Globalisation strategies and roles among Australian junior mining firms in Latin America

Adriana Nunez-Picado | Kirsten Martinus | Thomas Sigler

1Department of Geography and Planning, School of Social Sciences, The University of Western Australia, Perth, Western Australia, Australia
2School of Earth and Environmental Sciences, The University of Queensland, Brisbane, Queensland, Australia

Correspondence
Adriana Nunez-Picado, Department of Geography and Planning, School of Social Sciences, The University of Western Australia, Perth, Western Australia, Australia. Email: adriana.nunezpico@research.uwa.edu.au

Funding information
The University of Western Australia, Grant/Award Number: Scholarship for international research; Australian Research Council (ARC), Grant/Award Numbers: DE170100727, DP170104359; University of Western Australia (UWA)

Abstract
Australian junior mining firms’ globalisation strategies and roles inside the sector remain understudied in economic geography. Such firms are often overshadowed by larger global mining interests, whose operations drive most foreign direct investment, capital, and operational expenditure tied to resource extraction. Unlike large multinationals and state-owned enterprises, junior firms are nimble, often untethered from path-dependent national systems, less encumbered by statutory constraints or corporate structures, and less accountable to shareholders. This study sought to understand globalisation strategies and roles among junior mining firms by reference to a case study of 55 Australian junior firms in Latin America. We used spatial analysis to uncover three patterns of junior firm globalisation strategies and roles: specialised service providers supporting the further development of mature and emerging mining industries; regional spearheads opening new destinations; and mineral avant-gardists developing new speculative industries that are critical to clean energy technologies. We conclude both that Australian junior firms play a crucial role in the development of critical resource basins in other nations and that there are significant forms of firm heterogeneity and functional integration at the core of mining globalisation that need to be more comprehensively incorporated in economic geography research.

KEYWORDS
Australia, exploration, globalisation, junior firms, Latin America, mining

1 INTRODUCTION

Since the late 1980s, junior mining firms from advanced resource economies such as Canada and Australia have increasingly expanded their international influence (Dougherty, 2011). Junior mining firms (hereafter junior firms) are small firms mostly focused on mining exploration to find and prove mineral reserves that are quickly turned into saleable assets (Haslam & Ary Tanimoune, 2016). Unlike large multinationals and state-owned enterprises, junior firms are nimble and flexible (Dougherty, 2011; Kneas, 2020). Compared with large firms, they are less constrained by path-dependent national systems and operating conventions, less encumbered by statutory restraints or corporate structures, and less accountable to shareholders expecting profitable returns. Industry estimates show that in 2019 alone, junior firms accounted for US$1.07 billion (AU$1.41 billion) in mining exploration expenditure (S&P Global Market Intelligence (S&P), 2020). This point highlights their importance in work to identify new mineral deposits and support the development of mining industries’ future production capacities (Tilton et al., 2016).
Junior firms’ globalisation strategies and roles in mining industries remain understudied in economic geography. Studies of Canadian junior firms have found that some operate in high-risk mining countries, such as Guatemala (Dougherty, 2011, 2013), and do so as part of a strategic functional interdependency between junior and larger mining firms. In that context, high-risk exploration is the purview of junior firms. Larger mining firms focus on mineral extraction and low-risk exploration and often access new potential mineral deposits by forming alliances with junior firms. This approach is consistent with industry perceptions that junior firms are risk-seeking (Williams, 2012) and that senior and medium (larger) firms are receding from early-stage high-risk exploration (Guj & Schodde, 2013). Thus, the spatial distribution of junior firms provides insights into the strategies and roles that junior firms play in mining industries, which have been broadly overshadowed by the prominence of large multinational production firms in academic literature (cf. Bridge, 2004; Martinus & Sigler, 2018; Scholvin, 2019; Sigler et al., 2018). As such, more research at larger geographical scales is needed to better grasp and unpack junior firms’ globalisation strategies and roles in the sector.

We take up that opportunity in an exploratory study to understand the activities of an increasing number of Australian junior firms that have ventured to Latin America since the early 2000s (Maponga & Maxwell, 2000; Satchwell & Redden, 2016). We define globalisation strategies as strategies of geographic expansion where firms integrate functionally with each other (Dicken, 2011; Lemoine & Dagnaes, 2003) and leverage the capital of industry actors within and across national borders. Operationally, such engagement results in a particular spatial distribution (firm locations) and composition (mineral industry and organisational structure). This approach is relational, which separates it from those involving Foreign Direct Investment (FDI) or internationalisation strategies (Kraemer & Van Tulder, 2009; Vivoda, 2017).

In Section 2, we review a select literature on junior firms and their globalisation strategies. Then, in Section 3, we explain the case study background for Australian junior firms and the conditions of mining in Latin America. In Section 4, we outline the methods used to collect and analyse data on project, subsidiary, and regional office locational data for 55 Australian junior firms identified from the Australian Stock Exchange (ASX) in 2019. Section 5 presents findings and analyses the spatial distribution and composition of Australian junior firm operations in Latin America, where identified patterns provide insight into three junior firm globalisation strategies and roles: specialised service providers, regional spearheads, and mineral avant-gardists. In Section 6, we conclude Australian junior firms play a crucial role in developing critical resource basins across mineral-rich nations and that there is significant firm heterogeneity and functional integration at the core of mining globalisation that needs to be more comprehensively incorporated in future economic geography research.

### Key insights

This article explores the spatial distribution and composition of junior mining firms’ operations with a view to understand their globalisation strategies and roles in mining industries, focusing on Australian junior mining firms in Latin America. Our results identify three patterns of junior firm globalisation strategies and associated roles: specialised service providers, regional spearheads, and mineral avant-gardists. We conclude that Australian junior firms play a crucial role in developing critical resource basins in other nations and that there are significant forms of firm heterogeneity and functional integration at the core of mining globalisation that need to be more comprehensively incorporated in economic geography research.

### 2 | JUNIOR MINING FIRMS AND THEIR GLOBALISATION STRATEGIES

Junior firms are structurally and operationally different from larger multinational mining firms and state-owned enterprises. Junior firms have small operative and administrative structures, with “as little as three staff ... a geologist, engineer and accountant” (Gilbert, 2020, p. 20). This arrangement enables quick decision-making, frugal operations, great mobility, and flexibility (Dougherty, 2013). Such firms engage in little or no mineral production and are dedicated mostly to resource speculation and exploration (Dougherty, 2013; Kneas, 2020), including the identification, characterisation, and value assessment of mineral deposits, later turned into saleable assets (Eggert, 2016; Hogan et al., 2002). These activities require minimal infrastructure or supporting services and are subject to fewer regulatory controls and forms of scrutiny than are applied to mining extraction activities (Tilton et al., 2016).
Junior firms are, in essence, venture capital firms, highly dependent on equity markets and other external investors to support their operations (Majury, 2014; Tsing, 2000). Mining exploration requires large sums of capital and, in contrast to larger mining firms, few junior firms generate cash flow from mineral production and their risk profiles are often incompatible with traditional debt funding sources (Tilton et al., 2016). They compete for high-risk speculative investments, which are scarce (Bird et al., 2013; Poskitt, 2005) and which fluctuate along with changes in commodity prices and mineral demand speculation (Connolly & Orsmond, 2011; Gilbert, 2020; Tsing, 2000). Their shares are often bought and sold as packages of derivatives, highly hedged across institutional portfolios (Emel & Huber, 2008). This practice reduces pressure on individual junior firms to perform. These firms tend to be short-lived, because failure to convert mineral prospects into cash flow often leads to their disintegration, merger, or acquisition (Gilbert, 2020). As such, junior firms are less accountable to shareholders than larger firms (cf. De los Reyes, 2017), given their in-built high-risk profiles and accounting for how easily these are disintegrated or transformed.

Considering the relevance and highly competitive characteristics of external funding, junior firms develop strategies to manage perceptions of project risk in order to attract and maintain investor interest. Exploration projects are exposed to political risks based on host country characteristics, economic risks associated with changing mineral prices or access to funding, and geological risks regarding the probability of discovering valuable ore deposits (Eggert, 2016). Besides, when firms operate abroad their risks are intensified by their foreign status (Kneas, 2020). The lack of familiarity with new environments, and increased needs to manage local stakeholders’ expectations (Haslam et al., 2019). Recent studies show junior firms combine and present project-related risks in different ways in order to attract investors. Some junior firms contextualise their projects in terms of high mineral demand and resource deficit such as those related to lithium (Kneas, 2020) and thereby seek to reduce their economic risks. Others position their own near others’ successful projects, also to reduce political or geological risks (Kneas, 2020). To reinforce perceptions about resources’ potential and lower notions of political and economic risks inherent to their projects, some use industry political rankings, discount rates (Gilbert, 2020), or resource projections (Olofsson, 2020). Although these investment attraction strategies are key to junior firm operations and allude to locational and operative decisions, analyses of them remain at a discursive level and are yet to be linked to the distribution and composition of firm operations.

Junior firms also differ from traditional mining services supplier firms, including transport, engineering, equipment, and consultancy services (cf. Bravo-Ortega & Muñoz, 2021; Urzúa, 2012). At times, mining exploration can be categorised as a mining service (cf. Atienza et al., 2021), given larger mining firms may hire junior firms to undertake particular exploration projects. However, unlike traditional mining services, junior firms’ business models do not rely necessarily on contracting for larger firms because they can set independent exploration projects and raise funds. Furthermore, their activities are based on highly technical geological knowledge and expertise that is core to mining production and cannot be easily translated into other economic sectors (Tilton et al., 2016).

Several scholars working in urban and economic geography have sought to understand the spatial distribution and functional integration of mining firms and the resources sector more broadly but provide little to no information on junior firms. For example, in the world city networks literature, some studies have mapped mining, oil, and gas corporate structures identifying transnational structures that concentrate power and control in specific cities (Loginova, 2021; Martinus & Sigler, 2018; Sigler et al., 2018). Other studies have shown how such transnational structures are shaped by political territorial realities and sectoral relationships as these affect the locational strategies of firms (Breul, 2019; Loginova et al., 2020). Although that literature includes junior firm international locations, the data do not allow differentiation of locational strategies from other types of mining firms. Additionally, as much of the literature oriented to city-networks focuses on intra-firm connectivity, junior firms are limited in their influence because they are often characterised by a single office location with few staff. Likewise, studies based on FDI include all types of mining firms and the investment data are aggregated to a level that prevents one identifying which portion responds to junior or other types of firms (cf. Bridge, 2004).

Junior firms may also be underrepresented in FDI-oriented studies, given exploration projects require less capital expenditure than mining extraction (Global Data Energy, 2021; Klossek & Klossek, 2014), representing smaller shares of FDI than larger mining firms. Meanwhile, studies on resources global production networks have mapped the activities of resource sector firms, which suggests that sites of operation are broadly defined by geology, means of mineral extraction, and national regulation (Bridge, 2008), whereas coordination and control tend to allocate in nearby intermediary cities.
strategically block their competitors. Large resource basins, reduce their operational costs, or firms appear to locate in regions where they can access larger mining firms. From this perspective, mining focusing exclusively on the empirical experience of explored the international expansion of mining firms, and consequently of junior firms. Although these qualitative studies provide a first insight on the junior firms’ globalisation strategies, more research is needed because their results are limited to the particularities of Canadian junior firms operating in one country and to the role they play in that context. The remainder of this article addresses this research gap using a case study of Australian junior mining activity in Latin America.

3 | AUSTRALIAN JUNIOR MINING FIRMS IN LATIN AMERICA

Australia has a strong junior mining sector comprising hundreds of firms (Williams, 2012). More than 660 junior firms were listed on the Australian Stock Exchange (ASX) in October 2019 (Ker, 2019). These are distinguished from junior firms in other resources industries, such as oil and gas, because of their particular expertise in minerals. Most Australian junior firms focus exclusively on mining exploration and are recognised for their capacity to work in remote and inhospitable environments (Maritz, 2003; Satchwell & Redden, 2016). Some junior firms are also small-scale mineral producers, especially of gold—an industry with a long tradition in Australia (Blainey, 1963; Maritz, 2003). They tend to depend financially on the ASX, which exposes them to commodity prices cycles and capital availability (Maponga & Maxwell, 2000; Williams, 2012). They are small in staff numbers and volumes of revenue, and whereas they have relatively low success rates, they are “remarkably long-lived” with average survival rates of more than 17 years (Schodde, 2015).

In the 1990s, Australian junior firms undertook unprecedented geographical expansion, following the 1980s mining boom (Maponga & Maxwell, 2000). This expansion occurred simultaneously with the aperture of developing resource-rich nations to foreign investment (Bridge, 2004) and greater liberalisation of the Australian economy (O’Neill & Fagan, 2006). Aside from the complexity of native titles and land rights, the maturity of mining exploration increased the difficulties for mining exploration in Australia (Hogan et al., 2002; Maponga & Maxwell, 2000). At the time, Australian junior firms invested in North America and Western Europe and expanded in a wave of investment to the Asia-Pacific region and Africa (Maponga & Maxwell, 2000). This wave
was facilitated by geographical proximity, the mineral affinity between regions, and relatively little development of African and Asia-Pacific mining industries—which have given Australian junior firms a knowledge edge (Piper, 2011). By 2016, sub-Saharan Africa had the highest concentration of Australian mining foreign operations (36%) followed by Asia-Pacific (22%) and Latin America (17%) (Australia-Africa Minerals & Energy Group, 2016; Satchwell & Redden, 2016).

In the 1990s, Latin America’s mineral riches and a surge of neoliberal reforms brought increased investment from foreign mining firms (Bridge, 2004; Perreault, 2018). In that decade, all Latin American governments opened their resource sectors to foreign investment, even those with highly nationalised sectors, such as Bolivia (Sanchez Albavera et al., 1999). However, investment was not evenly distributed across the region and was concentrated especially in Chile—an early and radical neoliberalisation adopter (Bridge, 2004). In the ensuing decades, Chile, Brazil, Mexico, and Peru developed large mining industries reliant on mineral exports (United States Geological Survey (USGS), 2008; Walter, 2016), whereas smaller or less mining-experienced nations, such as Guatemala and Argentina, deliberately looked for foreign investment to explore and exploit their minerals (USGS, 2008). Foreign mining investment in Latin America has been primarily Canadian, representing between 50% and 70% of formal mining operations by 2005 (Studnicki-Gizbert, 2016). Since 2010, Chinese mining investment has intensified in the region. The Chinese government has supplied funds via loans and donations to develop infrastructure (Gonzalez-Vicente, 2012; Küblböck et al., 2019). Meanwhile, Chinese private mining firms have invested in lithium-bearing salt lakes, including Chengdu Tianqi in Chile and Jiangxi Ganfeng in Argentina (Küblböck et al., 2019). Australian senior mining firms established operations in Latin America in early 1980s with the purchase of key mining assets, such as La Escondida copper mine in Chile by BHP (Blainey, 2015). That mine is still managed by BHP and has the largest copper production capacity globally (International Copper Study Group, 2020).

In the 2000s, Australian junior firms entered Latin America and expanded rapidly. The 20 Australian mining firms that operated in Latin American countries in 2009 grew four-fold to 77 ASX-listed companies in 2011 (Piper, 2011). In 2014, 80 of the 96 ASX-listed mining firms with operations in Latin America were junior firms (Australian Stock Exchange, 2014). By 2016, Latin America was the fastest-growing destination for Australian mining firms (Satchwell & Redden, 2016). This second wave of expansion occurred after the 2000s mining boom (cf. Argent, 2015) but remains understudied. The late engagement between these regions can be partly attributed to geographical distance, misconceptions of economic irrelevance or competition, perceptions of difficulties for doing business in Latin America, and the regions’ interest in more proximate markets (Esposto & Fien, 2016; Kenyon & van der Eng, 2011). Anti-imperialist discourses in the region (cf. Haslam et al., 2019), the large size of Latin American deposits, and the higher level of development of its mining industries can also be challenging for small junior firms (Piper, 2011).

Still, Latin American mining provides an attractive environment to Australian junior firms. The region is rich in a wide variety of minerals and has large prospective areas to be explored, positioning it as the most attractive for exploration investment globally (S&P, 2020). Resources tend to be in remote locations and include metals such as gold, copper, and iron ore (Walter, 2016), all within the expertise of Australian junior firms. Latin American governments have limited funding for mining exploration, infrastructure, and development (Brown, 2012; Perreault, 2018), whereas domestic private investment and equity markets are small and lack mining expertise (Blume et al., 2013; Organisation for Economic Co-operation and Development, 2019). This capital deficiency is met by Australian junior firms’ capacity to raise exploration funds in the ASX or other similar equity markets, including the Toronto Stock Exchange (Maponga & Maxwell, 2000; Williams, 2012). Fewer Australian junior firms operate in Latin America than in Africa or Asia, which is a source of differentiation for investor attraction (Piper, 2011). Multinational and local senior mining firms are active in the region (USGS, 2008), which increases the potential for vertical integration and partnerships.

Latin America is expected to play an important role in the transition to renewable energy because of its large deposits of lithium and copper (USGS, 2008, 2020). This mineral richness has drawn much investment to the region in recent years (Economic Commission for Latin America and the Caribbean, 2019) and increased interest from nations such as China, Korea, Japan, and Australia (Economic Commission for Latin America and the Caribbean, 2019; Gonzalez-Vicente, 2012). Although Latin America and Australia are sometimes presented as competitors in the lithium industry, the differences in the types of lithium deposits they hold, the sheer size and limited development of Latin American lithium salt lakes create incentives for Australian junior firms to enter the market (Andrews, 2019).
4 METHODS

In this study, we employed an exploratory case study approach justified by the dearth of theoretical and empirical knowledge concerning the globalisation strategies and roles of junior firms (Seawright & Gerring, 2008; Yin, 2014). After case selection, we used spatial analysis to inductively identify spatial patterns that provide insights into complex economic and social phenomena (Harbers & Ingram, 2017; Python & Brandsch, 2019), such as globalisation strategies of junior firms.

4.1 Case selection

We selected the novel case of Australian junior firms in Latin America to unveil a recently formed and growing relationship between two strong mining regions. The case has enabled us to explore contemporary junior firm globalisation strategies and roles in a context that is less influenced by geographical proximity or historical economic relations than is the case with Canadian junior firms in Latin America (cf. Perreault, 2018) or Australian junior firms in Africa (cf. Youe, 2010). This case is also less influenced by geopolitical power dynamics than is the case with Chinese firms in Latin America (Küblböck et al., 2019). Australian junior firms share structural and operation characteristics with Canadian junior firms and have emerged in similar regulatory and financial environments (Haslam et al., 2018). These similarities enable comparison. Chinese mining firms, and firms from other developing countries such as India or South Africa, have differentiated operative structures and regulatory environments (Oskarsson & Lahiri-Dutt, 2019; Robinson, 2016; Vivoda, 2011), making comparisons difficult.

4.2 Sample and data collection

Drawing on all firms listed on the ASX’s materials subgroup in September 2019, we identified a data set of 55 Australian junior firms. We used four criteria to select the junior firms:

1. firm residence in Australia and announced operations in Latin America—excluding non-Australian junior firms listed in ASX;
2. specialisation in mining exploration (Deonandan & Dougherty, 2016; Dougherty, 2013; Kneas, 2020)—excluding mining services suppliers, financial or shell firms;
3. market capitalisation equal to or less than AU$500 million (cf. White, 2016); and,
4. reliance on external investors to support their operations, especially equity markets (Gilbert, 2020; Kneas, 2020; Majury, 2014)—excluding private junior firms as no publicly available records were found.

We collected locational and mineral interest data for each firm. We identified mining projects and regional office addresses from firm websites and annual reports and used Google maps to obtain exact or approximate location coordinates. The identified project locations were compared with those in mining project catalogues on Latin American government websites. Data on subsidiaries’ country of incorporation were extracted from DataAnalysis premium website. Data collection on senior and medium Australian mining firms with operations in Latin America (N = 6) followed the same procedure. Mineral facilities locations in Latin America (that is, mines, mineral smelters, and refineries) were extracted from the dataset developed by Baker and Buteyn (2016), which is publicly available from the United States Geological Survey (USGS). Data on oil and gas facilities were excluded; this dataset was the most recent we found and was considered appropriate due to the long life of mining facilities.

4.3 Analysis

Our analysis explored the spatial distribution and composition of Australian junior firm operations for insights on the globalisation strategies and roles these firms adopt in the mining industries. We assumed that the spatial distribution and composition of operations described how firms managed geological, economic, and political risks (Eggert, 2016), established particular integrations with larger firms (Dougherty, 2011), and enabled access to capital (Gilbert, 2020; Kneas, 2020; Olofsson, 2020).

There were six steps in our analysis. First, we identified project location by national mining industry development levels as an indicator of geological and political risks. For this identification, we created a categorisation of mining industry development for Latin America (Table 1), using academic literature (cf. Viana-Ríos, 2018) and technical reports on Latin American mining (Barcena, 2018; USGS, 2008; Walter, 2016). The categories considered national mining production levels, size of firms, operating conditions, mining-related infrastructure, and national importance of the mining sector. Views on mining investment risk were derived from a globally recognised ranking of mining investment attractiveness (cf. Stedman et al., 2019).
Second, we determined colocation between respective Australian junior firm projects and proven mineral deposits using a heatmap and clustering in QGIS software as indicators of geological risk (USGS, 2020). Third, using QGIS to identify clusters and determine the average distance, we calculated project proximity to the nearest mining facilities (that is, existing mines, smelters, and other mineral refining facilities). Fourth, we grouped project mineral interests by frequency per country and later divided those into expanding critical, established critical, and other as indicators of economic risk (Table 2). We developed this categorisation based on mineral criticality to clean energy technology production, on the mineral’s current applications, and on whether the minerals were long-established commodities or had developing market conditions. That work was informed by literature (Bazilian, 2018; Speirs et al., 2014) and technical reports (The World Bank, 2017, 2020; USGS, 2020).

Fifth, we used the total number of junior firms’ regional offices and subsidiaries to determine the composition of firm administrative structures and their flexibility. Sixth, to assess differences in spatial patterns we compared the geographies of junior firm operations and administrative structures with those of senior and medium firms.

We combined the patterns derived from the spatial distribution and operational composition analyses described above to identify three junior firm globalisation strategies and roles. A more nuanced understanding of each strategy was gained by examining specific junior firms and the relationships they had built with larger firms.

### 5 | RESULTS

Australian junior firms included in the sample \((N = 55)\) had 152 projects in Latin America. Of those, 46 firms operated in only one Latin American country, whereas nine firms operated in two countries simultaneously. Most firms had projects in countries with mature mining industries (Table 3). Chile was the most frequent
location, Brazil was the third, and was followed by Mexico and Peru. None operated in Bolivia—which is mineral-rich and has a long mining history but has governance challenges (Robb et al., 2015). In countries with emerging mining industries, only Argentina had a significant Australian junior firm presence, followed by Colombia and Ecuador, which had considerably fewer firms and projects. Three junior firms operated in countries with limited mining industries, establishing four projects across only three nations: Nicaragua, Cuba, and the Dominican Republic.

Most projects were close to other Australian junior firm projects, creating 29 geographic clusters of various sizes, from two to 16 projects (see Figure 1). Ten clusters (81 projects) were in the north of Chile and on or near the Chilean border with Argentina and Peru.

### TABLE 2  Operationalisation of mineral industry types

<table>
<thead>
<tr>
<th>Type of mineral industry</th>
<th>Description</th>
<th>Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanding critical</td>
<td>• Expanding industries, with little prior development and not as clearly defined set of actors and market conditions (such as price).</td>
<td>Lithium, Cobalt, Vanadium, Indium, Tellurium, Gallium, Germanium, Rare Earths, and Selenium</td>
</tr>
<tr>
<td></td>
<td>• Increasingly important to the energy transition. Often described as ‘critical mineral’. Applications mostly related to the future energy transition, limited current application.</td>
<td></td>
</tr>
<tr>
<td>Established critical</td>
<td>• Developed commodity industries, with clearly defined market structures and regulations. Wide range of current and future applications, lower risk.</td>
<td>Copper, Manganese, Nickel, Lead, Zinc, Iron Ore, Bauxite, Tin, and Platinum</td>
</tr>
<tr>
<td>Other</td>
<td>• Developed or under-developed mining industries which are not critical to the energy transition.</td>
<td>Alumina, Gold, Coal, Phosphate, Silver, Mineral and Iron Sands, and so forth.</td>
</tr>
</tbody>
</table>

*Note: Adapted from Bazilian (2018); Speirs et al. (2014); The World Bank (2017, 2020); USGS (2020).*

### TABLE 3  ASX-listed Australian junior firms in Latin America 2019, by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Firms</th>
<th>Projects</th>
<th>Mining development level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>25</td>
<td>69</td>
<td>Mature</td>
</tr>
<tr>
<td>Argentina</td>
<td>12</td>
<td>22</td>
<td>Emerging</td>
</tr>
<tr>
<td>Brazil</td>
<td>7</td>
<td>19</td>
<td>Mature</td>
</tr>
<tr>
<td>Mexico</td>
<td>6</td>
<td>15</td>
<td>Mature</td>
</tr>
<tr>
<td>Peru</td>
<td>5</td>
<td>16</td>
<td>Mature</td>
</tr>
<tr>
<td>Colombia</td>
<td>3</td>
<td>3</td>
<td>Emerging</td>
</tr>
<tr>
<td>Ecuador</td>
<td>2</td>
<td>4</td>
<td>Emerging</td>
</tr>
<tr>
<td>Cuba</td>
<td>1</td>
<td>1</td>
<td>Limited</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1</td>
<td>1</td>
<td>Limited</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>1</td>
<td>2</td>
<td>Limited</td>
</tr>
<tr>
<td>Bolivia</td>
<td>0</td>
<td>0</td>
<td>Mature</td>
</tr>
<tr>
<td>Guatemala</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
<tr>
<td>Honduras</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
<tr>
<td>Salvador</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
<tr>
<td>Uruguay</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
<tr>
<td>Paraguay</td>
<td>0</td>
<td>0</td>
<td>Limited</td>
</tr>
</tbody>
</table>
Three smaller clusters were in the north of Mexico, six clusters were across Brazil, six in Peru, two in southern Chile, and one in each of Colombia and Ecuador. Eighteen projects were distanced from Australian junior firm projects. The largest project clusters corresponded with the region’s richest mineral deposits, especially the Andean copper belts in Chile, the lithium triangle near the borders between Chile, Peru, and Argentina and, to a lesser extent, the copper and gold deposits in the north of Mexico.

Most junior firm projects were near existing mineral facilities and related infrastructure (Figure 1), the only exceptions being two clusters in the middle of Brazil. On average, projects were 75 kilometres (km) away from existing mining facilities, although that distance varied between countries according to their size, remoteness, and levels of development of mining deposits (Table 4). The only project in the Dominican Republic was less than one km away from its few existing mining facilities. Projects in Chile were, on average, 50 km away from existing mining facilities, with a range of 2 to 483 km. Projects in Brazil were farthest from existing mining facilities (about 195 km away). That distance shows the remoteness of potential resources yet to be developed.

More than half of Australian junior firm projects in Latin America (55.4%) have explored critical minerals to clean energy technologies (Figure 2). The most explored mineral was copper (36.8%)—a well-established industry—with most copper projects located in Chile. Lithium has been the most explored expanding critical mineral and the third most explored overall (17.1%), with most projects being in Argentina. Among the other non-critical minerals, most exploration has been for gold (26.9%) in Chile and Brazil. Operations in countries with limited mining industries have mostly for gold.

The 55 Australian junior firms established 146 subsidiaries in Latin America, almost as many as exploration projects, and with only 13 regional offices (Table 5). Most subsidiaries represented highly flexible administrative structures without a physical address or permanent staff. Many of them were legal structures with easily sold or transferrable mining tenement concessions. There were subsidiaries in all countries where junior firms operate, excepting one subsidiary in Panama, where no operations were found. Regional offices were concentrated in the capital or head financial cities of countries with mature and emerging mining industries: Santiago, Buenos Aires, Sao Paulo, Lima, and Bogota. There was one regional office each in Nicaragua and the Dominican Republic, where there were few projects. There were no regional offices in Mexico, Ecuador, or Cuba, despite exploration there.

Junior firms were both more abundant and had more varied projects than senior and medium firms (Figure 3). Senior and medium firms had fewer operations, with geographies characterised by limited numbers of firms with multiple large mining projects and administrative structures that included more and larger regional offices. Their projects were concentrated in the north of Chile and Argentina and a few were across Brazil, Ecuador, and Colombia. They were in neither Mexico nor any country with limited mining industries. In contrast, the geographies of junior firms included an extensive network of exploration projects run by small independent firms across the entire region and colocated with larger firms in mature mining regions, such as in the north of Chile, where they had joint exploration ventures with local and multinational mining firms.

Three differentiated globalisation strategies and roles for Australian junior firms emerged from these distributional and compositional patterns (Table 6). First, junior firms appeared to operate as specialised service providers in mature or emerging mining regions, with project locations chosen according to low political risks and access to proven large mineral sinks and infrastructure. They operated in established mineral industries, such as copper, near existing mineral facilities and larger firms, frequently having regional offices, partnerships or service provision agreements with larger mining firms to support their operations. For example, in 2013, Southern Hemisphere Mining owned the Llalauiin copper-gold...
exploration project in Chile, which was funded by the Canadian senior firm Lundin Mining Corporation as part of a farm-in agreement in exchange for 75% of the tenement interest (Heber, 2013; Wendt, 2014). Similarly, Latin Resources had a farm-in Joint Venture with Canadian senior copper firm First Quantum Minerals for an exploratory copper porphyry project in Ilo, Peru (Latin Resources Ltd, 2019; Proactive Investors, 2015).

Second, junior firms appeared to operate as regional spearheads in regions with limited mining industries, economic or socio-political constraints, and away from other junior firms or existing mining facilities. Exploration was mostly in established minerals such as copper or gold, and it pushed the geopolitical and economic boundaries of the mining industries by opening space for larger firms that either support their operations or purchase their discoveries. Such a strategy was the least frequent, perhaps because of the challenges involved in raising capital for high-risk projects. Examples include Oro Verde’s Topacio gold exploration project in Nicaragua in 2015. At the time, no other Australian firm and only a few UK and Canadian junior firms operated in that country (Dickinson, 2015). In 2017, the firm attracted farm-in project support from Newcrest, an Australian major gold mining firm (Andrews, 2017). In 2019, after several years of relative success, the firm abandoned the project.

![Table 4](image.png)

**Table 4**  Junior firm project distance from existing mining facilities, in kilometres

<table>
<thead>
<tr>
<th>Country</th>
<th>Avg distance</th>
<th>Std deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>72.85</td>
<td>56.08</td>
<td>2.05</td>
<td>198.34</td>
</tr>
<tr>
<td>Brazil</td>
<td>195.92</td>
<td>184.91</td>
<td>0.43</td>
<td>508.26</td>
</tr>
<tr>
<td>Chile</td>
<td>50.16</td>
<td>78.45</td>
<td>2.20</td>
<td>483.52</td>
</tr>
<tr>
<td>Colombia</td>
<td>57.56</td>
<td>56.14</td>
<td>19.41</td>
<td>122.03</td>
</tr>
<tr>
<td>Cuba</td>
<td>111.92</td>
<td>-</td>
<td>111.92</td>
<td>111.92</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>0.30</td>
<td>-</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Ecuador</td>
<td>137.73</td>
<td>67.79</td>
<td>40.44</td>
<td>193.21</td>
</tr>
<tr>
<td>Mexico</td>
<td>61.08</td>
<td>36.21</td>
<td>12.12</td>
<td>148.07</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>63.51</td>
<td>32.92</td>
<td>40.23</td>
<td>86.78</td>
</tr>
<tr>
<td>Peru</td>
<td>52.97</td>
<td>37.60</td>
<td>4.04</td>
<td>134.16</td>
</tr>
<tr>
<td>Total</td>
<td>75.74</td>
<td>100.19</td>
<td>0.30</td>
<td>508.26</td>
</tr>
</tbody>
</table>

![Figure 2](image.png)

**Figure 2**  Distribution of Australian junior mining firm projects in Latin America, by country and mineral

exploration project in Chile, which was funded by the Canadian senior firm Lundin Mining Corporation as part of a farm-in agreement in exchange for 75% of the tenement interest (Heber, 2013; Wendt, 2014). Similarly, Latin Resources had a farm-in Joint Venture with Canadian senior copper firm First Quantum Minerals for an exploratory copper porphyry project in Ilo, Peru (Latin Resources Ltd, 2019; Proactive Investors, 2015).

Second, junior firms appeared to operate as regional spearheads in regions with limited mining industries, economic or socio-political constraints, and away from other junior firms or existing mining facilities. Exploration was mostly in established minerals such as copper or gold, and it pushed the geopolitical and economic boundaries of the mining industries by opening space for larger firms that either support their operations or purchase their discoveries. Such a strategy was the least frequent, perhaps because of the challenges involved in raising capital for high-risk projects. Examples include Oro Verde’s Topacio gold exploration project in Nicaragua in 2015. At the time, no other Australian firm and only a few UK and Canadian junior firms operated in that country (Dickinson, 2015). In 2017, the firm attracted farm-in project support from Newcrest, an Australian major gold mining firm (Andrews, 2017). In 2019, after several years of relative success, the firm abandoned the project.
because of ongoing civil unrest in Nicaragua—although it retained another project there (Nicholas, 2019). In 2020, the firm changed its name and focused on new exploration in Africa (Ionic Rare Earths Ltd., 2020). Simultaneously, the senior Australian firm Rio Tinto entered an option farm-in agreement with a Canadian junior firm to explore in Nicaragua (Zhou, 2020).

Third, junior firms appeared to operate as mineral avant-gardists by means of engaging in projects in highly speculative expanding critical industries such as lithium, where few senior mining firms have operated. Relations to larger mining firms have less relevance, with firms prioritising proven access to the demanded mineral and operations in mature or emerging mining regions. For example, in early 2018 Galan Lithium secured lithium projects in Salar del Muerto within the Argentinean side of what is known as the Lithium triangle (Mining Journal, 2018). Between 2018 and 2020, the project advanced steadily and expanded as a result of resource and financial successes (Ellis, 2019; Nicholas, 2020).

### Table 5
ASX-listed Australian junior firms, subsidiaries and regional offices in Latin America in 2019, by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Firms</th>
<th>Subsidiaries</th>
<th>Regional offices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>25</td>
<td>46</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>12</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Peru</td>
<td>7</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>Mexico</td>
<td>6</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Argentina</td>
<td>5</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Colombia</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Cuba</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Panama</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Note:** Subsidiaries are shown at the capital of the country of incorporation for presentation purposes only.

**Figure 3** Projects, regional offices, and subsidiaries of ASX-listed Australian mining firms in Latin America, 2019
A firm aims to develop a lithium production operation in Argentina (Bromby, 2020). Similarly, in 2017, Lithium Power International (LPI) entered a Joint Venture to develop the Maricunga Salt Lake in Chile (Erkan, 2019). In 2019, LPI signed a memorandum of understanding with the Chilean State-owned mining firm CODELCO to co-develop the project (Bloomberg, 2019). These strategies are not exclusive and some junior firms adopt more than one strategy across their projects either simultaneously or at different times. Mixing strategies can potentially counterbalance different risks, either through project location selection, the maturity level of the mineral industry (that is, established vs expanding) or leveraging larger firm support. For example, Latin Resources—described in the first strategy—also has lithium projects in Argentina, following a mineral avant-gardist strategy (Latin Resources Ltd, 2021).

### Conclusion

This study has sought to understand the globalisation strategies and roles of junior firms by considering the case of Australian junior firms in Latin America. Research suggests a functional and spatial distribution between junior and larger mining firms, as junior firms operate high-risk projects funded or later sold to more risk-averse larger mining firms (Dougherty, 2011, 2013). This risk-seeking behaviour is consistent with the

<table>
<thead>
<tr>
<th>Globalisation strategy</th>
<th>Role in the mining industry</th>
<th>Key characteristics</th>
</tr>
</thead>
</table>
| 1. Specialised service providers | Support the expansion of mature and emerging mining industries | - Access to proven large mineral basins.  
- Projects in countries with mature or emerging mining industries, with low political risks, favourable environments for investment, and infrastructure.  
- Projects in established mineral industries, such as copper.  
- Proximity to existing mining facilities, other junior firms and larger mining firms.  
- Partnerships or service provision arrangements with larger mining firms help to manage increased financial risks. |
| 2. Regional ‘spearheads’ | Push the geopolitical and economic boundaries of the mining industries | - Projects in countries with limited mining industries with high-political risk levels, infrastructural and economic constraints.  
- Away from other junior firms, larger firms or existing mining facilities.  
- Projects in established or other mineral industries, such as copper and gold, help to reduce their projects’ economic risk.  
- Partnerships with large firms that aim to secure access to potential new mining regions. |
| 3. Mineral avant-gardists | Support the early development stages of highly-speculative mineral industries, such as lithium | - Projects in speculative, expanding critical industries, with high economic risks, such as lithium.  
- Projects in countries with mature or emerging mining industries, where political risks are lower.  
- Few junior firms and larger mining firms may operate in the industry. |
regional spearhead globalisation strategy—the least common of three strategies identified among Australian junior firms. The strategy challenges traditional determinants for mining firm investment overseas (cf. Kasatuka & Minnitt, 2006; Vivoda, 2017), as junior firms venture into countries with high political and geological risks (cf. Eggert, 2016). The strategy is also characterised by a functional integration that ensures larger firms’ access to projects that may be suitable in the long-term and helps to push the geopolitical boundaries of the mining industries. This tendency resonates with practices by early 20th century explorers and miners who ventured into “unexplored” regions (Bevan & Glover, 2010; Blainey, 1963; Dumett, 2009). Nevertheless, junior firms are not limited to this one strategy and operate in at least two other ways relevant to the development of mining industries.

Junior firms following a specialised service provider strategy play a role in supporting more development of mature and emerging mining industries. As such, their locational choices are less politically risk-seeking, emulating those of larger mining firms (cf. Kasatuka & Minnitt, 2006; Vivoda, 2017). This strategy may imply costly mining tenements and operation under more stringent regulations, increasing economic risks. However, their proximity to successful mining projects and larger firms may help reduce specifically geological risks and attract investors (cf. Gilbert, 2020; Kneas, 2020). Such proximity enables an alternative functional interdependency between junior and larger firms, concretised in the form of exploration partnerships and purchases of projects that align with larger firms’ risk profiles in the short term. This dynamic is consistent with the functional but not with the spatial distribution described in other studies (cf. Dougherty, 2011, 2013). This variation may suggest that senior firms not only recede from high-risk but also from low-risk exploration (cf. Guj & Schoettle, 2013).

Junior firms with a mineral avant-gardist strategy play a role in the development of speculative critical emerging industries. Their projects are placed in sought-after mineral industries where mineral demand and capital availability can change quickly. This placement resembles strategies of investment attraction (Kneas, 2020), as well as a willingness to engage in considerable economic risk. Although junior firm locational choices align with natural mineral deposits (Bridge, 2008; Dougherty, 2011), they also suggest an aversion to political risk (Kasatuka & Minnitt, 2006; Vivoda, 2017), as exemplified by the absence of Australian junior operations in Bolivian lithium. This strategy displays a longer-term functional integration between junior and larger mining firms, more concerned with the development of emerging mining industries to enable future investment than with the spatial distribution of the firms.

Thus, these three strategies describe functional differences between junior and larger mining firms that are often excluded or obscured in analyses on the globalisation of mining industries in economic geography (cf. Bridge, 2004; Martinus & Sigler, 2018; Scholvin, 2019; Scholvin et al., 2017; Sigler et al., 2018). These differences are key to better understandings of the global dynamics and geographies of mining industries and provide insights into why and how junior firms expand their operations in the first place. They justify paying closer attention to junior firm activities, and highlight the need for greater distinction between junior and larger firms in data and method.

Our study corroborates that the location of proven or prospective mineral deposits and national particularities influence the geography of junior firm operations (cf. Bridge, 2008; Dougherty, 2011). It also suggests that capital cities play an intermediary role in junior firm operations (cf. Scholvin, 2019, 2017), as most regional offices were located in capital cities rather than in towns near exploration projects. The Australian cities that house junior firm headquarters, then, function as centres of command and control for junior firms in Latin America (cf. Martinus & Sigler, 2018) and link Latin American operations back to access to capital in Australian equity markets (cf. Dougherty, 2011, 2013; Studnicki-Gizbert, 2016).

Three areas for new research emerge from this exploratory study. The first is to better understand how the three globalisation strategies apply to junior firms more generally or establish if they are exclusive to Australian junior firms in Latin America. The second is to investigate firm decision-making processes and factors that influence each strategy, including the specific determinants shaping firm locational choices, how these vary over time and are impacted by investor attraction efforts. The third is to consider how junior firm internationalisation processes generate specific spatial distributions, as well as the outcomes of these activities and junior firm roles for industries and regions.

Finally, our research contributes to the literature by evidencing how junior firm globalisation strategies co-exist and have a role in shaping the global geographies of the mining industries. It underscores significant firm heterogeneity and functional integration at the core of mining globalisation and leads us to call for more comprehensive representations of these dynamics in future research. It also highlights the crucial role that junior firms play across nations and exposes the footprint and influence of national mining industries, such as
Australia’s, in the development of critical resource basins in other mineral-rich nations. Indeed, junior firms appear to be important in setting stepping stones for future mining projects, and ultimately the global development of the mining industries and nations.

ACKNOWLEDGEMENTS
We acknowledge contributions made by Professor Matthew Tonts in the preliminary stages of this work. The work was supported by the University of Western Australia (UWA) and the Australian Research Council (ARC) Grant No. DP170104359. Kirsten Martinus was also supported by ARC Grant No. DE170100727.

CONFLICT OF INTERESTS
We have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

ORCID
Adriana Nunez-Picado https://orcid.org/0000-0002-4465-6525
Kirsten Martinus https://orcid.org/0000-0001-9727-7310
Thomas Sigler https://orcid.org/0000-0002-7789-0916

REFERENCES
Bravo-Ortega, C., & Muñoz, L. (2021). Mining services suppliers in Chile: A regional approach (or lack of it) for their development. Resources Policy, 70, 101210. https://doi.org/10.1016/j.resourpol.2018.06.001


Maritz, A. (2003). Tax incentive options for junior exploration companies. ABARE eReport 03.4, for the Department of Industry, Tourism and Resources.


Vivoda, V. (2011). Determinants of foreign direct investment in the mining sector in Asia: A comparison between China and India.

Resources Policy, 36(1), 49–59. https://doi.org/10.1016/j.resourpol.2010.08.005

Vivoda, V. (2017). Determinants of foreign direct investment in the mining industry. In T. O’callaghan & G. Graetz (Eds.), *Mining in the Asia-Pacific: Risks, challenges and opportunities* (pp. 19–33). https://doi.org/10.1007/978-3-319-61395-6_2


