

Mining in Africa after the supercycle: New directions and geographies

Andrew Bowman¹  | Tomas Frederiksen²  | Deborah Fahy Bryceson¹  |
 John Childs³  | Emma Gilberthorpe⁴  | Susan Newman⁵ 

¹Centre of African Studies, University of Edinburgh, Edinburgh, UK

²Global Development Institute, University of Manchester, Manchester, UK

³Lancaster Environment Centre, University of Lancaster, Lancaster, UK

⁴School of International Development, University of East Anglia, Norwich, UK

⁵The Open University, Milton Keynes, UK

Correspondence

Tomas Frederiksen

Email:

tomas.frederiksen@manchester.ac.uk

Funding information

British Academy (Grant Number: pf130031). Department for International Development (Grant number: PO 5113). University of Edinburgh, School of Social and Political Science's Strategy fund. University of Manchester, School of Environment, Education and Development Seed funding.

Mining in Africa is at a pivotal moment. For most of the period 2000 to 2012, the extractive industries were in a “supercycle” of sustained high commodity prices. Driven by resource-intensive growth in emerging market economies, these high commodity prices were anticipated to continue for decades to come. However, this “supercycle” ended in 2012 and there followed a severe slump in mineral prices from 2014 onwards. On the one hand, a new era of commodity market dynamics has begun, with changing patterns of economic activity, minerals governance, and environmental regulation. On the other hand, the end of the supercycle has continued or intensified pre-existing trends towards mechanisation, automation, and enclavity, while distributive pressures on companies by local communities and host nations increase. We argue that the end of the supercycle has reconfigured the geographies of extraction in ways that are not yet reflected in existing research or taken into consideration in policy implementation, particularly around corporate strategy, state–business relations, and models for mineral-based development strategies. In this paper we map the terrain of research on the supercycle in Africa and identify emerging post-supercycle trends – some of which have overtaken research. The paper is structured around examining four themes: (1) new geographies of investment and extraction; (2) new geographies of struggle; (3) national minerals-based development; and (4) labour and livelihoods, for which we identify key trends during the supercycle and post-supercycle and areas for future research and policy development.

KEYWORDS

Africa, critical review, development, mining, supercycle

1 | INTRODUCTION

Mining is at a pivotal moment. For much of the previous two decades, observers considered mining to be in a “supercycle” driven by rapid resource-intensive growth in China and other emerging economies, and a lag in supply growth (Humphreys, 2015; Morris et al., 2012). Mining's history is defined by successive cycles of boom and bust. However, prolonged high prices across multiple commodities, and expectations that this would continue due to demand from emerging economies, convinced many that this time was different. This sustained high investment levels, and mining companies expanded into

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

The information, practices and views in this article are those of the author(s) and do not necessarily reflect the opinion of the Royal Geographical Society (with IBG).

© 2021 The Authors. *Area* published by John Wiley & Sons Ltd on behalf of Royal Geographical Society (with the Institute of British Geographers).

regions previously deemed marginal or risky, including many parts of Africa (Humphreys, 2015). Artisanal and small-scale mining (ASM) also proliferated, particularly in the gold sector – estimated to provide direct income to over 10 million people (Hayes, 2008). Optimism about the prospects for minerals-based development grew among African policymakers (African Union, 2009), as economists identified in the supercycle a once in a generation opportunity for growth and poverty reduction through improved fiscal management of mineral rents (Collier, 2015) and minerals-based industrial policies (Morris et al., 2012).

Driven by changing patterns of economic activity and natural resource policy, this supercycle ended in the mid-2010s and a new, more complex period of commodity-market dynamics began. The euphoria of prolonged high prices, which quickly rebounded after the 2008 global financial crisis, spurred excessive investment, creating oversupply in multiple commodities and high levels of corporate indebtedness. In a severe period of economic distress from 2014 onwards, prices plummeted, corporates rapidly cut costs, and revenues dwindled for commodity-dependent governments. Even before the impacts of COVID-19, recovery had been faltering and uneven. Key mineral-energy industries – notably coal and oil – are widely anticipated to face declining long-term demand (International Energy Agency [IEA], 2019). However, there has been increased investor interest – both from private and state actors – in “clean energy” minerals like copper, coltan, and lithium, while gold prices have surged as investors seek a counter-cyclical safe-haven amid increased global economic uncertainty.

Notwithstanding these examples, the mining industry has faced difficult circumstances. Multinational mining companies have become more cautious, focusing on lowering costs and risks: in some cases shedding tens of thousands of jobs and reducing costs through organisational and technological innovation, while repositioning project portfolios away from more “complex” operating environments. This has important consequences for economic development and political change in mineral-rich African countries. Having often borrowed heavily – particularly on infrastructure – and expanded public spending during the boom, lower growth and resource rents have fiscally strained governments. The IMF (2019) observes a dualistic pattern among African economies, with resource-intensive nations experiencing slower growth and increasing fiscal distress relative to non-resource-intensive economies. Mining labour migration (large-scale and ASM) has incited demographic shifts that continue spurring economic diversification and new spatial and occupational patterns (Mususa, 2012).

Inflated expectations have been built around the developmental benefits of an industry whose future is uncertain. Policy mechanisms conceived during a boom have been implemented during a slump. This creates socio-political tension at local and national scales (Bebbington et al., 2018), reconfiguring state–business relations and the dimensions of “resource nationalism” (Andreasson, 2015; Childs, 2016). Perceptions of the limited developmental benefits deriving from extractive industries and the unsatisfactory fiscal contribution of multinational investors are driving new demands for the state to retake control of mineral resources. However, with declining resource rents, the balance of bargaining power between fiscally constrained African states and multinational firms is shifting.

The booming extractive sector spurred a concomitant research boom. Geographers have been quicker to examine the consequences of commodity “booms” than resource “busts” in emerging economies. In academic and policy circles, research has focused on capturing and using the rewards of a supercycle rather than on managing the industry’s volatility and busts (exceptions noted below). In this paper we map the terrain of research on the minerals supercycle in Africa in Geography, identify emerging post-supercycle trends in mining – some of which have overtaken research – and establish key questions for geographers and policymakers. The paper combines an analysis of industry trends with critical reflections on literature on extractive industries by geographers from the last two decades, prioritising work by African scholars. Though not a comprehensive formal systematic review, this paper reflects on key trends and absences to identify future directions. We write at a level of generalisation that exceeds country- or mineral-specific research. Industry- or location-specific dynamics may differ from the more general trends we posit and we examine metals mining, not oil and gas.

The broad trends and new geographies in commodities investment and production of the supercycle are reviewed in section 2, followed by three sections exploring emerging themes from the supercycle and existing research: new geographies of struggle (section 3), national minerals-based development (section 4), and labour and livelihoods (section 5). In each section we sequentially examine key trends during the supercycle, examine the emerging post-supercycle picture, and identify core areas for future research and policy development.

2 | KEY ECONOMIC TRENDS OF THE SUPERCYCLE AND BEYOND

From the early 2000s, rising emerging-market demand, particularly from China, drove rapid mineral commodity price increases of a kind not seen since the 1960s (Figure 1). Interrupted by the 2007/08 global financial crisis, the trend recommenced immediately thereafter. This reinforced dominant industry narratives that commodity prices were not in an ordinary

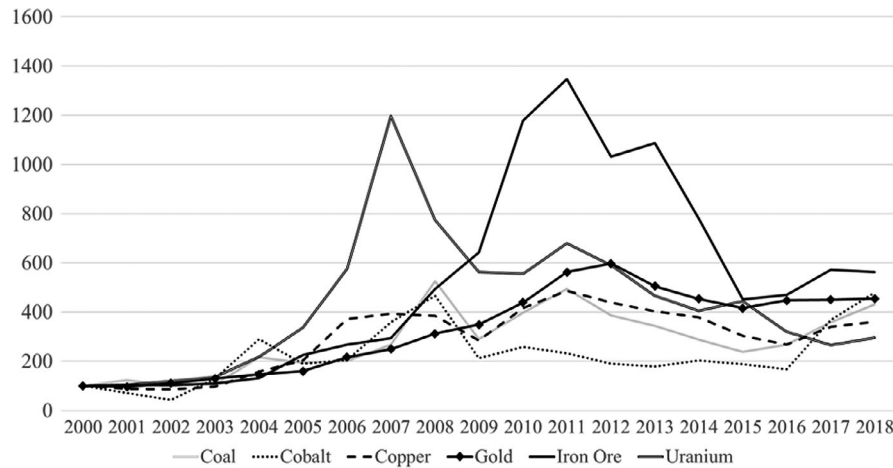


FIGURE 1 Index of commodity prices, 2000–2018 (2000 = 100).

Source: IMF

price cycle, but a “supercycle” that would continue for decades (Humphreys, 2015). These narratives shaped investor, corporate, and government expectations.

Mining is defined by the imperative for continual spatial expansion to secure new reserves, but this took on a new character during the boom (Bridge, 2008). Inflated price expectations made projects previously deemed uneconomic or excessively risky newly attractive to multinationals, while concerns over scarcity compelled strategic investment from state-backed emerging market companies, particularly from China (Carmody, 2011). Industrial mining’s geographic scope expanded rapidly, exemplified by increased multinational interest in high-risk post-conflict jurisdictions such as the DRC, Mozambique, and Sierra Leone, as well as large increases in foreign direct investment (FDI) to reach unexploited deposits in more established mining jurisdictions like Zambia, Ghana, and Guinea. There was also a spatial shift to the deep-ocean as a new space of mineral extraction, with diamonds and phosphate now mined from the seabed within the exclusive economic zones of Namibia and South Africa (Childs, 2020). Similarly, the search for new, “unconventional” rare earth mineral deposits focused on land (e.g., Mkango Resources in Malawi), and water, such as the tellurium-rich Tropic Seamount, 500 km off the coast of north-west Africa (Cornwall, 2019).

Neoliberal reforms of previous decades designed to improve investor shares of resource rents (Campbell, 2013) fuelled extractive expansion. Interpretations ranged from a new “scramble for Africa” (Carmody, 2011) entrenching Africa’s neo-colonial insertion in the global economy (Bush, 2010; Taylor, 2014), to optimistic reappraisals of the role of minerals in Africa’s economic development as “Africa Rising” (African Morris et al., 2012; Union, 2009) (see section 4). Scholars and policymakers shared a common assumption of continued high prices and rapid expansion of mining.

Subsequent events confounded these assumptions. Triggered by slowing Chinese growth and excess capacity created by over-investment during the boom, mineral prices fell in near unison in the mid-2010s. As of 2018, most minerals remained well below 2007/08 peaks, a notable exception being battery metals like cobalt.

Many major mining companies were placed in financial difficulty, with excess capacity, over-leveraged balance sheets from increasingly financialised accumulation strategies, and high operating costs from prioritising volume over efficiency, and accessing lower-quality and harder to access ore bodies (Humphreys, 2019b). Market valuations for listed mining companies slumped as returns and investor optimism dwindled (Figure 2).

Post-2016 trends reflect these cost challenges. Revenues for PWC’s largest listed mining companies – a global sample that now includes 19 emerging market-headquartered firms, 10 of them Chinese – are just below their 2012 peak, but margins remain considerably lower (Figure 3).

Corporate strategy shifted from expansion to cost-cutting and repairing balance sheets. Capital expenditure for PWC’s top-40 dropped almost 60% between 2012 and 2018, alongside near identical decreases in exploration expenditure and debt issuance globally (Table 1). In recent years alternative mine financing provided by royalty and streaming companies has become increasingly significant, though aggregate data are not available.

Efforts to improve productivity fuelled interest in automation and mechanisation (Durrant-Whyte et al., 2015), with implications for labour. Major mining companies already show signs of significant shifts in labour intensity (Humphreys,

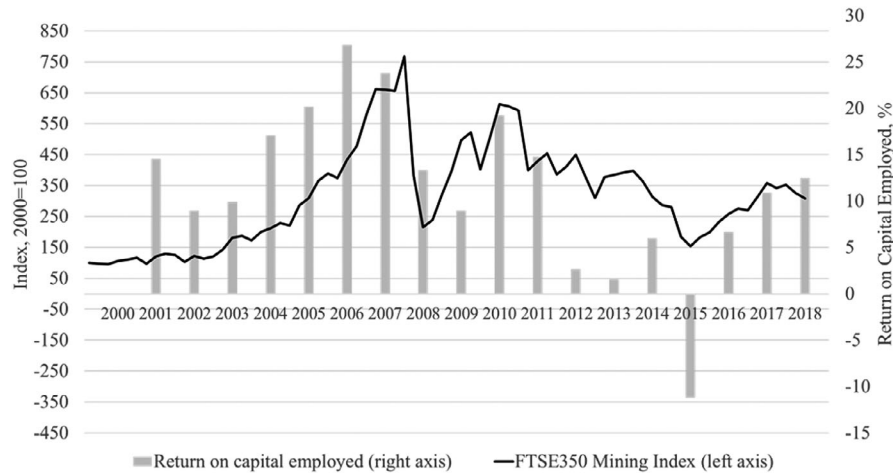


FIGURE 2 FTSE 350 mining index 2000–2018.

Source: Bloomberg Data

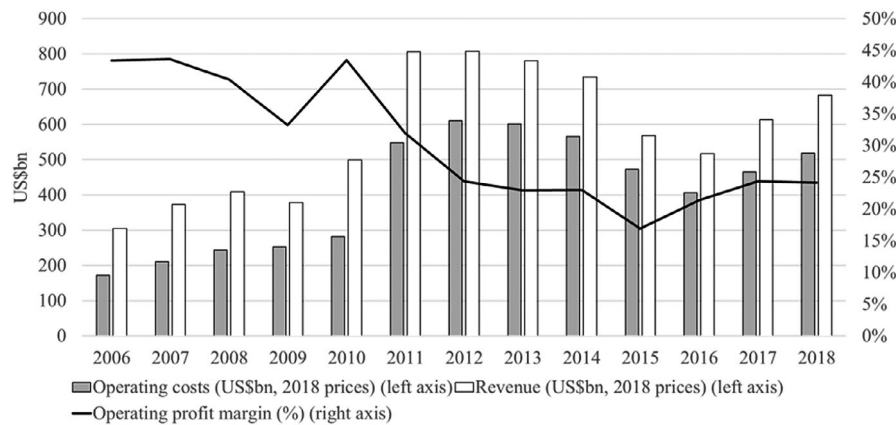


FIGURE 3 Revenue and profitability of PWC top-40 largest mining companies, 2006–2018.

Source: PWC

TABLE 1 Global mining industry investment, 2012–2018 (US\$bn, 2018 prices).

	Exploration expenditure Global (PDAC/S&P)	Equity capital raised Global (PDAC/S&P)	Debt capital raised Global (PDAC/ S&P)	Capital expenditure Top-40 largest mining companies (PWC)
2012	23	37	110	140
2013	16	26	103	140
2014	11	40	70	110
2015	9	31	59	87
2016	7	29	35	51
2017	8	32	56	52
2018	10	21	45	57
% change 2012– 2018	–58%	–45%	–59%	–59%

2019a). For example, Rio Tinto, Anglo American, and BHP Billiton have reduced employee numbers by 35%–50% since 2012, even as asset values per-employee have increased (Table 2).

Beneath these general trends is considerable heterogeneity. Major mining firms in Africa have become more diverse due to emerging market investment, most significantly from Chinese companies, some of which are state-owned or benefit from

TABLE 2 Employment and capital intensity of production for Rio Tinto, Anglo American, and BHP, 2008–2018.

	Rio Tinto		Anglo American		BHP	
	Employees	Asset value per employee (US\$m)	Employees	Asset value per employee (US\$m)	Employees	Asset value per employee (US\$m)
2008	105,733	0.85	105,000	0.47	41,732	1.82
2018	47,458	1.92	61,527	0.85	27,161	4.12
% change	–55%	126%	–41%	81%	–35%	126%

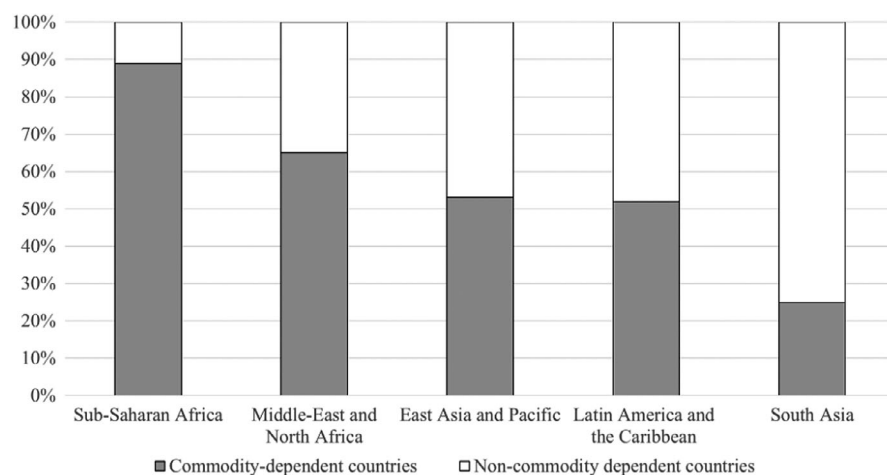
Source: company reports.

forms of state support. Investments often involve unconventional financing arrangements like resource-for-infrastructure deals, and are often motivated by strategic concerns about resource security rather than solely commercial imperatives (Power et al., 2012). Whilst Power et al. (2012, pp. 191–220) highlight differing approaches to environmental governance and labour relations, Lee (2018) suggests that some Chinese mining investors may be more long-term in orientation and thus less sensitive to market and political risks.

Deeper discussion of trends relating specifically to emerging market investment in African minerals is beyond this paper's scope, but indicators suggest that the pace of Chinese expansion in African mining may have slowed. The annual value of Chinese investment transactions in sub-Saharan Africa's metals' sector has been falling over recent years, from US \$4.4bn in 2014 to US\$2.2bn in 2018, compared to a 2011 peak of US\$5.6bn.¹ While overall Chinese FDI in Africa continued increasing, Chinese FDI stock in African mining remained stationary between 2016 and 2018.²

Declining profitability and investor caution has clear implications for mineral-dependent African countries. For the 2013–2017 period, 90% were commodity dependent (commodity exports > 60% total merchandise export value) (Figure 4), with 18 classified as mineral-commodity dependent (UNCTAD, 2019). Altered conditions in mining have had significant macro-economic consequences for many countries' growth prospects. The IMF has observed a dualistic pattern, with resource-intensive countries averaging 2%–3% annual GDP growth since 2013 – meaning relatively stagnant per capita growth – compared to above 5% in non-resource-intensive countries (IMF, 2019).

This has fiscal consequences. Since the 1980s, African countries have had significantly larger resource rents (oil, gas, mineral, and forest rents) relative to GDP than low and middle income country averages, rents that are important to government revenues given thin tax bases. Resource rents grew spectacularly during the 2000s, averaging just under 15% of GDP compared with 8% during the 1990s, but have now fallen back to 1990s levels (Figure 5). This has created severe fiscal strains as many governments increased public expenditure and borrowing in anticipation of a sustained supercycle.

**FIGURE 4** Commodity-dependent countries by region, 2013–2017.

Source: UNCTAD

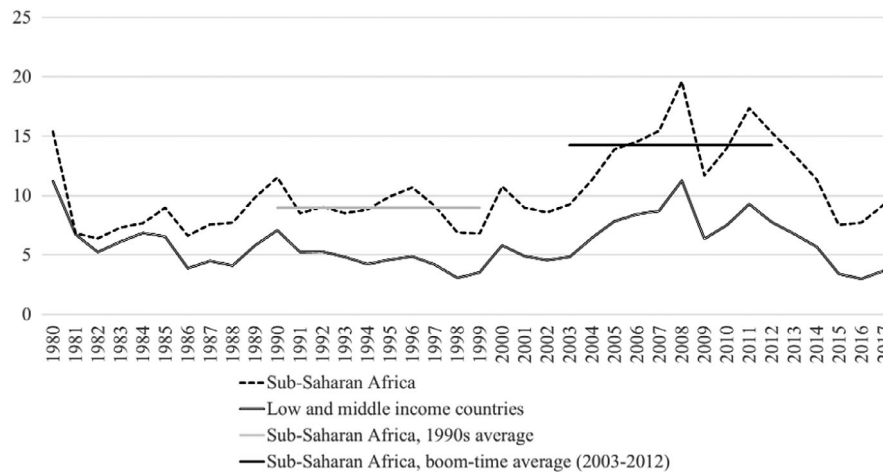


FIGURE 5 Resource rents as a percentage of GDP, 1970–2017.

Source: World Bank

As the following sections show, these changing economic dynamics prompt a reframing of recent scholarship on mining and development and raise new questions while giving fresh salience to earlier work on the social, political, and economic consequences of boom–bust cycles (e.g., Ferguson, 1999; Karl, 1997). The following sections interrogate how the changing economic context altered the trajectory of mining across different countries and commodity groups. Leaving aside examples such as battery metals, the framing assumption of a “scramble” – inexorable rapid expansion of frontiers to secure scarce resources – no longer appears certain. Instead, a more complex picture is emerging. Major mining companies have generally adopted more conservative approaches, favouring lower-cost, higher-grade deposits in less “risky” jurisdictions. China’s growth is slowing and expected to shift to a less mineral-intensive economic model, slowing demand growth, though not necessarily causing absolute declines. These dynamics highlight the need for research that examines what heightened corporate investment caution and withdrawal might mean for (1) policy in commodity-dependent African states such as Zambia, the DRC, and Guinea, (2) relations and bargaining between mining, states, and communities, and (3) the role of artisanal and small-scale mining in exploiting high-risk deposits (Verbrugge & Geenen, 2018).

3 | NEW GEOGRAPHIES OF STRUGGLE

Recent decades have seen a rise in mining-related conflicts – between 2002 and 2013 the ICMM documented an eight-fold rise in conflict (ICMM, 2015). This trend has been extensively analysed by geographers, who have documented a rise in levels of struggle and violence exacerbated by the industry entering “new” areas and implementing new forms in previously mined areas across Africa (e.g., from shaft to open pit mining). These struggles were “geographic” because they operated unevenly across both space and time. They occurred locally and were often connected with global activist communities.³ These struggles were also examples of the mining industry’s “politics of time,” where the speed environmental impacts were made knowable shapes the ensuing kinds of struggle (Kirsch, 2014).

There are various catalysts. (1) Struggles over resources – many people were displaced and thus dispossessed of access to critical resources, especially land and water (Frederiksen & Himley, 2020), causing widespread losses to livelihoods (Abuya, 2016; Akiwumi, 2011). (2) Struggles over environmental impacts and pollution, especially of water (Abuya, 2016; Akabzaa, 2009; Akiwumi, 2011). (3) Struggles over resource rent distribution – at the national level, rising “resource nationalism” often played out as a struggle over taxation levels (see section 4), while resource rents created newly powerful political actors (including regional) (Akabzaa, 2009; Bebbington et al., 2018; Lungu, 2008; Tsuma, 2010). (4) Struggles over access to mining wealth – “enclave” models of extraction reduced opportunities to spread benefits widely (Ferguson, 2006; Negi, 2011), while contracting and service tenders affected local level access to employment. Communities frequently challenge extractive operations’ use of capital-intensive, low-labour methods (Ofori & Ofori, 2018). Despite evidence that corporate social responsibility (CSR) programmes’ scope and resources have expanded, their development impacts were questioned and contested (Andrews, 2019; Franks et al., 2014; Frederiksen, 2018).

As the supercycle ended, dynamics changed. Some conflicts associated with expansion lessened, simply because mining companies were less active and not entering new areas. As revenues declined, communities’ bargaining power over mining

companies decreased and their “dependence” was exposed (Verbrugge & Geenen, 2018). Other forms of struggle increased, sometimes catalysing in protests against layoffs (see section 5). Where operations continued, expectations of company behaviour sometimes rose, particularly in areas with a history of mining conflicts (e.g., Ghana). Declining mining revenues generated pressure to focus community investment budgets on conflict amelioration. For some industry observers, corporations took an instrumental approach to spending and CSR, further reducing corporate/community relations (Thomson, pers. comm.). Community development became secondary to “shared value,” risk management, “social performance,” and “measurable results,” while “social license” remained, despite its faults (Frederiksen, 2018).

These trends raise important questions for researchers about the new geographies of struggle. How do conflicts over extractive industry change as mining shrinks or retreats? Are new emerging market actors, often with less experience of managing impacts, running “poorer performing” mines? How can “enclave” mining generate benefits (and therefore legitimacy) for local communities? How can changing discourses and pressures on CSR shape development outcomes? How does resurgent CSR instrumentality affect patronage and clientelism in areas of operation? And finally what are the long-term consequences of automation and retrenchment on political volatility?

4 | NATIONAL MINERALS-BASED DEVELOPMENT

The “supercycle” induced significant shifts in thinking about mining’s role in economic development in many Africa countries, and the state’s role in governing mineral extraction. The rise of “resource nationalism” broke a period of consensus around neoliberal models of mineral governance that emphasised favourable conditions for FDI, minimising risks and increasing investors’ share of resource rents (Campbell, 2013). Simultaneously, dominant thinking in economics around the “resource curse” framed mineral rents as economically and politically distorting (Collier et al., 2011; Siakwah, 2017), a problem to be solved by “good-governance” institutions for mineral extraction and marketing that minimised political discretion and state intervention. Dissatisfaction over the benefits of these policies, despite the supercycle, led many resource-rich governments to consider alternatives (Besada, 2016). Reviews of mining legislation and contracts with a view to increasing state and/or community shares in mineral rents took place in multiple African countries (Tanzania, Ghana, Sierra Leone, South Africa, Liberia, the DRC, Zambia, and Zimbabwe), aimed at higher taxes or royalties, indigenous ownership requirements, and domestic value addition or local content requirements (Humphreys, 2019a). Pejoratively termed “resource nationalism” by critics, this represented a reframing of mining’s role in national development (Andreasson, 2015; Childs, 2016). New policies sought to use state intervention to increase domestic economic linkages with large-scale mining, boost domestic industrial capacity with requirements for local content upstream in the value chain, and encouraged mineral beneficiation downstream (Morris et al., 2012). Such ideas were influential in African policy circles, as reflected in the 2009 Africa Mining Vision (African Union, 2009; Busia & Akong, 2017), and saw new legislation, local content policies, and mining licence renegotiations across the continent (Ambe-Uva, 2017; Ayisi, 2015). However, much research into commodity-based development seemed to take for granted that the supercycle, and the increased relative bargaining power of mineral-rich states accompanying it, would continue for decades. Moreover, research focused on material linkages to mining, and paid too little attention either to the relative power of multinational corporations or the political economy that shapes the design and delivery of industrial policy on the ground (Fessehaie & Rustomjee, 2018). Outcomes of local content and linkage development initiatives to date have frequently been poor (Hilson & Ovidia, 2020).

Policies conceived and implemented during the latter stages of a boom have continued into the slump. Many African governments are pursuing a harder line against multinational mining companies in worsening economic conditions. In recent years this has notably included protracted disputes between governments and multinational investors over efforts to increase rates of taxation on mining in Tanzania, Zambia, and the DRC, even as mineral prices and investment levels have remained low. This suggests the durability of “resource nationalist” policy agendas given competition for resources from new emerging market mining investors, increasingly strained fiscal circumstances, and populist political pressures (e.g., see Jacob & Perseson, 2018). The situation emphasises how changing market dynamics intersect with the political economy of minerals-based industrial and fiscal policies, which can create new interest groups, patronage networks, and political claims on the mining industry (Hansen et al., 2016; Jacob & Perseson, 2018). The shift in economic policy towards mining has also been accompanied, in many instances, by changing political rhetoric about natural resources’ contribution to development, and rising popular expectations related to public expenditure, employment, and opportunities for domestic business elites (see Barlow, 2020; Frynas et al., 2017). This combination of factors has contributed to an increasingly fraught politics of mining and more adversarial state–business relations in many contexts.

The evolution of national minerals-based development policies in a commodity slump compounded by COVID-19 depends on the balance of forces within society, how new and existing interest groups develop and relate to one another,

and what this means for the distribution of rents from mining and commitment to broad-based economic development –including the development of industrial activities. Given the current context, will changing economic conditions continue to entrench “resource nationalism” or spur a return to more “investor-friendly” governance modalities? Will mining companies previously willing to engage with voluntary local content and beneficiation initiatives continue to do so, or will cost-cutting and productivity imperatives spur capital-intensive, “enclave” operating models? Can nascent domestic industries around mining survive continued instability and uncertainty? What forms of counter-cyclical industrial policy support might help protect the limited progress made to date?

5 | LABOUR AND LIVELIHOODS

The supercycle led to the expansion of formal and informal mining in many African countries with important consequences for labour and livelihoods. Struggles between mining companies and labour expanded with industry growth and increased profits, with companies organising their corporate and operational structure to minimise (organised) labour’s power, most notably through the use of subcontracting (Fraser & Lungu, 2007; Negi, 2011; Verbrugge & Geenen, 2018). In areas with accessible deposits, rising prices also made ASM a lucrative livelihood option, leading to booms in areas previously overlooked (e.g., Tanzania, eastern DRC; see Jonsson & Bryceson, 2017; Verbrugge & Geenen, 2018). While augmented local and national state resources enabled expanded welfare programmes and state employment (Bebbington et al., 2018), the impact of mining booms on livelihoods remained complex. For example, in rural areas, increased competition for land and water, negative environmental externalities, and changing rural labour force composition all impacted existing agrarian livelihoods (see section 3), while the corporate priority of securing reserves for future growth generated increased contestation over resource access between the formal and informal sectors (e.g., DRC, Tanzania, Ghana; see Hilson & Potter, 2005; Verbrugge & Geenen, 2018). Areas witnessing both artisanal and formal booms saw influxes of migrant labour, for both employment in mining and the attendant service-sector around operations (Akiwumi, 2011; Bryceson & Geenen, 2016; Nyame et al., 2009). This strained existing natural resource-based livelihoods, infrastructure/social services, and created social tension as communities linked migration to crime and prostitution (Akiwumi, 2011). More widely, increased competition for qualified mining talent drove wage inflation in skilled job categories, exacerbating already stark expat/local wage disparities.

Post-supercycle, this picture changed. As focus shifted to cost control over expansion, emphasis on technological innovation and digital technologies expanded to enable automation and mechanisation and to more efficiently manage resources and reduce costs (Durrant-Whyte et al., 2015). With labour a key cost, labour-intensive extraction techniques were under pressure, creating labour struggles. Redundancies and layoffs (or prospects thereof) from the formal mining sector have political and economic ripple effects. For example, unemployment and constraints on government spending increases pressure on mines as a source of livelihoods and generator of employment (Hilson & Potter, 2005). However, as the formal sector stalls on deposits that are no longer economic, more artisanal producers can occupy space left by the formal sector, absorbing its labour (Verbrugge & Geenen, 2018). The outlook for communities that grew up around now-closed mining operations can be bleak. Historically, many communities have taken decades to recover. For example, South African ex-gold and coal mining towns have suffered widespread unemployment and deprivation (Binns & Nel, 2009, Siyongwana & Shabalala, 2018). By contrast, company layoffs can spur surges in ASM as unemployed miners resort to artisanal mining at familiar sites (Yankson & Gough, 2019). Particularly gold diggers have proliferated in mineral-rich mining sites, acting inadvertently as prospectors for large-scale mining interests. Artisanal miners, who benefited from the gold price rise of the supercycle, were most likely to move to nearby towns, where they could invest in diversified businesses and improved housing, thereby contributing to urbanisation, while being readily at hand should prospects of mineral investment return (Bryceson & MacKinnon, 2012; Jonsson & Bryceson, 2017).

All this raises questions for future research (Table 3). Automation and mechanisation leads to a smaller labour force, with higher skill requirements. Technology has often been used as a means to control labour, what now? How will these trends interact with expectations for employment creation? If the retreat of the formal sector sees a concomitant growth in the artisanal sector, how best to manage the social and environmental impacts of ASM? How do mining and other livelihoods (particularly, agrarian) interact in changing rural spaces? What do these changing livelihood opportunities mean for patterns of migration in extractive zones? How can mine closure impacts on local communities be best managed? Can deindustrialisation lead to economic innovation and alternative paths to development (Binns & Nel, 2009)? How are former mine sites remembered and what material and emotional geographies do they leave behind with what consequences for justice (Pini et al., 2010)?

TABLE 3 Summary of key arguments.

Area	Key supercycle dynamics	Key post-supercycle dynamics	Key questions for research and policy
Economic trends	<ul style="list-style-type: none"> • Sustained high commodity prices • MNC's expansion into areas previously "too risky" or uneconomic by both large-scale mining and ASM • Expectations of sustained high mineral rents in many African countries 	<ul style="list-style-type: none"> • Many – but not all – mineral prices have significantly fallen • Many mining companies in financial difficulty, retreating from areas and retrenching staff • Mining investment and mineral rents declined to pre-supercycle levels 	<ul style="list-style-type: none"> • What do these changes mean for: • Policy in commodity-dependent African states? • Relations and bargaining between mining, states, and communities? • The role of ASM in exploiting high-risk deposits?
Geographies of struggle	<p>Expansion into new areas and modes of extraction increased conflict over:</p> <ul style="list-style-type: none"> • access to resources, especially land • environmental impacts and pollution • resource rents and other forms of benefit distribution, such as CSR spending and jobs 	<ul style="list-style-type: none"> • Forms of conflict associated with expansion into new areas lessened • Expectations of increased benefit distribution and conflicts over them remain with some intensified (e.g., around layoffs) • CSR spending squeezed and less emphasis on community development 	<ul style="list-style-type: none"> • How do conflicts over extractive industry change as mining shrinks or retreats? For example: What does automation and retrenchment mean for political volatility? • How can "enclave" mining generate benefits for local communities? • How can changing discourses and pressures on CSR shape development outcomes?
National minerals-based development	<ul style="list-style-type: none"> • Rise of "resource nationalism" • Revised minerals legislation to secure greater share of rents for national development and counter enclave tendencies, e.g., local content • Increased bargaining power of states over international mining companies 	<ul style="list-style-type: none"> • Countries pursuing harder line against international mining companies despite worsening investment climate • Protracted disputes over raising rents and taxation in the context of fiscal strains • Fraught popular politics of mining and deteriorating state–business relations 	<ul style="list-style-type: none"> • Will changing economic conditions entrench "resource nationalism" or spur a return to more "investor-friendly" governance modalities? • Will cost-cutting and productivity imperatives spur capital-intensive, "enclave" operating models? • What forms of counter-cyclical fiscal policy and industrial policy support might help mitigate the effects of slumps and protect nascent domestic industries around mining?
Labour and livelihoods	<ul style="list-style-type: none"> • Growth of employment – both formal and ASM • Increased labour struggles and use of subcontracting • Migration and service sector growth in areas of mining growth • Skilled wage inflation 	<ul style="list-style-type: none"> • Focus on cost control, accelerated automation, and mechanisation leading to retrenchment • ASM remains large – formal sector withdrawal transitions some deposits to ASM • Challenges for former mining towns and areas 	<ul style="list-style-type: none"> • How will retrenchment, automation, and mechanisation interact with expectations for employment, and other rural livelihoods? • How to manage the social and environmental impacts of a larger ASM sector? • What do these changing livelihood opportunities mean for migration in extractive zones? • How can mine closure impacts on local communities be best managed, both culturally and economically?

6 | CONCLUSIONS

In this paper we have explored recent research on the mining sector in Africa and reflected on this considering the supercycle's end. We have explored the changing geographies of investment and sectoral shifts in mining before examining the changes brought by the supercycle, its end, and what questions emerge for future research in three key areas: struggle, national development strategies, and labour and livelihoods. The last half decade has seen a fundamental shift in the possibilities of extraction-led development and the reconfiguring of governance of the extractive sector. New trends have emerged around corporate strategy and actors, including the increasing presence of emerging market-based companies with implications for state–business relations and models for mineral-based development strategies. Equally, the end of the supercycle has perpetuated or intensified pre-existing trends towards mechanisation, automation, and enclavity, while distributive pressures on companies by local communities and host nations increase. While, at the global level at least, it

remains that Africa is not that important to mining, mining is important to Africa. As scholars we need to grapple with the changes afoot in Africa since the end of the supercycle, not least those spurred by the COVID-19 pandemic. The research directions suggested here offer initial ways to chart how mining can offer more constructive pathways towards development in both boom and bust.

ACKNOWLEDGEMENTS

Work in this paper was supported by University of Manchester School of Environment, Education and Development Seed funding, the University of Edinburgh School of Social and Political Science's Strategic Research Support Fund, the DFID/ESRC funded Effective States and Inclusive Development Research Centre [grant number PO 5113] and Hallsworth fund at the University of Manchester and a British Academy Postdoctoral Fellowship [grant number pf130031]. This paper has benefited from feedback from two anonymous reviewers. All remaining errors and omissions are our own.

DATA AVAILABILITY STATEMENT

Data sharing not applicable – no new data generated, or the paper describes entirely theoretical research.

ORCID

Andrew Bowman  <https://orcid.org/0000-0001-5132-6121>
 Tomas Frederiksen  <https://orcid.org/0000-0002-6881-1411>
 Deborah Fahy Bryceson  <https://orcid.org/0000-0002-2136-0078>
 John Childs  <https://orcid.org/0000-0003-3293-9517>
 Emma Gilberthorpe  <https://orcid.org/0000-0002-8982-2769>
 Susan Newman  <https://orcid.org/0000-0001-7220-4326>

ENDNOTES

- ¹ Data from American Enterprise Institute's China Global Investment Tracker (<https://www.aei.org/china-global-investment-tracker/>). Accessed April 2021.
- ² Data from the China-Africa Research Initiative (<http://www.sais-cari.org/chinese-investment-in-africa>). Accessed April 2021.
- ³ The Environmental Justice Atlas (ejatlas.org) is one tool that visually describes the spatiality of mining-related conflict. Evidencing over 3,000 instances of socio-environmental conflict, the mineral sector accounts for nearly a third of cases worldwide, many of which are found on the African continent.

REFERENCES

- Abuya, W. O. (2016). Mining conflicts and corporate social responsibility: Titanium mining in Kwale, Kenya. *The Extractive Industries and Society*, 3, 485–493. <https://doi.org/10.1016/j.exis.2015.12.008>
- African Union. (2009). *African mining vision*. Addis Ababa, Ethiopia: African Union.
- Akabzaa, T. (2009). Mining in Ghana: Implications for national economic development and poverty reduction. In *Mining in Africa* (pp. 25–65). London, UK: Pluto Press.
- Akiwumi, F. A. (2011). Global incorporation and local conflict: Sierra Leonean mining regions. *Antipode*, 44, 581–600. <https://doi.org/10.1111/j.1467-8330.2011.00945.x>
- Ambe-Uva, T. (2017). Whither the state? Mining codes and mineral resource governance in Africa. *Canadian Journal of African Studies*, 51, 81–101. <https://doi.org/10.1080/00083968.2016.1277148>
- Andreasson, S. (2015). Varieties of resource nationalism in sub-Saharan Africa's energy and minerals markets. *The Extractive Industries and Society*, 2, 310–319. <https://doi.org/10.1016/j.exis.2015.01.004>
- Andrews, N. (2019). *Gold mining and the discourses of corporate social responsibility in Ghana*. Cham, Switzerland: Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-92321-5>
- Ayisi, M. K. (2015). The review of mining laws and the renegotiation of mining agreements in Africa: recent developments from Ghana. *Journal of World Investment & Trade*, 16, 467–505. <https://doi.org/10.1163/22119000-01603003>
- Barlow, A. (2020). The politics of the temporary: Tanzanian local content in the East African crude oil pipeline. *The Extractive Industries and Society*, 7, 738–747. <https://doi.org/10.1016/j.exis.2020.03.010>

- Bebbington, A. J., Abdulai, A.-G., Bebbington, D. H., Hinfelaar, M., & Sanborn, C. A. (2018). *Governing extractive industries*. Oxford, UK: Oxford University Press. <https://doi.org/10.1093/oso/9780198820932.001.0001>
- Besada, H. G. (2016). *Governing natural resources for Africa's development*. London, UK: Routledge. <https://doi.org/10.4324/9781315514253>
- Binns, T., & Nel, E. (2009). The village in a game park: Local response to the demise of coal mining in KwaZulu-Natal. *South Africa. Economic Geography*, 79, 41–66. <https://doi.org/10.1111/j.1944-8287.2003.tb00201.x>
- Bridge, G. (2008). Global production networks and the extractive sector: Governing resource-based development. *Journal of Economic Geography*, 8, 389–419. <https://doi.org/10.1093/jeg/lbn009>
- Bryceson, D. F., & Geenen, S. (2016). Artisanal frontier mining of gold in Africa: Labour transformation in Tanzania and the Democratic Republic of Congo. *African Affairs*, 115, 296–317. <https://doi.org/10.1093/afraf/adv073>
- Bryceson, D. F., & MacKinnon, D. (2012). Eureka and beyond: Mining's impact on African urbanisation. *Journal of Contemporary African Studies*, 30, 513–537. <https://doi.org/10.1080/02589001.2012.719376>
- Bush, R. (2010). Conclusion: mining, dispossession, and transformation in Africa. In *Zambia, mining, and neoliberalism* (pp. 237–268). New York, NY: Palgrave Macmillan. https://doi.org/10.1057/9780230115590_9
- Busia, K., & Akong, C. (2017). The African mining vision: Perspectives on mineral resource development in Africa. *Journal of Sustainable Development Law and Policy*, 8, 145–192. <https://doi.org/10.4314/jsdlp.v8i1.7>
- Campbell, B. (2013). *Modes of governance and revenue flows in African mining*. Basingstoke, UK: Palgrave Macmillan. <https://doi.org/10.1057/9781137332318>
- Carmody, P. (2011). *The new scramble for Africa*. Cambridge, UK: Polity.
- Childs, J. (2016). Geography and resource nationalism: A critical review and reframing. *The Extractive Industries and Society*, 3, 539–546. <https://doi.org/10.1016/j.exis.2016.02.006>
- Childs, J. (2020). Extraction in four dimensions: Time, space and the emerging geo politics of deep-sea mining. *Geopolitics*, 25, 189–213. <https://doi.org/10.1080/14650045.2018.1465041>
- Collier, P. (2015). *The end of the super-cycle: The time for taking stock of what went wrong*. Retrieved from <http://webtv.un.org/watch/the-end-of-the-super-cycle-the-time-for-taking-stock-of-what-went-wrong/4080666618001/?term=>
- Collier, P., A. J. Venables, & T. Venables (Eds.) (2011). *Plundered nations?: Successes and failures in natural resource extraction*. New York, NY: Palgrave Macmillan. <https://doi.org/10.1057/978-0-230-35607-8>
- Cornwall, W. (2019). Sunken summits. *Science*, 365(6458), 1104–1107. <https://doi.org/10.1126/science.365.6458.1104>
- Durrant-Whyte, H., Geraghty, R., Pujol, F., & Sellschop, R. (2015). How digital innovation can improve mining productivity. *Mckinsey Metals & Mining November 2015*.
- Ferguson, J. (1999). *Expectations of modernity*. Berkeley, CA: University of California Press.
- Ferguson, J. (2006). *Global Shadows: Africa in the neoliberal world order* (pp. x–257). Durham, NC & London, UK: Duke University Press.
- Fessehaie, J., & Rustomjee, Z. (2018). Resource-based industrialisation in Southern Africa: Domestic policies, corporate strategies and regional dynamics. *Development Southern Africa*, 35, 404–418. <https://doi.org/10.1080/0376835X.2018.1464901>
- Franks, D. M., Davis, R., Bebbington, A. J., Ali, S. H., Kemp, D., & Scurrah, M. (2014). Conflict translates environmental and social risk into business costs. *Proceedings of the National Academy of Sciences*, 111, 7576–7581. <https://doi.org/10.1073/pnas.1405135111>
- Fraser, A., & Lungu, J. (2007). *For whom the windfalls; Winners & loser in the privatisation of Zambia's copper mines*. Luksaka, ZM: Civil Society Trade Network of Zambia & Catholic Centre for Justice, Development and Peace.
- Frederiksen, T. (2018). Corporate social responsibility, risk and development in the mining industry. *Resources Policy*, 59, 495–505. <https://doi.org/10.1016/j.resourpol.2018.09.004>
- Frederiksen, T., & Himley, M. (2020). Tactics of dispossession: Access, power, and subjectivity at the extractive frontier. *Transactions of the Institute of British Geographers*, 45, 50–64. <https://doi.org/10.1111/tran.12329>
- Frynas, J. G., Wood, G., & Hinks, T. (2017). The resource curse without natural resources: Expectations of resource booms and their impact. *African Affairs*, 116, 233–260. <https://doi.org/10.1093/afraf/adx001>
- Hansen, M. W., Buur, L., Mette Kjær, A., & Therkildsen, O. (2016). The economics and politics of local content in African extractives: Lessons from Tanzania, Uganda and Mozambique. *Forum for Development Studies*, 4, 201–228. <https://doi.org/10.1080/08039410.2015.1089319>
- Hayes, K. (2008). *Artisanal and small-scale mining and livelihoods in Africa*. Amsterdam, Netherlands: Common Fund for Commodities.
- Hilson, A. E., & Ovidia, J. S. (2020). Local content in developing and middle-income countries: Towards a more holistic strategy. *The Extractive Industries and Society*, 7, 253–262. <https://doi.org/10.1016/j.exis.2020.04.014>
- Hilson, G., & Potter, C. (2005). Structural adjustment and subsistence industry: Artisanal gold mining in Ghana. *Development and Change*, 36, 103–131. <https://doi.org/10.1111/j.0012-155X.2005.00404.x>
- Humphreys, D. (2015). *The remaking of the mining industry*. Basingstoke, UK: Palgrave Macmillan. <https://doi.org/10.1057/9781137442017>
- Humphreys, D. (2019a). Mining productivity and the fourth industrial revolution. *Mineral Economics*, 33, 115–125. <https://doi.org/10.1007/s13563-019-00172-9>
- Humphreys, D. (2019b). The mining industry after the boom. *Mineral Economics*, 32, 145–151. <https://doi.org/10.1007/s13563-018-0155-x>
- ICMM. (2015). *Research on company–community conflict*. London, UK: ICMM.
- IEA. (2019). *World Energy outlook 2019*. Paris, France: IEA.
- IMF. (2019). *Regional economic outlook: Sub Saharan Africa: Recovery amid elevated uncertainty: April 2019*. Washington, DC: IMF.
- Jacob, T., & Pedersen, R. H. (2018). New resource nationalism? Continuity and change in Tanzania's extractive industries. *The Extractive Industries and Society*, 5, 287–292. <https://doi.org/10.1016/j.exis.2018.02.001>

- Jonsson, J. B., & Bryceson, D. (2017). Beyond the artisanal mining site: Migration, housing capital accumulation and indirect urbanization in Tanzania. *Journal of East African Studies*, 11, 3–23. <https://doi.org/10.1080/17531055.2017.1287245>
- Karl, T. L. (1997). *The paradox of plenty: Oil booms and petro-states*. Berkeley, CA: University of California Press.
- Kirsch, S. (2014). *Mining capitalism*, Oakland, CA: University of California Press.
- Lee, C. K. (2018). *The specter of global China: Politics, labor, and foreign investment in Africa*. Chicago, IL: University of Chicago Press.
- Lungu, J. (2008). Copper mining agreements in Zambia: Renegotiation or law reform? *Review of African Political Economy*, 35, 403–415. <https://doi.org/10.1080/03056240802411032>
- Morris, M., Kaplinsky, R., & Kaplan, D. (2012). “One thing leads to another” — Commodities, linkages and industrial development. *Resources Policy*, 37, 408–416. <https://doi.org/10.1016/j.resourpol.2012.06.008>
- Mususa, P. (2012). Mining, welfare and urbanisation: The wavering urban character of Zambia’s urban Copperbelt. *Journal of Contemporary African Studies*, 30, 571–588. <https://doi.org/10.1080/02589001.2012.724873>
- Negi, R. (2011). The micropolitics of mining and development in Zambia: Insights from the Northwestern Province. *African Studies Quarterly*, 12, 27–44.
- Nyame, F. K., Andrew Grant, J., & Yakovleva, N. (2009). Perspectives on migration patterns in Ghana's mining industry. *Resources Policy*, 34, 6–11. <https://doi.org/10.1016/j.resourpol.2008.05.005>
- Ofori, J. J. Y., & Ofori, D. R. (2018). Earning a social license to operate: Perspectives of mining communities in Ghana. *The Extractive Industries and Society*, 6, 531–541. <https://doi.org/10.1016/j.exis.2018.11.005>
- Pini, B., Mayes, R., & McDonald, P. (2010). The emotional geography of a mine closure: A study of the Ravensthorpe nickel mine in Western Australia. *Social & Cultural Geography*, 11, 559–574. <https://doi.org/10.1080/14649365.2010.497850>
- Power, M., Mohan, G., & Tan-Mullins, M. (2012). *China's resource diplomacy in Africa: Powering development?*. New York, NY: Palgrave Macmillan.
- Siakwah, P. (2017). Political economy of the resource curse in Africa revisited: The curse as a product and a function of globalised hydrocarbon assemblage. *Development and Society*, 46, 83.
- Siyongwana, P. Q., & Shabalala, A. (2018). The socio-economic impacts of mine closure on local communities: evidence from Mpumalanga Province in South Africa. *GeoJournal*, 84, 367–380. <https://doi.org/10.1007/s10708-018-9864-5>
- Taylor, I. (2014). *Africa rising?: BRICS-Diversifying dependency*. Woodbridge, UK: Boydell & Brewer Ltd.
- Tsuma, W. (2010). *Gold mining in Ghana*. Münster, Germany: LIT Verlag Münster.
- UNCTAD. (2019). *State of commodity dependence*. Geneva, Switzerland: UNCTAD.
- Verbrugge, B., & Geenen, S. (2018). The gold commodity frontier: A fresh perspective on change and diversity in the global gold mining economy. *The Extractive Industries and Society*, 6, 413–423. <https://doi.org/10.1016/j.exis.2018.10.014>
- Yankson, P., & Gough, K. (2019). Gold in Ghana: The effects of change in large-scale mining on artisanal and small-scale mining. *The Extractive Industries and Society*, 6, 120–212. <https://doi.org/10.1016/j.exis.2018.09.009>

How to cite this article: Bowman A, Frederiksen T, Bryceson DF, Childs J, Gilberthorpe E, Newman S. Mining in Africa after the supercycle: New directions and geographies. *Area*. 2021;00:1–12. <https://doi.org/10.1111/area.12723>