representing the cash flows by their expected values and increasing the rate of return in order to outweigh the possibilities for unfavourable outcomes; expressing uncertainty related to the cash flows and applying the risk free discount rate; and finally a combination of the two – expressing uncertainty in the cash flows and discounting with a risk adjusted discount rate (RADR). In theory, it is proved that all three approaches to account for additional risk related to country specific characteristics can be applied interchangeably. Based on this concept, our research examined the hypothesis that the RADR method, containing Country Risk premium, can be applied as an equivalent of probability weighted scenarios (PWS) approach in a process of accounting for Country Risk in the expected Net Present Value (ENPV) calculation for FDI.

The existence of such interchangeability is of paramount importance to MNEs conducting numerous FDIs, due to the fact that the majority of the methods based on RADR are easier (i.e. cheaper) to apply than PWS which require financial and human resources to be committed to achieve the desired accuracy and effectiveness. For academics, this is a matter of principle, since this controversial topic has been around for more than 40 years now.

Thus, the main aim of this research is to investigate whether the concept of interchangeability between the two main methods (i.e. RADR and PWS) for accounting for Country Risk in FDI appraisal is valid, providing that publicly available methods are used for both approaches.

The deliberate intervention on a micro scale has been identified as an appropriate approach in order to test the stated hypothesis.

Theoretical background

FDI projects are generally perceived as riskier than otherwise similar projects developed within home countries, assuming these are considered low risk countries. The 'additional risks' related to cross-border investing include currency inconvertibility, civil unrest, institutional instability, expropriation and widespread corruption. Additionally, investments in the so-called emerging markets (EMs) are more volatile than in the developed economies.[2]

The theory of investment decision-making as part of financial management was developed as a normative theory by economists.[3] When considering projects where the cash flows are known in advance, the rate of return associated with other risk-free investments, like bank deposits, forms the basis for the discount rate to be used in the net present value (NPV) calculations. When the cash flows are uncertain, which is usually the case, various procedures are used. These can be summarized as (1) representing the cash flows X_t by their expected values $E(X_t)$ and increasing the rate of return in order to outweigh the possibilities of unfavourable outcomes, (2) expressing uncertainty related to the cash flows and applying the risk free discount rate r_f, and (3) a combination of the two – expressing uncertainty in the cash flows and discounting with a RADR.

The majority of relevant textbooks[4] present the claim that all three approaches to account for additional risk related to country specific characteristics can be applied interchangeably. That is theoretically sound and it can be shown that it is possible to find either the combination of PWS returning the same result as an assumed Country Risk premium, or to recalculate backwards the Country Risk premium when the prior combination of PWS expressing the Country Risk elements is agreed[5]. However, it can be shown that at least two approaches, (2) and (3), utilise absolutely contradictory assumptions regarding the main characteristics of Country Risk. Furthermore, practice and publications of professionals[6] provide evidence that it is very hard (if not impossible) to find examples confirming the concept of interchangeable use of both methods with regard to Country Risk. This is also

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[2] R. Pike, B. Neale: *Corporate finance and investment: decisions and strategies*, FT Prentice Hall, Harlow 2003, p. 856.

[3] J. Hirshleifer: *Risk, the Discount Rate, and Investment Decisions*, "American Economic Review" 1961, 51(2).

[4] R.D. Johnson, B.R. Siskin: *Quantitative Techniques for Business Decisions*, Prentice-Hall, Inc., 1976; H.J. Bierman, S. Smidt: *The capital Budgeting Decision. Economic Analysis of Investment Projects*, Macmillan Publishing Co., Inc., 1980; C.R. Harvey: *The International Cost of Capital and Risk Calculator (ICCRC)*, 2001, http://faculty.fuqua.duke.edu/~charvey/Research/Working_Papers/W35_The_international_cost.pdf; A.F. Herbst: *Capital asset investment: Strategy, Tactics and Tools. Wiley-Finance*, John Wiley & Sons, Ltd., Chichester 2002; N. Seitz, M. Ellison: *Capital Budgeting and Long Term Financing Decisions*, Thomson South-Western, UK 2005.

[5] R. Mills, M. Peksyk, W. Weinstein: *Sharpening the Tools of Country Risk Analysis*, "The ICFAI Journal of Financial Risk Management" 2006, December.

[6] M. Zener, E. Akaydin: *A practical Approach to the International Valuation &Capital Allocation Puzzle*, Salomon Smith Barney, Global Corporate Finance, 2002, July; M. Goedhart, P. Haden: *Emerging Markets aren't as risky as you think*, "The McKinsey Quarterly" 2003.

supported by the literature on attempts to find appropriate RADR summarised in the Table 1, 2 and 3.

From field based studies, it is recognised that the majority of the questioned decision-makers adopt RADR methods.

Moreover, recent proceedings from joint academic and professional conferences[7] show that both communities finally recognise and confirm the enormous power of the extra Country Risk premiums used in method (1). It was clearly presented that decision-makers may abuse the RADR method by applying low premiums to those projects they would like to get past the corporate investment scrutiny, whereas less favourable projects could easily be blocked by the application of high premiums to compensate for the higher perceived risk. Furthermore, the participants agreed upon the uncomfortable truth that, as long as Country Risk premium is purely judgmental, its application may carry all the errors sourced in heuristic and behavioural uncontrolled biases.

Table 1

Pros and Cons of Different CAPM-like Approaches for Accounting for Country Risk

	Pros	Cons	Applicability
1	2	3	4
Adjusted Local CAPM	Simple extension of typical domestic model. Enables assessment of segmentation.	High volatility of emerging markets renders the computations of long-term market premiums and betas quite complicated, since both are highly unstable along time, and historical averages tend to be unreliable or simply unavailable.	Segmented markets.
Adjusted Hybrid CAPM	Includes easily available data from the global market.	It assumes stability between global company or industry betas, and the betas in the local market, a fact that is still largely unproved in emerging markets.	Integrated markets (Sabal, 2001). All markets (Stulz, 1995).
International CAPM	Easy to implement if the price history of a sufficiently long period (e.g. 5 years) is available.	ERP may be underestimated for segmented equity markets, such as India, that have low correlation with the global equity indices.	All markets (see the note in 'cons' column).
Global CAPM	Easy to implement if the price history of a sufficiently long period (e.g. 5 years) is available. Allows for peer group replacement where project history is not available.	Difficult to defend the global CAPM in the light of conspicuous market imperfections; the model may be plausible in developed markets, but certainly not in emerging markets, where country risk is present.	Should be used in integrated and partially integrated markets.
Globally Nested CAPM	The model works particularly well for the Latin America region, because the countries of that region tend to have strong economic ties.	Not recommended outside Latin America.	Latin America.
Hauptaman and Natella	Authors claim it works in the Latin America economic environment.	The model is difficult to interpret and not very appealing to practitioners.	Latin America.

[7] R. Ruback: *Enterprise Valuation Roundtable*, "Journal of Applied Corporate Finance" 2007, 19 (Spring).

1	2	3	4
Goldman-Sachs Sovereign Risk Adjusted Discount Rate	Applicable in all markets.	Lack of solid academic basis	All markets.
JP Morgan's Modified World CAPM	Takes into account emerging markets' limited availability of diversifying away the unsystematic elements of Country Risk.	Fuelled with intuitive motivation that the other models return too low betas for emerging markets.	All markets.
Salomon Smith Barney model of Adjusted Global CAPM	Builds unsystematic elements of Country Risk into discount rate.	All three factors are built into a global CAPM to reduce the PRP perceived by authors as being too high.	All markets.
Downside CAPM	Scientifically tested and proved to bring statistically acceptable results for certain sectors.	Does not account for incompleteness of the emerging markets.	Integrated markets.

Source: M. Peksyk: *On The Methods of Accounting for Country Risk in Foreign Direct investment Appraisal*. A thesis submitted for the degree of Doctor of Philosophy at Brunel University/Henley Management College, January 2008, p. 99.

Table 2

Pros and Cons of Modified CAPM Derivatives Accounting for Country Risk

	Pros	Cons	Applicability
Country Bond Default Spread Model.	The easiest model to apply.	Lack of scientific base. Purely intuitive, aims for the simplest adjustment not grounded in the scientific evidence.	Applicable in all capital markets in countries which issued sovereign US dollar denominated bonds.
Espinosa and Godfrey.	Raises the estimated beta values from the unreasonably low levels generally obtained while applying a global CAPM.	Directly contradicts the CAPM.	Applicable in all capital markets in countries which issued sovereign US dollar denominated bonds.
Relative Equity Market Standard Deviation. Default Spreads plus Relative Standard Deviation.	It recognises that one can't just use the bond yield spread as a plug number in the CAPM model.	The model assumes that Sharpe ratios for stocks and bonds must be the same in any particular country.	Applicable in all capital markets in countries which issued sovereign US dollar denominated bonds.

Source: M. Peksyk: *op.cit*., p. 106.

Table 3

Pros and Cons of the Other RADR Based Methods

	Pros	Cons	Applicability
1	2	3	4
Multifactor Model based on Arbitrage Pricing Theory.	Includes different factors that can affect the required rate of return requested by investors. Reveals higher explanatory power higher than the CAPM.	Requires a great amount of data and computational analysis. Heavily dependent on the reliability and quality of input data that is hard to achieve in emerging markets.	All markets

1	2	3	4
Country Risk Rating Model (Erb, Harvey and Viskanto).	No market data required for developing or non-market based economies. Country Risk ratings are readily available for most developing countries	Country Risk rating may not take into consideration other risks that are inherent in the equity market of a particular country, therefore requires further adjustments for company-specific risks.	Applicable in all that are covered by the Institutional Investor Country Credit Rating.

Source: M. Peksyk: *op.cit.*, p. 110.

The conclusions drawn here are that method (3) although not perfect, appears to be acting better as a provider of the decision rule, whereas methods based on the RADR approach are not very well suited for long-term FDI appraisal in the presence of Country Risk.

Research Approach and Methodology

In order to perform the appropriate test of the aforementioned concept, we will follow the guidelines for the positivist approach to empirical research provided by Remenyi et al.[8] We will base our experiment on deliberate intervention on a microscale approach, due to the fact that we will have total control over the system being researched and we will impose the intended change in the variables in order to observe the impact of these changes to the final outcomes. This approach seems the most appropriate to us, as it allows us to focus strongly on a particular aspect of the problem investigated and should provide, at least from a positivist point of view, the most detailed information.[9]

In the process of the literature review the theoretical concept (though much more appropriate would be the term 'conjecture') of the equivalence between E[NPV|r(RADR)][10] and E[NPV|p(X_t)][11] in accounting for Country Risk in FDI appraisal was identified. The existence of such interchangeability is of paramount importance to MNEs conducting numerous FDIs, due to the fact that that majority of the E[NPV|r(RADR)] methods are easier (we mean cheaper) to apply than [NPV|p(X_t)] which requires financial and human resources to be committed to achieve the desired accuracy and effectiveness.

In the analysis of testing we will use the FDI portfolio of Statoil – a national oil and gas conglomerate. It consists of 24 investment cases performed in six countries. Our supposition has its roots in the fact that although it is possible to calculate the Country Risk premium for E[NPV|r(RADR)] that would balance out the results of additional scenarios in E[NPV|p(X_t)], it is highly unlikely to find this solution independently starting simultaneously with both methods and achieving the same result (we mean here the same ENPV).

[8] D. Remenyi, B. Williams, A. Money, E. Swartz: *Doing Research in Business and Management: An Introduction to Process and Method*, SAGE Publications, London 2002, pp. 82–89.

[9] A. Grobler: *Metodologia nauk*, Wydawnictwo AUREUS & Wydawnictwo ZNAK, Kraków 2006, pp. 65–75.

[10] Method described earlier as (1).

[11] Method described earlier as (3).

What we were looking for in the end was at least a consistency of the signals supporting the decision-making process conducted by managers. We mean here the traditional decision rule that says that if the ENPV > 0 then investment should be considered as profitable. Therefore, we decided to conduct a full-scale computer experiment (also called computer simulation).[12] Although computer simulation is highly disregarded by certain representatives of extreme behavioural economics[13] as a legitimate tool for experimental design, Pabis[14] describes computer experiments as legitimate tools serving the empirical sciences.

The company and its Dataset

Statoil is a Norwegian national company in the global oil and gas market with a multinational portfolio of investment interests, with a risk management system that can be represented in the illustration below.

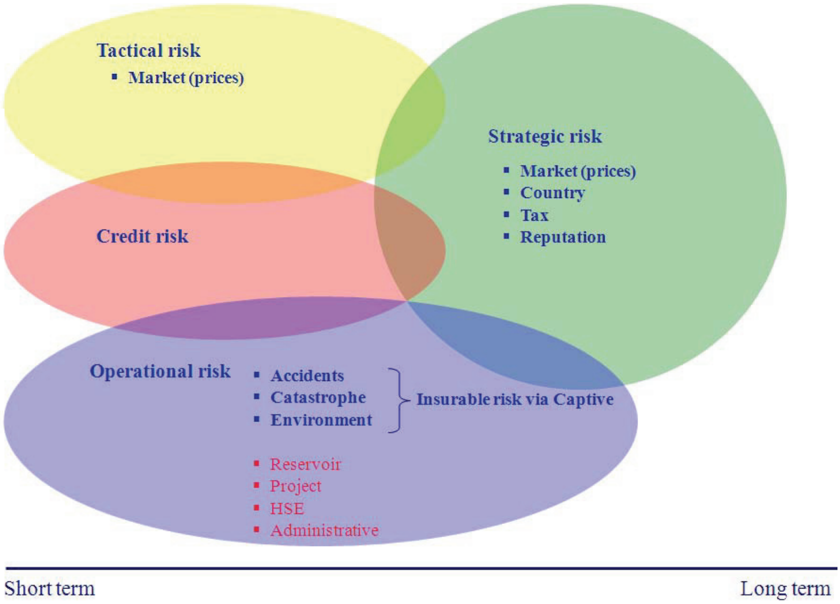

Figure 1. Statoil's Enterprise-wide Risk Management System

Source: R. Nilsen: *Enterprise-wide risk management*, Energy Risk Europe, 4th October 2006, London.

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[12] K. Fang, R. Li, A. Sudjianto: *Design and Modelling for Computer Experiments*, Chapman & Hall/CRC, London 2006, pp. 10–11; S. Pabis: *Metodologia i metody nauk empirycznych*, Państwowe Wydawnictwo Naukowe, Warszawa 1985, pp. 239–245.

[13] Friedman and Cassar categorically state that "By our definition, [computer] simulations are part of theory, not empirics, because they do not involve actual people and events in the world"; D. Friedman, A. Cassar: *Economics Lab: An Intensive Course in Experimental Economics*, Routledge, London and New York 2004, p. 20.

[14] S. Pabis: *op.cit.*

The data set received from Statoil was processed in line with the Esterby et al.[15] definition of the operational process, which states that "concepts need to be operationalised in a way which enables facts to be measured quantitatively" to receive the material which would enable us to test the equivalence theory.

For each investment case, the ENPV was calculated in two ways.

– First, Statoil's methodology (see Fig. 2) was employed to derive the ENPV based on the PWS, in other words $E[NPV|p(X_t)]$, that accounts for Country Risk by adjusting the Base Case Scenario with the possible downside risk events.

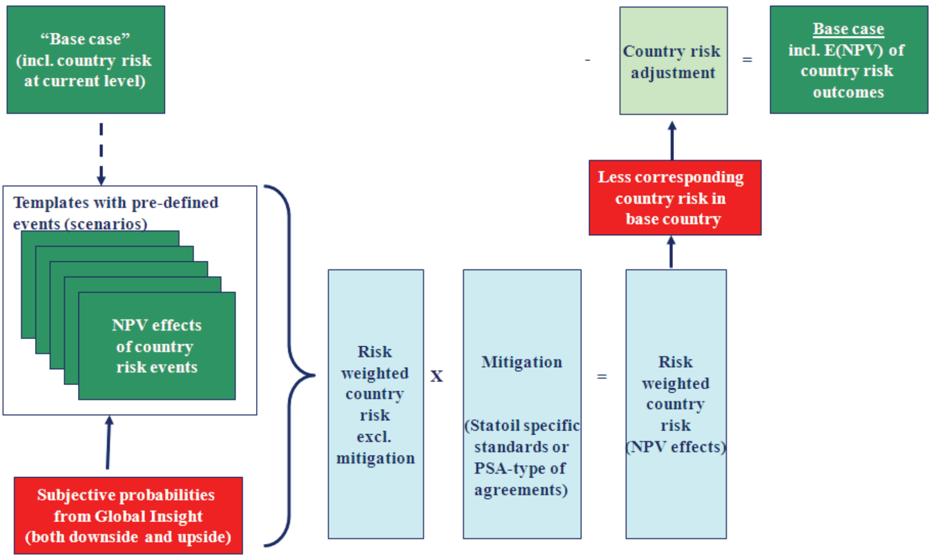

Figure 2. The ENPV Model Based on Method (3) – Statoil's approach

Source: E. Aven, S. Flørenæs: *Country Risk: Quantitative Measurement and Analysis*, "Risk Review" 2004, May/June.

– Then the ENPV that accounts for Country Risk via RADR, that is E[NPV|r(RADR)], was derived with the use of all applicable methods. Due to the fact that nearly all of Statoil's FDIs were conducted in countries where the local capital markets were not yet developed, the E[NPV|r(RADR)] based on Country Risk Rating Model (EHV)[16] was the only applicable approach.

[15] M. Easterby-Smith, R. Thorpe, A. Lowe: *Management Research: An Introduction*, (2nd ed.), Sage, London 2002, p. 23.

[16] EHV stand for Erb Harvey Viskanto model introduced in the seminal work of C. Erb, C. Harvey, T. Viskanta: *Expected Returns and Volatility in 135 Countries*, "The Journal of Portfolio Management" 1996 Spring.

– Thus, we obtained one result based on $E[NPV|p(X_t)]$ for each case and one based on all applicable variations of $E[NPV|r(RADR_{EHV})]$. Next, a table was constructed which gathered all the results. It is worth noting that we were able to create the factorial metamodel[17] and use the same conditions and data for both approaches, $E[NPV|p(X_t)]$ and $E[NPV|r(RADR)]$.
– The only difference was the treatment of Country Risk in both methods. Therefore, we managed to isolate the Country Risk factor and test the decision tools for what impact the adoption of different treatments of Country Risk has on them.
– Consequently, the source of discrepancies between ENPV derived with different methods is the different treatment of Country Risk only.

The Hypotheses

To provide proof for our claim, we employ Popper's approach of falsification. Consequently we state the following **null hypothesis $H1_0$**:

'The $E[NPV|r(RADR_{EHV})]$ approach is an equivalent of $E[NPV|p(X_t)]$ and both can be used interchangeably to account for Country Risk in the process of FDI appraisal'.

Next, the information regarding decision supporting signals has been coded, in a way that 0 means 'do not invest' and 1 means 'invest'. The purpose of the described transformation of the data was to enable us to test the following **null hypothesis $H2_0$**:

'The $E[NPV|r(RADR_{EHV})]$ approach returns the same decision supporting signals as $E[NPV|p(X_t)]$ and both can be used interchangeably to account for Country Ris in the process of FDI appraisal'.

Research method selection – the use of Non- Parametric Methods

Due to the fact that we were using a set of investment cases from one source (precisely one MNE), we were not able to conform to the requirements for using parametric tests[18] and generalise our conclusions on the whole population of FDIs in the presence of Country Risk. If we tried to generalise on the whole population, we would have to follow the guidance for non-equivalent comparison group designs.[19] Sadly, this method attracts more critique than affirmation from the academic community. Therefore, in this situation, we will use nonparametric tools for testing our hypotheses that will be valid in the world of

[17] According to Fang et al. (2006:6), the factorial model is a set of level-combinations with the main purpose of estimating main effects and some interactions of the factors, whereas the metamodel is an approximate model which is close to the real one but faster to run, and yields insight into the relationships between exogenous and endogenous variables (Fang et al., 2006:12; Chen et al., 2002:232).

[18] J. Wilson: *Thinking with Concepts. Cambridge*, University Press, 1969; M. Doherty: *Probability versus Non-Probability Sampling in Surveys*, "The New Zealand Statistics Review" 1994, March; M. Szreder: *Metody i techniki sondażowych badań opinii*, Polskie Wydawnictwo Ekonomiczne, Warszawa 2004.

[19] G. Marczyk, D. DeMatteo, D. Festinger: *Essentials of research design and methodology*, John Wiley & Sons, Inc., Hoboken, New Jersey 2005, pp. 138–139.

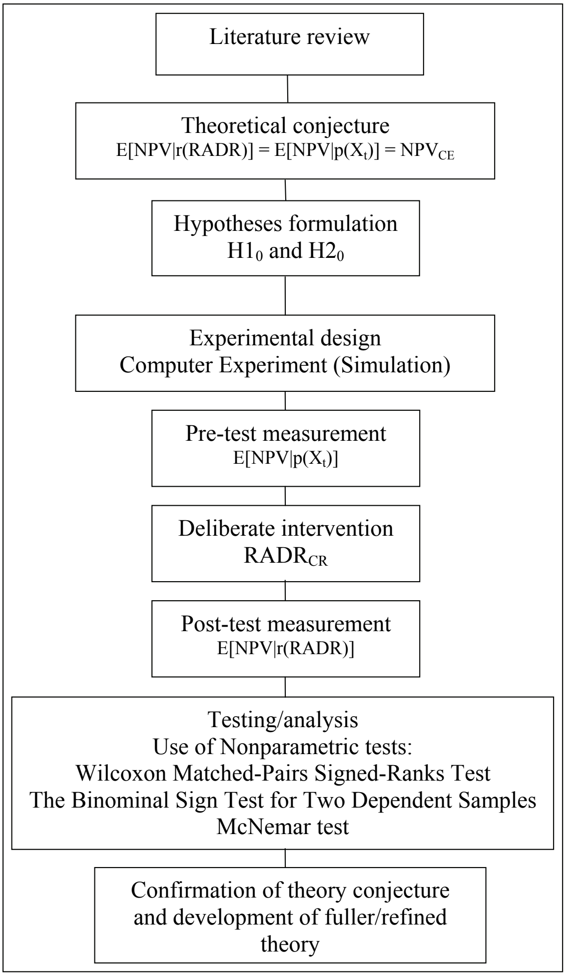

Figure 3. Steps in the Research Process – Category Three

Source: Adopted from D. Remenyi, B. Williams, A. Money, E. Swartz: *op.cit.*, p. 86 with author's own changes.

Statoil's FDIs. This approach is common practice in engineering disciplines investigating reliability and quality of the systems, as well as effectiveness of technology changes within small populations (such as with singular plant or one international organisation).[20] Likewise, industrial experimental design applies nonparametric tools when computer simulations are

[20] M. Korzyński: *Metodyka eksperymentu – planowanie, realizacja i statystyczne opracowanie wyników eksperymentów technologicznych*, Wydawnictwa Naukowo Techniczne, Warzawa 2006, pp. 112–121,

in use.[21] Furthermore, Fang et al. point out that nonparametric techniques were invented to exploit the possible hidden structures and to reduce modelling biases of traditional parametric methods. This shift has been driven by many sophisticated applications, demanded by the need for nonlinear modelling and fuelled by modern computing power (mainly computationally intensive data-analytic modelling techniques). The nonparametric test for hypotheses testing are also recommended when there is an expert opinion involved in describing the uncertainty related to the underlying assumptions.[22] Furthermore, we found many similarities in the way our research problem was investigated, testing the methods used to measure Country Risk, and the solutions proposed by Sprent et al.[23] to laboratory instrument calibration. They also found nonparametric methods to be the most appropriate in such cases. Finally, the experimental design, based on the nonparametric tests introduced by Myers et al.[24] and which had been used to investigate the efficiency of the sophisticated capital budgeting methods implemented by US-based enterprises, provided us with strong support for the extensive use of nonparametric methods in our research.

Finally, the results obtained from testing both hypotheses ($H1_0$ and $H2_0$) will enable us to confirm or reject the concept of interchangeability of both methods, at least on the micro-scale represented here by the MNE operating in the oil and gas industry.

Results of the Two Hypothesis and their Interpretation

Two null hypotheses were identified before the research began. Both null hypotheses were rejected in favour of predicted results. The first null hypothesis stated:

> *($H1_0$) 'The $E[NPV|r(RADR_{EHV})]$ approach is an equivalent of $E[NPV|p(X_i)]$ and both can be used interchangeably to account for Country Risk in the process of FDI appraisal'.*

A significant difference in ENPV derived from both methods was observed. The null hypothesis was rejected in support of an alternate hypothesis based on the predicted results:

> *($H1_A$) 'The $E[NPV|r(RADR_{EHV})]$ approach is not an equivalent of $E[NPV|p(X_i)]$ and both cannot be used interchangeably to account for Country Risk in the process of FDI appraisal'.*

[21] V.C.P. Chen, K-L. Tsui, R.R. Barton, J.K. Allen: *A Review of Design and Modelling in Computer Experiments*, [in:] *Handbook of Statistics*, eds. R. Khattree, C. R. Rao, Vol. 22, Elsevier Science B.V., 2002; T.J. Santner, B.J. Williams, W.I. Notz: *The Design and Analysis of Computer Experiments*, Springer, Berlin 2003; K. Fang et. al.: *op.cit.*

[22] C. Rodger, J. Petch: *Uncertainty and Risk Analysis*, Business Dynamics, PricewaterhouseCoopers, London 1999, p. 18.

[23] P. Sprent, N.C. Smeeton: *Applied Nonparametric Statistical Methods* (3rd ed.), Chapman & Hall/CRC, London 2001.

[24] M.D. Myers, L.A. Gordon, M.M. Hamer: *Postauditing Capital Assets and Firm Performance: An Empirical Investigation*, "Managerial and Decision Economics" 1991, 12(4).

Therefore, we claim that current opinion that one can use both methods interchangeably is not substantiated in the evidence coming, at least, from the world of Statoil's FDIs.

Support for the Conclusion

The above findings were then confirmed with the binomial sign test for two dependent samples. The alternative hypothesis H1A: stating that the $E[NPV|r(RADR_{EHV})]$ approach is not an equivalent of $E[NPV|p(X_t)]$ and both cannot be used interchangeably to account for Country Risk in the process of FDI appraisal, was supported at the $\alpha = .05$ level and the $\alpha = 0.01$ level with the p-value way below 0.0001 showing the significance of the results. Therefore, we can conclude that Wilcoxon[25] matched-pairs signed-ranks test, as well as binomial sign test for two dependent samples, provided support for the view that the results obtained from using both $E[NPV|p(X_t)]$ and $E[NPV|r(RADR)]$ methods belong to two different populations and the differences between them can be neither attributed to the statistical error nor recognised as statistically insignificant. Therefore, as a consequence of the above, we can state that in the case of the Statoil FDIs there is no equivalence between $E[NPV|p(X_t)]$ and $E[NPV|r(RADR)]$ when the EHV model was employed to derive RADR accounting for Country Risk.

Although intuitively we knew that there might be a statistically significant difference between the results obtained with the use of both approaches, the actual results were still astonishing ($T(24) = 0$, $p < 0.001$). The extreme case (Country B Investment (10)) shows a difference of 9 orders between $E[NPV|p(X_t)]$ and $E[NPV|r(RADR_{EHV})]$. The minimal discrepancy equals 5% of the $E[NPV|p(X_t)]$, but this is outlier when we compare this with the average 268% difference for the whole population and median of differences at a level of 189%.

There could be several reasons, explaining why $E[NPV|r(RADR_{EHV})]$ substantially differs from $E[NPV|p(X_t)$ and these are discussed, but they do not contradict the above conclusion.

Summary of Real World Relevance and Application

The results of this experiment, support the alternative hypotheses that the results obtained from the use of both $E[NPV|p(X_t)]$ and $E[NPV|r(RADR_{EHV})]$ methods belong to two different populations and the differences between them can be neither attributed to the statistical error nor recognised as statistically insignificant. Whereas the theory says that both approaches should return the same final E[NPV], the research based on Statoil's practice

[25] F. Wilcoxon: *Individual comparisons by ranking methods*, "Biometrics" 1945, 1; F. Wilcoxon: *Some rapid approximate statistical procedures*, Starnford Research Laboratories, American Cyanamid Corporation, Stamford 1949.

shows that there is no such relationship. This provides a valuable and meaningful practical guide for professionals in undertaking such decisions.

This research provides a clear insight into the issue of Country Risk, when considering direct investment appraisal. It is vitally important contribution to the management and financial communities in national economies, which influence the wealth and welfare of nations and their people. The research provides a new and additional contribution for understanding of the policy and practice of important decision makers, enhancing the methodology, using an appropriate concept framework and financial concepts to better understand this important and emerging area of theory which can impact real world practice

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Marcin Pęksyk, Ph.D., FAIA (Acad)
Academy of International Economic and Political Relations

Eyvind Aven, MEcon
Vice president, Strategic Risk, Statoil

Liv Marit Klausen, Cand. Polit,
Adviser, Strategic Risk, Statoil

Summary

One of the practical problems faced by managers when choosing between alternatives (including whether or not to invest in a particular foreign project), is how to deal with the uncertainty of the outcome(s). Research examined the hypothesis that the risk adjusted discount rate (RADR) method, containing Country Risk premium, can be applied as an equivalent of probability weighted scenarios (PWS) approach in a process of accounting for Country Risk in the expected Net Present Value (NPV) calculation for Foreign Direct Investment (FDI).

The experiment was run on a sample taken from the FDI portfolio of Statoil, a Norwegian oil and gas company, which consists of 24 investment cases performed in six countries. The results of this experiment support the hypothesis that, for the tested population, the RADR method is not an equivalent of the PWS approach and that both cannot be used interchangeably to account for Country Risk in the process of FDI appraisal.

UZGLĘDNIANIE RYZYKA KRAJU W ANALIZIE OPŁACALNOŚCI PROJEKTÓW ZGRANICZNYCH INWESTYCJI BEZPOŻREDNICH – ANALIZA PORÓWNAWCZA W OPARCIU O PORTFEL INWESTYCYJNY FIRMY STATOIL

Streszczenie

Artykuł koncentruje się na zagadnieniu ekwiwalentności metod oceny projektów bezpośrednich inwestycji zagranicznych z uwzględnieniem ryzyka kraju. Metodzie skorygowanej stopy dyskontowej (RADR) przeciwstawiono wyniki otrzymane przy zastosowaniu scenariuszy ważonych ryzykiem.

W badaniu posłużono się projektami inwestycyjnymi norweskiej firmy Statoil. Do weryfikacji hipotez badawczych użyto nieparametrycznych testów statystycznych.