# Exploration Funding and Mineral Investment Climate

Irina Khindanova
University of Denver

## ABSTRACT

This study analyzes how sensitive exploration funding is to investment climate changes. The paper conducts a separate analysis of different types of exploration funding: (i) total and grassroots exploration; (ii) directed towards specific minerals exploration targets (gold, base metals, and diamonds); and (iii) divided by funding origin country. The analysis is based on a cross-country log-linear model of exploration budgets with investment climate, mineral potential, population, and distance as explanatory variables. The paper results show that better geological potential leads to higher total and grassroots exploration investments. The sensitivity of exploration budgets to investment climate depends on targeted minerals or metals. Adequate investment conditions bring in more of total and grassroots exploration for gold and base metals. Total exploration for diamonds is not affected by the investment conditions, while grassroots exploration for diamonds is negatively correlated with the investment climate. The study of top three exploration funding countries demonstrates that the Canadian mining companies are sensitive to investment environment in host countries, while exploration budgeting of the Australian and UK companies is not linked to investment climate. The Canadian and Australian companies allocate more of exploration funds to countries in geographical proximity, while the UK companies invest more in distant countries. Paper findings will be useful for host countries and mining companies making exploration budgeting decisions.

## INTRODUCTION

For mineral producing countries, exploration investments are important for future global competitiveness. In order to bring in mineral investments, the countries offer generous terms to mining companies. Once the uncertainty fades away and the mineral developments begin to operate profitably, the host countries often impose harsher terms. However, the countries have to improve investment climate and offer better conditions to bring new investments or expand existing projects. Over time, the new deals become obsolete. Such an interaction between natural resource investors and a host country Raymond Vernon (1971) described as the "obsolescing bargaining". The obsolescing bargain model explains a cyclical shift of bargaining power from the foreign investor to the host country and back (Buckley, 2008). The important questions are then how much bargaining power mineral producing countries have and how important is the investment climate for mineral projects financings. In a recent paper (Khindanova, 2011), the author examined variations in countries' total non-ferrous minerals exploration investments and the relative importance of geological potential and investment climate for attracting exploration funding. The paper showed that exploration does not simply follow the geological potential. In order to attract exploration investments, countries rich with natural resources need to work on forming competitive investment environments. Harsher investment conditions might cause mining companies to move elsewhere. Jara, Lagos, and Tilton (2008) suggest that mineral exploration expenditures are more responsive to changes in investment conditions, comparing to mineral output or investment in new production capacity. Or, the exploration investments will "move" first. Jara, Lagos, and Tilton (2008) also find that grassroots exploration expenditures for specific metals, not a country's total exploration, immediately respond to investment climate transformations. This work analyzes how sensitive exploration funding is to investment environment changes. It considers grassroots exploration budgets and specific minerals exploration targets (gold, base metals, and diamonds), while the previous study, Khindanova (2011), analyzed total exploration investments. The current paper also investigates whether there are variations in the exploration target and location decisions among funding countries.

Chender (2009) points to one of current challenges facing exploration – "the need to better justify spending". It requires more scrupulous target decisions. The paper's results on sensitivity of exploration target funding to investment conditions will be useful for host countries and for mining companies making exploration target selections.

The analysis draws upon works by Johnson (1990), Eggert (1992 and 2008), Otto (1992a and 1992b), the Fraser Institute (2006), Jara, Lagos, and Tilton (2008), and Khindanova (2011). These papers point to two dominant factors of exploration expenditures: geological potential and investment climate. In the same way, Dunning (1998), Bullington (1999), Campos and Kinoshita (2003), Buckley at al (2007), and UNCTAD (2007) highlight importance of availability of natural resources and adequate investment environment for resource seeking Foreign Direct Investment. Some companies might prefer to invest locally or in neighboring countries despite attractive global geological potential and investment climate. The paper considers the third factor – geographical proximity of exploration locations to funding countries.

The analysis in the paper is based on log-linear models of exploration budgets with investment climate, mineral potential, population, and distances as explanatory variables. To reduce non-homogeneity of the exploration budgets data, I take logarithms of the original series. Such logarithmic transformation has been employed in an analysis of foreign direct investments by Bullington (1999); Cheng and Kwan (2000); and Wei (2000). The population factor is included to account for economies' sizes[1]. I estimated models using one indicator of geological potential (land areas) and one measure of investment climate (Index of Economic Freedom of the Heritage Foundation and the Wall Street Journal).

The paper is structured as follows. The second section describes the data. The third section presents models of exploration investments. It derives estimates of the sensitivity of exploration to investment climate changes. The forth section summarizes main findings and conclusions.

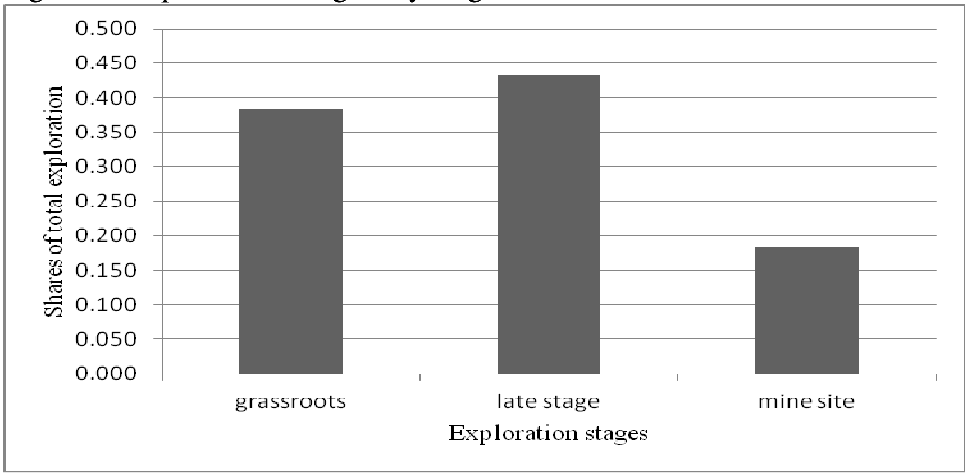
## DESCRIPTION OF DATA

This section describes the data on exploration expenditures, measures of the geological potential and investment climate, population, and distances.

Exploration investments data are from the Corporate Exploration Strategies 2006 Study of the Metals Economics Group[2] (MEG, 2006). The data include the 2006 budgets of mining companies for exploration of nonferrous metals and diamonds. The expenditures are reported for the following exploration targets: gold; base metals – copper, zinc, lead, nickel (does not include aluminum); diamonds; platinum; and other metals or minerals – silver, cobalt, molybdenum, mineral sands, tin, and some industrial minerals. The MEG Corporate Exploration Strategies Study has the 2006 exploration data for 124 countries and regions. In the regressions analysis, I examine 103 countries. Several countries were not included in the analysis because of lack of the investment climate data for them. Total exploration expenditures of included countries constitute around 98% of the 2006 exploration spending of surveyed companies. The paper uses MEG's definition of the grassroots stage - the beginning exploration stage, perimeter drilling, and the quantification of initial mineral deposit (MEG, 2006). The late stage exploration further quantifies and defines an identified ore body and conducts the feasibility study, up to a production decision. The mine site exploration means exploration at or immediately around operating sites or projects pledged to develop. Figure 1 shows distribution of exploration budgets of the included mining companies by different explorations stages in 2006: grassroots – 38.41%, late stage – 43.18%, mine site – 18.41%. The late stage exploration budgets exceed the grassroots and mine site budgets. This paper focuses on the grassroots exploration funds. The top ten destinations with largest grassroots investments were Canada, Australia, United States, Russia, Mexico, Brazil, Peru, Brazil, Chile, and China. These 10 countries accounted for 72.19% of the worldwide grassroots exploration.

[1] I estimated a model with an interaction term between geological potential and investment climate to test whether significance of geological potential for exploration investments depends on investment environment. I found that the interaction term was an insignificant factor.
[2] The Metals Economics Group is considered to be "the most reliable source of exploration data for the mineral sector" (Jara, Lagos, and Tilton, 2008). The MEG data were also used in Khindanova (2011).

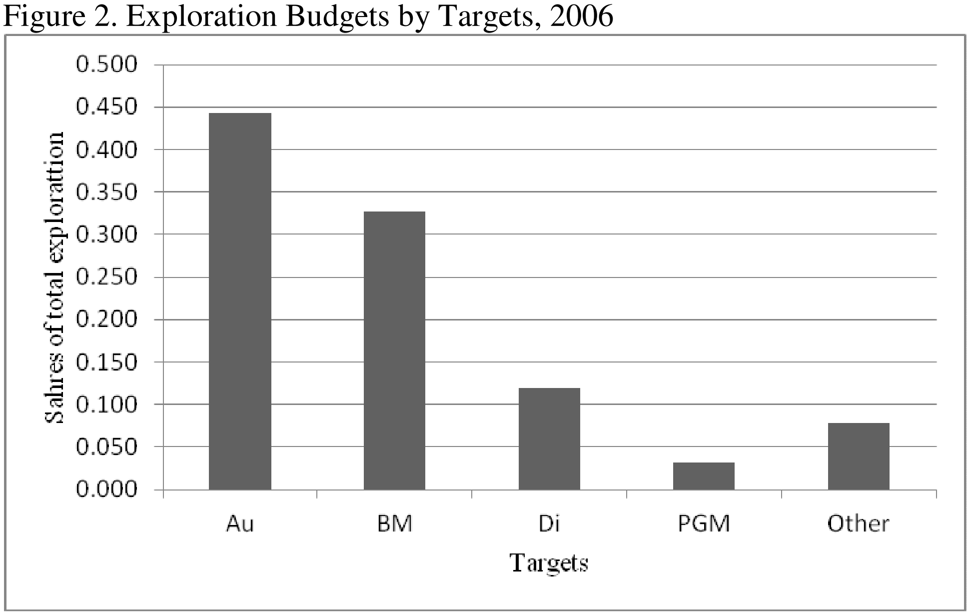
Figure 1. Exploration budgets by stages, 2006




Data source: MEG, 2006

Figure 2 illustrates allocations for specific minerals exploration targets in 2006. Shares of total exploration are calculated with respect to the total exploration investments in 103 countries covered in the analysis. The figure uses the following target abbreviations: Au – gold, BM – base metals, Di - diamond, PGM – platinum group metals, Other – Other metals. The gold exploration allocations (44.35%) are the largest across the exploration targets allocations, while the base metals allocations (32.68%) are the second largest, followed by the diamonds exploration allocations (11.97%). Top ten countries with largest gold exploration investments were Canada, Australia, United States, Russia, Mexico, China, Peru, Brazil, and Argentina. Top ten countries with largest base metals exploration budgets were Canada, Australia, Mongolia, United States, Peru, Brazil, Chile, Mexico, and Russia. Top ten countries with largest diamonds exploration funds were Canada, South Africa, Angola, Botswana, Russia, Democratic Republic of Congo, Sierra Leone, Brazil and Australia.

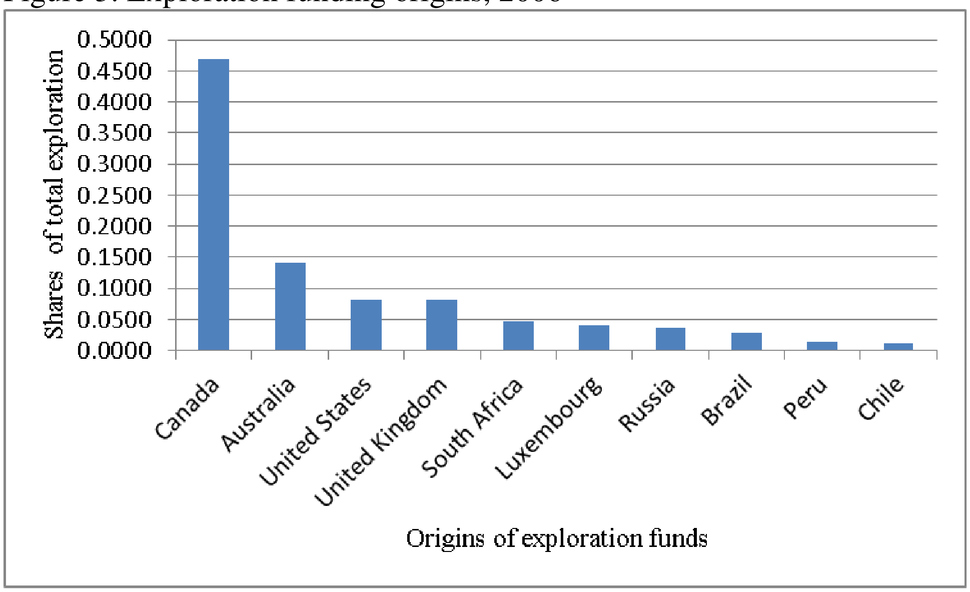
Figure 2. Exploration Budgets by Targets, 2006




Data source: MEG, 2006

Exploration funds for analyzed 103 countries were provided by 34 countries. Six countries allocated funds for investments abroad only, 12 countries planned investments only at home, remaining 18 countries budgeted investments at home and abroad. Figure 3 displays top 10 countries ranked by exploration funding origin, determined by companies' headquarters locations. These 10 countries accounted for 95.34% of the total exploration budgets in 2006. Canada stood out with a 47.03% contribution of worldwide exploration budgets. The Canadian mining companies invest more in exploration abroad (62%) than at home (38%). In contrast, Australia, the second-ranked country by exploration funding, planned larger proportion of funds (55%) for investments at home and 45% - for investments abroad. Interestingly, the UK mining companies planned only 0.07% of funds for home exploration, and 99.93% - for overseas.

Figure 3. Exploration funding origins, 2006




Data source: MEG, 2006

In the analysis, I examine one measure of geological potential - land areas[3]. Land measures were used as indicators of mineral and resource indicators in (Johnson, 1990), (Sachs and Warner, 1995), (Stijns, 2005), (Birdsall et al, 2001), (Khindanova, 2011). The data on countries' land areas is from the World Bank's database "World Development Indicators 2005" (World Bank, 2005). For a few countries, the land areas data are from the Central Intelligence Agency's (CIA) publication "The World Factbook 2005" (CIA, 2005). To reduce variations of the land areas across countries, I use logarithms of the land areas in the models.

I use one indicator of investment climate - the Index of Economic Freedom, published by the Heritage Foundation and the Wall Street Journal. The index reflects countries' economic conditions. It is calculated as an equally weighted average of scores for 10 indicators of economic freedom: business freedom, trade freedom, fiscal freedom, government size, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption, and

[3] I do not consider mineral reserves estimates as measures of the geological potential because of lack of the data for some analyzed countries. Another measure of geological potential is the Fraser Institute index of mineral potential (Fraser Institute, 2006). In 2006, the index covered only 36 countries. For this reason, I do not use the Fraser Institute index of mineral potential.

labor freedom (Heritage Foundation and the Wall Street Journal, 2009). The index values vary between 0 and 100. The higher score indicates economic conditions or policies more favorable to economic freedom. In the analysis, I use the scores of the index of economic freedom for the year 2005. Statistics for geological potential and investment environment indicators can be found in (Khindanova, 2011).

In order to control for countries' sizes, I include the population variable in models. Most of the data on countries' population is from the World Bank's database "World Development Indicators 2005" (World Bank, 2005). For a few countries, the population data are from the Central Intelligence Agency's (CIA) publication "The World Factbook 2005" (CIA, 2005).

I incorporate an additional variable into an analysis of investments decisions by the funding countries – the geographic proximity of the funding country to the recipient country, measured by distances between capital cities of two countries, in kilometers. The distance data are from HappyZebra.com, a website for travel information and tools.

## ESTIMATION OF SENSITIVITY OF MINERAL EXPLORATION FUNDING TO INVESTMENT CLIMATE

This section analyzes the sensitivity of exploration funding to changes in investment climate. I consider total and grassroots exploration; specific minerals exploration targets (gold, base metals, and diamonds); and funding origin country, determined by companies' headquarters locations. In the models for countries receiving exploration investments, the log-transformed exploration expenditures are the dependent variable; geological potential, investment climate, and population are explanatory variables. In the models for funding countries, I add distance between the funding and receiving countries as the fourth explanatory variable. I use logarithms of exploration budgets, population, and distances to reduce their significant variations across countries (to reduce heteroskedasticity of models' errors terms) and to model non-linear associations of variables. Such logarithmic transformation has been employed in an analysis of foreign direct investments by Bullington, 1999; Cheng and Kwan, 2000; Wei, 2000; Buckley et al, 2007.

Log-linear model of exploration investments for receiving countries[4]:

$$lexploration_i = c + b_1 geology_i + b_2 investment_i + b_3 lpopulation_i + \varepsilon_i, \qquad (1)$$

where lexploration is the log-transformed total exploration expenditures, $lexploration_i = \ln(exploration_i)$, $exploration_i$ is total exploration investments (includes investments for all three exploration stages: grassroots, late stage, and mine site) directed to country i; $geology_i$ is the geological potential indicator for country i; $investment_i$ is the investment climate indicator for country i, lpopulation is the log-transformed population, $lpopulation_i = \ln(population_i)$, $population_i$ is the population of country i, $\varepsilon_i \sim N[0,\sigma^2]$, i denotes a receiving country, i = 1, …, 103. I estimate model (1) for one measure of geological potential (log-transformed land areas – lland) and one investment climate indicator (the index of economic freedom - econfreedom):

$$lexploration_i = c + b_1 lland_i + b_2 econfreedom_i + b_3 lpopulation_i + \varepsilon_i \quad . \qquad (2)$$

Results of the model (2) regressions for total and grassroots exploration funds are reported in Table 1. The adjusted $R^2$ values are 0.477 and 0.493 for total and grassroots exploration, respectively. The statistically significant coefficients in Table 1 are shown in the bold font. In both regressions, the coefficient of geological potential (land areas) is significant

[4] Model (1) was also used in Khindanova (2011).

and positive, implying that geological potential is an important factor for both total and grassroots exploration investments and that better geological potential attracts more of exploration investments. The investment climate (index of economic freedom) is positive and significant for total exploration budgets at the 2.92% significance level and insignificant for grassroots exploration. The results confirm a conclusion in (Khindanova, 2011) that total exploration investments are sensitive to countries' investment climate. This paper determines the overall grassroots exploration funding is not sensitive to investment environment. The country size (measured by country's population) does not play a significant role for total explorations but is a factor for grassroots exploration.

Table 1. Model 2 estimation results for total and grassroots exploration funds*

| Explanatory variables | Dependent variable – exploration budgets | |
|---|---|---|
| | Total | Grassroots |
| Constant | -11.724<br>(-7.748) | -12.545<br>(-8.219) |
| lland | 1.009<br>(7.959) | 1.071<br>(9.080) |
| econfreedom | .031<br>(2.213) | 0.021<br>(1.404) |
| lpopulation | -0.184<br>(-1.384) | -0.310<br>(-2.676) |
| Number of observations | 103 | 98 |
| Adjusted $R^2$ | 0.477 | 0.493 |

* t-statistics of the model (2) coefficients estimates are given in parentheses. The t-statistics were derived using the White heteroskedastisity consistent standard errors.

Jara, Lagos, and Tilton (2008) suggest that grassroots exploration expenditures for specific metals, not total exploration, react to investment climate changes right away. The paper examines whether sensitivity of total and grassroots exploration to investment climate depends on targeted metals and minerals. I run regressions of model (2) for total and grassroots exploration budgets targeting gold, base metals, and diamonds[5]. Results of those regressions are provided in Tables 2 and 3, respectively. The gold, base metals, and diamonds exploration investments account for about 89% of the 2006 total exploration budgets. Gold exploration was

[5] There were not enough data to model explorations targeting platinum group metals.

Table 2. Model 2 estimation results for total exploration targeting specific minerals*

| Explanatory variables | Dependent variable – total exploration target budgets | | |
|---|---|---|---|
| | Gold | Base metals | Diamonds |
| Constant | -9.670<br>(-5.666) | -14.151<br>(-8.054) | -8.538<br>(-2.447) |
| lland | 0.720<br>(4.842) | 1.046<br>(6.797) | 0.958<br>(3.190) |
| econfreedom | 0.042<br>(2.683) | 0.045<br>(2.888) | -0.028<br>(-1.038) |
| lpopulation | -0.050<br>(-0.273) | -0.219<br>(-1.346) | -0.514<br>(-1.657) |
| Adjusted $R^2$ | 0.295 | 0.474 | .174 |
| Number of observations | 93 | 74 | 31 |

* t-statistics of the model (1) coefficients estimates are given in parentheses. The t-statistics were derived using the White heteroskedastisity consistent standard errors.

conducted in 93 countries, exploration of base metals – in 74 countries, and diamonds exploration – in 31 countries. The adjusted $R^2$ values in Table 2 for gold, base metals, and diamonds are 0.295, 0.474, and 0.174, respectively. In all three exploration target regressions, the coefficient of geological potential (land areas) is significant. Similarly to total exploration, target explorations increase with a better geological potential. The investment climate is statistically significant for gold and base metals exploration, and is insignificant for the total diamonds exploration. The diamonds exploration is driven mainly by the geological potential. The country size (population) does not play a role for the gold and base metals exploration but is significant for the diamonds exploration at the 10.91% significance level. The positive sign of the geological potential coefficient and the negative sign of the population coefficient indicate that a substantial proportion of diamonds exploration goes to countries with higher per capita geological potential.

The grassroots exploration for gold, base metals, and diamonds was carried out in 86, 68, and 28 countries, respectively. The adjusted $R^2$ values in Table 3 for the targets are 0.334 (grassroots gold exploration), 0.488 (grassroots base metals exploration), and 0.172 (grassroots diamonds exploration). As for total exploration, in all three targets grassroots exploration regressions, coefficient of geological potential is statistically significant. Investment climate is positively associated with the gold and base metals grassroots exploration, and negatively correlated with the diamonds grassroots exploration at the 10.41% significance level. The negative sign of the index of economic freedom coefficient in the grassroots diamonds exploration regression indicates that companies conduct significant proportion of grassroots diamonds exploration in countries with inadequate investment climate. The t-statistics of population in Table 3 suggest that the country size does not influence the gold and diamonds grassroots exploration funds but affects the base metals grassroots exploration budgeting. These findings imply that enhancements in geological potential will result in increased grassroots exploration of all three analyzed targets: gold, base metals, and diamonds. Improvements in investment climate will bring in more of gold and base metals grassroots exploration.

Table 3. Model 2 estimation results for grassroots exploration targeting specific minerals*

| Explanatory variables | Dependent variable – grassroots exploration target budgets | | |
|---|---|---|---|
| | Gold | Base metals | Diamonds |
| Constant | -10.580<br>(-6.406) | -13.987<br>(-7.895) | -7.324<br>(-2.078) |
| lland | 0.790<br>(5.796) | 1.051<br>(7.388) | 0.864<br>(3.013) |
| econfreedom | 0.031<br>(2.176) | 0.035<br>(2.306) | -0.037<br>(-1.689) |
| lpopulation | -0.166<br>(-0.988) | -0.372<br>(-2.690) | -0.418<br>(-1.405) |
| Adjusted $R^2$ | 0.334 | 0.488 | .172 |
| Number of observations | 86 | 68 | 28 |

* t-statistics of the model (1) coefficients estimates are given in parentheses. The t-statistics were derived using the White heteroskedastisity consistent standard errors.

The paper studies if the worldwide exploration target and location decisions vary among top funding countries. I consider three explanatory variables of model (2) and an additional variable – distance between funding and receiving countries:

$$lexploration_{ij} = c + b_1 lland_i + b_2 econfreedom_i + b_3 lpopulation_i + b_4 ldistance_{ij} + \varepsilon_{ij} \quad . \qquad (3)$$

where $lexploration_{ij} = \ln(exploration_{ij})$, $exploration_{ij}$ is exploration investments in country i funded by country j; geology is the geological potential indicator; investment is the investment climate indicator, $lpopulation_i = \ln(population_i)$, $ldistance_{ij} = \ln(distance_{ij})$ is the log-transformed distance between countries i and j[6], $\varepsilon_{ij} \sim N[0,\sigma^2]$, i denotes a receiving country, j represents a funding country. In the analysis of funding countries, I examine exploration investments abroad[7]. The results of model (3) regressions for three top overseas funding countries (Canada, Australia, and United Kingdom)[8] are provided in Table 4. These three countries accounted for 69.21% of the total exploration budgets in 2006. Canadian mining companies allocated budgets for exploration in 74 foreign countries, Australian companies – in 57 countries, the U.K. companies – in 59 countries. The geological potential and distance coefficients are significant in the Canadian, Australian, and UK regressions. The negative signs of the distance coefficient in the Canadian and Australian regressions suggest that the Canadian and Australian mining companies prefer to conduct exploration in geographical proximity. The investment climate (index of economic freedom) is significant only for the Canadian mining companies. The country size (population) coefficient is insignificant in three regressions. Thus, the three top funding countries invest more in countries with better geological potential. The Canadian and Australian companies invest more in countries which are closer geographically. The UK mining companies do not mind explorations in distant countries. The investment climate matters for the Canadian companies but does not play a role for the Australian and UK companies. The three countries are not concerned with host countries sizes.

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[6] Distances between countries are measured by distances between capital cities of the countries.
[7] Thus, receiving country *i* is different from funding country *j*.
[8] The funding origins were determined by companies' headquarters locations.

Table 4. Model (3) estimation results for total exploration budgets of top three funding countries*

| Explanatory variables | Dependent variable – total exploration budgets | | |
|---|---|---|---|
| | Canada | Australia | UK |
| Constant | -3. 440<br>(-1.234) | 3.886<br>(0.756) | -11.630<br>(-5.848) |
| lland | 0.722<br>(5.162) | 0.480<br>(2.496) | 0.423<br>(2.734) |
| econfreedom | 0.036<br>(2.485) | -0.007<br>(-0.337) | 0.021<br>(1.257) |
| lpopulation | -0.047<br>(-0.267) | 0.042<br>(0.211) | 0.048<br>(0.364) |
| ldistance | -0.651<br>(-2.475) | -0.939<br>(-2.318) | 0.700<br>(3.315) |
| Adjusted $R^2$ | 0.352 | 0.206 | .372 |
| Number of observations | 74 | 57 | 59 |

* t-statistics of the model (1) coefficients estimates are given in parentheses. The t-statistics were derived using the White heteroskedastisity consistent standard errors.

Table 5. Model (3) estimation results for grassroots exploration budgets of top three funding countries*

| Explanatory variables | Dependent variable – grassroots exploration budgets | | |
|---|---|---|---|
| | Canada | Australia | UK |
| Constant | -4.087<br>(-1.757) | 1.331<br>(0.256) | -11.319<br>(-5.902) |
| lland | 0.734<br>(5.105) | 0.494<br>(2.559) | 0.572<br>(4.075) |
| econfreedom | 0.024<br>(1.614) | -0.016<br>(-0.806) | 0.015<br>(1.061) |
| lpopulation | -0.081<br>(-0.538) | -0.038<br>(-0.223) | -0.066<br>(-0.586) |
| ldistance | -0.614<br>(-2.740) | -0.693<br>(-1.385) | 0.438<br>(2.119) |
| Adjusted $R^2$ | 0.357 | 0.149 | .405 |
| Number of observations | 70 | 50 | 50 |

* t-statistics of the model (1) coefficients estimates are given in parentheses. The t-statistics were derived using the White heteroskedastisity consistent standard errors.

An analysis of host countries' exploration investments showed that total exploration investments are sensitive to countries' investment climate, while grassroots exploration investments are not. The paper investigates whether the funding countries grassroots and total exploration decisions differ. Results of model (3) regressions for grassroots explorations by Canada, Australia, and the UK are presented in Table 5. The geological potential is significant for the three countries' grassroots exploration budgets. The investment climate matters only for the Canadian mining companies at the 11.13% significance level. The country size does not influence grassroots exploration funding by the countries. The proximity to destination countries plays a role for grassroots exploration decisions by Canada and the UK. The Canadian companies allocate more grassroots exploration budgets for neighboring countries but the UK companies invest more in faraway countries. The Australian companies' grassroots exploration decisions are not affected by distance.

## CONCLUSIONS

This study analyzes sensitivity of exploration funding to investment climate changes. The paper conducts a separate analysis of different types of exploration funding: (i) total and grassroots exploration; (ii) directed towards specific minerals exploration targets (gold, base metals, and diamonds); and (iii) divided by funding origin country. The analysis is based on a cross-country log-linear model of exploration budgets with investment climate, mineral potential, population, and distance as explanatory variables. The model is estimated using the Metals Economics Group's exploration funding data. The paper results show that better geological potential attracts more of the total and grassroots exploration investments. The investment climate is significant for total exploration and insignificant for grassroots exploration. An exploration target analysis shows that the sensitivity of exploration budgets to investment climate depends on targeted minerals or metals. Better investment conditions lead to higher total and grassroots exploration for gold and base metals. Total exploration for diamonds is not affected by the investment conditions, while grassroots exploration for diamonds is negatively correlated with the investment climate. The study of top three exploration funding countries demonstrates that the Canadian mining companies are sensitive to investment environment in host countries, while exploration budgeting of the Australian and UK companies is not linked to investment climate. The Canadian and Australian companies allocate more of exploration funds to countries in geographical proximity, while the UK companies invest more in distant countries. The paper findings will be useful for host countries and mining companies making exploration budgeting decisions.

## REFERENCES

Bullington, N. (1999). The Location of Foreign Direct Investment: An Empirical Analysis. Applied Economics, 31, 65-76.

Birdsall, N., Pinkney, T. & R. Sabot, R. (2001). Natural Resources, Human Capital, and Growth. Resource Abundance and Economic Growth, R. Auty ed., Oxford University Press.

Buckley, P.J. (2008). Do We Need a Special Theory of Foreign Direct Investment for Extractive Industries? Journal of Chinese Economic and Foreign Trade Studies, 1, (2), 93-104.

Buckley, P.J., Clegg, L.J., Cross, A.R., Liu, X., Voss, H. & Zheng, P. (2007). The Determinants of Chinese Outward Foreign Direct Investment. Journal of International Business Studies, 38, 499-518.

Campos, N. F. & Kinoshita, Y. (2003). Why Does FDI Go Where it Goes? New Evidence from the Transition Economies. IMF Working Paper, WP/03/28.

Central Intelligence Agency. (2005). The World Factbook 2005. Washington, DC, http://www.cia.gov/cia/publications/factbook/

Chender M. (2009). Global Exploration Trends. CESCO Exploration Forum. Santiago, Chile, March 31, 2009.

Cheng, L. K. & Kwan, Y.K. (2000). What Are the Determinants of the Location of Foreign Direct Investment? The Chinese Experience. Journal of International Economics, 51, 379-400.

Dunning, J. H. (1998). Location and the multinational enterprise: a neglected factor. Journal of International Business Studies, 29, (1), 45-66.

Eggert, R.G. (1992). Exploration. In: Peck, M.J., Landsberg H.H., Tilton, J.E. (Eds), Competitiveness in Metals – the Impact of Public Policy. London: Mining Journal Books, 21-67.

Eggert, R. G. (2008). Trends in Mineral Economics: Editorial Retrospective, 1989-2006. Resources Policy, 33, 1-3.

Fraser Institute. (2006). Survey of Mining Companies: 2005/2006, Vancouver, Canada.

HappyZebra.com. (2014). Distance Calculator. http://www.happyzebra.com/distance-calculator . Accessed on September 5, 2014.

Heritage Foundation and Wall Street Journal. (2009). 2009 Index of Economic Freedom, Washington, DC.

Jara J.J., Lagos, G. & Tilton, J.E. (2008). Using Exploration Expenditures to Assess the Climate for Mineral Investment. Resources Policy 33, 179-187.

Johnson, C. J. (1990). Ranking Countries for Minerals Exploration. Natural Resources Forum, August 1990, 178-186.

Khindanova, I. (2011). Location Factors for Non-Ferrous Exploration Investments. Journal of Applied Business and Economics, 12(1), 38-45.

Metals Economics Group. (2006). Corporate Exploration Strategies 2006, Halifax, Canada

Otto, J. M. (1992a). Results of a Survey of Mineral Investment Preferences. Mineral Investment Conditions in Selected Countries of the Asia-Pacific Region, United Nations, 330-342.

Otto, J. M. (1992b). Criteria for Assessing Mineral Investment Conditions, Mineral Investment Conditions in Selected Countries of the Asia-Pacific Region, United Nations, 1992, 6-34.

Sachs, J. D. & Warner, A.M. (1995). Natural Resource Abundance and Economic Growth, NBER Working Paper Series, Working Paper 5398, Cambridge, Massachusetts.

Stijns, J.-P. C. (2005). Natural Resource Abundance and Economic Growth Revisited. Resource Policy, 30, 107-130.

United Nations Conference on Trade and Development (UNCTAD). (2007). World Investment Report: Transnational Corporations, Extractive Industries and Development.

Vernon, R. (1971). Sovereignty at Bay, Harmondsworth: Penguin.

Wei, S.-J. (2000). How Taxing is Corruption on International Investors? The Review of Economics and Statistics, 82(1), 1-11.

World Bank. (2005). World Development Indicators 2005.