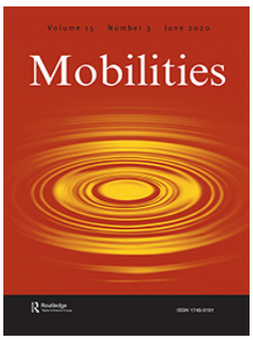

Mobilities

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rmob20

Mining mobility and settlement during an East African gold boom: Seeking fortune and accommodating fate

Deborah Fahy Bryceson , Jesper Bosse Jønsson & Mike Clarke Shand

To cite this article: Deborah Fahy Bryceson , Jesper Bosse Jønsson & Mike Clarke Shand (2020) Mining mobility and settlement during an East African gold boom: Seeking fortune and accommodating fate, Mobilities, 15:3, 446-463, DOI: 10.1080/17450101.2020.1723879

To link to this article: https://doi.org/10.1080/17450101.2020.1723879

Published online: 12 Mar 2020.

MOBILITIES
2020, VOL. 15, NO. 3, 446–463
https://doi.org/10.1080/17450101.2020.1723879

Routledge
Taylor & Francis Group

Mining mobility and settlement during an East African gold boom: Seeking fortune and accommodating fate

Deborah Fahy Bryceson [a], Jesper Bosse Jønsson [b] and Mike Clarke Shand [c]

[a]Centre of African Studies, University of Edinburgh, Edinburgh, UK; [b]RSK Environment (East Africa) Ltd., Dar es Salaam, Tanzania; [c]School of Geographical and Earth Sciences, University of Glasgow, Glasgow, UK

ABSTRACT

In light of Shiller's concept of 'irrational exuberance', we interrogate migrants' optimistic material expectations at artisanal and industrial gold mining locations during a period of exceptional mobility spurred by the international gold boom of 2000–2013. Our household survey and interview findings reveal miners' and residents' mobility and settlement patterns in three Tanzanian gold mining settlements, representing different stages and forms of mining along a trajectory of deepening gold extraction and increasing urbanization. Resident miners', traders' and service providers' personal motivations, strategies and dilemmas surface. The constancy of migrants' motivation for economic betterment and the contingency of their strategic thinking in the face of gold supply uncertainty emerges clearly. However, mining site residents' highly mobile lives entail toleration of temporary, inadequate housing in infrastructurally deficient, polluted and unsafe mining environments, a situation at odds with their aims for lifestyle enhancement. Given the unpredictability of gold production, residents reconcile their expectations of striking it rich with the reality of sub-optimal outcomes. Those who gain satisfaction and esteem in their careers are likely to do so through high levels of mobility, ultimately rewarded with desirable housing and settlement locations, whereas others adapt to constrained mobility and unenviable settlement locations, or abandon mining.

ARTICLE HISTORY
Received 20 April 2019
Accepted 13 January 2020

KEYWORDS
Artisanal mining; large-scale mining; housing; economic development; irrationality; gold boom; Tanzania

Introduction

Urry (2000) insightfully draws attention to the increasing global frequency, volume, speed and intensity of human mobility by the turn of the 21st century. Most of the mobility literature to date has been focused on urban and international migration.[1] There is scant mention of the context, nature and strategies of mining migration and associated settlement patterns. This article intends to address this gap.

Significant migration destined for mineral-rich areas during the 1990s surfaced steadily and relatively inconspicuously in Sub-Saharan Africa.[2] As international mineral prices for gold climbed to unprecedented heights, migrants gravitated to sites of rumoured mineral strikes. Alongside migrants' mass entry into artisanal mining, African governments, and the World Bank, were actively encouraging international investment in large-scale mines (Bryceson and MacKinnon 2012).

The spread of spontaneous mineral rush settlements engendered an estimated ten million African artisanal miners by 2014 with the number of people indirectly benefiting from the sector set at 54 million (Fritz et al. 2018). Migrants intending to mine, as well as those destined for trade and service provisioning work, arrived with high expectations of economic betterment, while downplaying the material uncertainty and physical trials of daily life at African mining sites (Benin: Grätz 2009; Burkina

CONTACT Deborah Fahy Bryceson dfbryceson@bryceson.net

Faso: Werthmann 2009; DRC: Geenen 2015; Sierra Leone: Maconachie et al. 2006). During a gold boom, populations in mining sites tend to be highly mobile relative to non-mining, especially agrarian, communities. Migration, aimed at material advance in the form of higher earnings and standards of living, often involves extreme material sacrifice, physical discomforts, hazards and locational remoteness. This article interrogates the motivations and material outcomes of the people who amassed at artisanal and industrial mining sites in Tanzania during the international gold boom of 2000–2013.

Increasingly there is an awareness that booms and busts are driven by rational and irrational decision-making on the part of people seeking to enhance their economic well- being. Shiller (2015) analytically dissects the nature of 'irrational exuberance' in which mounting numbers act on their anticipation of material gain, based largely on narrative stories of success that conflate possibility with high probability of the macro-economic consequences of such expectations on the part of national populations (Shiller 2019). In this article, we document what happens at the local level as massive numbers of migrants arrive speculatively at mining sites intending to make a fortune.

The article is based on household survey and personal interview findings from the Urbanization and Poverty in Mining Africa (UPIMA) research programme. The first section discusses the theory of irrational exuberance and the context in which the mining boom arose, including the nature of artisanal mining as opposed to industrial mining sites. The next outlines Tanzania's historical background, our research methodology and local study site selection. The sites provide a spatial and temporal cross-section of Tanzania's mining experience, representing distinct locational and demographic contexts that differentially influence migration and settlement decision-making of miners, entrepreneurs and service providers. Thereafter, the motivations and attitudes of the residents at each of the three mining sites are probed with respect to stages of mining along a trajectory of deepening levels of mine extraction. A comparative summary of the three sites' migration and settlement dynamics follows before concluding.

Gold mining in a boom context

Irrational exuberance

John Maynard Keynes (1936) in *The General Theory of Employment, Money and Interest* coined the term 'animal spirits' to refer to proclivities, instincts and emotions, which influence human behavioural responses to economic opportunities and constraints. The Nobel prize-winning economists Akerlof and Shiller (2009) revived this concept, arguing that irrationally high expectations and intuition drive surges of economic activity.

Shiller (2015) links his concept of 'irrational exuberance' to the appearance of 'bubbles' in markets propelled by over-optimism about the value of specific commodities or stocks, which fuel investors' expectations of high profits. A raft of speculative bubbles have surfaced through history when people act on impulse, collectively catalyzing a bandwagon effect. This phenomenon starts as individually rational if 'one can get in and out ahead of the others [and] knows one is in the early stages of the chain' (Kindleberger 1978:34–35). But mob psychology is subject to the 'fallacy of composition' in which the whole differs from the sum of its parts. Latecomers are likely to do badly. Shiller (2019:3) argues that people are motivated by narratives, defined as a 'contagious story that has the potential to change how people make economic decisions', largely devoid of detailed factual investigation. Gold mining is particularly liable to contagious narratives of personal enrichment.[3]

African mining dynamics in the 21st century

Certainly, attraction to gold boom sites from the perspective of African artisanal miners, traders and service sector providers has been heavily speculative. In light of irrational exuberance theory, those heading for gold rush sites could be described as fortune-seekers, embarking on a 'dash for cash', with little heed to the possibility of a 'crash' thereafter. The mobility and settlement experiences of potential 'dash-cash-crash' mining residents are scrutinized in this article.

Artisanal and industrial mining represent differing levels of scale, technological investment and skill deployment. Artisanal and small-scale mining (ASM) is labour-intensive, using basic hand-held tools or simple portable machinery. Tools include a pan and sieve for river panning, or spades, hammers and picks for digging vertically downwards or tunneling horizontally to remove hardrock. Artisanal mining's relatively limited investment costs are counterbalanced by a test of miners' physical strength and perseverance. African artisanal gold mining is a relatively open entry occupation given its low starting capital. In the context of an on-going process of agricultural labour displacement in Sub-Saharan Africa, artisanal mining's open entry provides much needed income opportunities for rural dwellers and, to a lesser extent, urbanites.

Large-scale mining (LSM) is capital-intensive, with negligible opportunities for employment of uneducated labourers. It is characterized by deep tunneling or open-pit mining requiring heavy capital investment, most often obtained through foreign investment. African nationals with secondary or university education are employed in management or operating the sophisticated digging and processing equipment. Unskilled labourers are restricted to relatively low-paid maintenance and service positions.

ASM and LSM are often found in close locational proximity to one another. Artisanal miners in an area may inadvertently serve as prospectors for large-scale mining companies looking for potential mining locations. Inversely the presence of a company's tailings, or gold ore body, may signal a source of mining opportunity for artisanal mining despite being illegal and annoying for LSM management. Industrial mining companies, as royalty and tax-paying entities seeking harmonious relations with the national, regional and local tiers of government, are usually heavily favoured over artisanal miners by African governments. The establishment of an industrial mine in an erstwhile ASM area spells contentious zero-sum consequences for artisanal miners' livelihood, no matter how much corporate social responsibility is dispensed by the large-scale mine.

The Tanzanian policy-oriented mining literature draws attention to the incompatibilities between ASM and LSM (Carstens and Hilson 2009; Lange 2011). Traditionally, artisanal miners have predominantly been part of the informal sector. They have generally paid little or no tax, their gold output tends not to enter formal marketing channels within the country, and they frequently use mercury to process their gold (Jønsson, Appel, and Chibunda 2009; Hilson et al 2018a). Thus, much of the policy-oriented literature is directed at discussing ways and means of controlling ASM by requiring them to obtain formal mining licenses, locationally concentrating their activities at designated areas and providing them with processing support (Hilson and Maconachie 2017; Hilson et al. 2017; Verbrugge and Geenen 2019). While there are comprehensive provisions for ASM within Tanzania's regulatory regime, not all artisanal miners can afford the license fees or meet other conditions such as an Environmental Protection Plan. During formalization, many artisanal miners are forced to move away from their informal mining sites and are likely to experience impoverishment as well as locational displacement (Ouoba 2017).

The knee-jerk reaction of those facing marginalization from mining is occupational diversification. Since the 1980s, tens of millions of Sub-Saharan Africans have partially or fully abandoned agrarian livelihood in a process of deagrarianization (Bryceson 2018b), so for most, displacement from agriculture has preceded their displacement from mining. Due to the relative absence of industrial opportunities, deagrarianized labourers are primarily absorbed into low paid informal sector services and trade. This explains why so many have eagerly moved to remote mining sites in the hope of gaining a more lucrative livelihood (Aizawa 2016). Nonetheless, as industrial mining increasingly displaces artisanal mining, many are forced to fall back on subsistence farming (Banchirigah and Hilson 2010; Okoh and Hilson 2011), or search for service sector work and petty trade in urban areas. For those who retain a foothold in mining, the uncertain location and ephemeral nature of mineral deposits, miners' migration and settlement decision-making is necessarily open-ended.

Throughout their work career, artisanal miners frequently move to other locations in response to new opportunities, constraints or imperatives (Jønsson and Bryceson 2009; Maclin et al. 2017; Botchwey et al. 2019). Beginning with the distance they travel to their first mining site, their movement

follows the supply of gold. When artisanal miners' accessibility to their gold deposits dwindles or they are marginalized by LSM, or when mining employees lose their jobs in industrial mining, they all face the decision of staying or moving elsewhere. Traders and service providers are not spared this dilemma, with the thinning or disappearance of miners, their major customers, they are also likely to move. The drawbacks of such high mobility are exacerbated by the presence of accompanying wives and children, who become rooted in residential sites. Moving destabilizes their lives and welfare, and poses the dilemma of no certainty of finding a viable alternative location. Young men without proximate family ties are far freer to move.

Before probing the nature and quandaries of migration and settlement at each of the three study sites, the next section provides contextual background to our Tanzania-based case study.

Background to the study

Recent Tanzanian mining history

At national independence in 1961, over 90 % of Tanzania's population were rural dwellers.[4] Tanzania is a poor country ranked 154th on the Human Development Index. Its skilled labour force is estimated to be 5.1 % of its population of 57.3 million people (UNDP 2019).

Tanzania was the third biggest gold-producing country in Africa at the time of our study (US Geological Survey 2012), having only recently revived its industrial gold-producing capacity in response to the rising international price of gold (Figure 1). From 1992 to 2013 Tanzania's industrial gold output expanded almost ten-fold in constant value terms (Bank of Tanzania 1992-2017).

Artisanal mining had been illegal throughout the British colonial period and during Tanzania's post-independence period until 1979. In that year, serious deterioration of the national economy arising from the global rise in oil prices coincided with a surge in international gold prices, prompting the Tanzanian government to lift the artisanal mining ban. A rapid succession of gold discoveries during the 1980s followed (Kulindwa et al. 1998). Coupled with prevailing low agricultural commodity prices, and IMF-imposed structural adjustment policies, rural households coped with livelihood adversity. They concentrated on searching for non-farm income sources of work. In mineral-rich parts of the country, artisanal mining provided the most lucrative alternative to smallholder agriculture (Chachage 1995; Bryceson and Jønsson 2010).

In 2011, Jønsson listed 64 Tanzanian sites of gold discoveries, stating this was far from an exhaustive list. The Ministry of Energy and Minerals estimated there were nearly 700,000 informal artisanal miners in 2011, which rose to 1,000,000 when women and children's mineral processing activities along the supply chain were included (Tanzania 2011). Furthermore, the multiplier effects

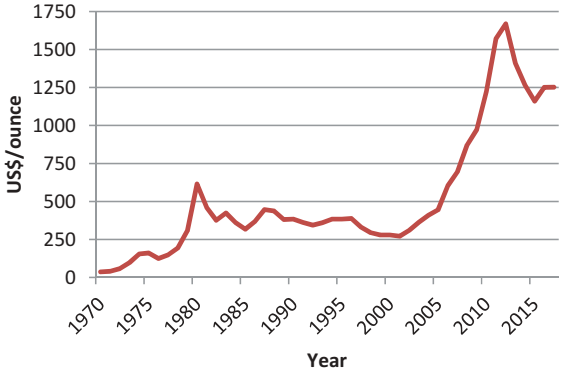

Figure 1. International gold price, 1970–2017.
Source: Compiled by the authors from Kitco.com data.

of artisanal mining were estimated to generate four ancillary non-mining livelihoods per every artisanal miner (Tanzania 2011; World Bank 2015). The value of Tanzania's large-scale mined gold production peaked in 2011 at a value of 2.2 billion US$ (Bank of Tanzania, 2002–2017), coinciding with the international gold price slump beginning in 2012 (UNCTAD 2015).

Research methodology

The UPIMA research programme began with an extensive review of current and historical literature and an international workshop in Tanzania to discuss inter-relationships between African mining and urbanization. Tanzanian fieldwork took place from May 2011 to March 2012 in three selected settlements. The key informant interviews embraced regional and district government officials, settlement leaders, teachers, religious leaders, health workers, traders and mine leaders. An in-depth focus group discussion with successful gold miners and brokers was held. Our interviewees were questioned about the settlements, migration, social stratification, family stability, sources of tension in the settlements as well as recent demographic and economic data from the settlement. In each settlement, a random sample survey of 36 households stratified between the inner core and the outer perimeter of housing was conducted, which provided coverage of mining as well as non-mining households, representing early and later cohorts of migrants. Swahili was the language of communication to maximize clarity and participation with the residents, except when an interviewee preferred to speak English. Our field assistants were supervised by the authors of this article.

Following an interlude for preliminary analysis of the survey data, a day-long workshop with Tanzanian district policymakers was held in the regional capital to obtain their reaction to the study's findings. Finally, focus group discussions were conducted in each of the three study settlements with secondary students regarding migration, life in their settlements and occupational trajectories. 'Digging Deeper' art competitions and festivals took place in which Form 4 students artistically depicted their mining settlement through displays of paintings, sculptures and play performances. This entertaining phase revealed both positive and negative aspects of the settlements that had not previously surfaced in our more conventional data-gathering. All the recorded interviews were transcribed and translated into English by the project field coordinator. The survey data was processed in SPSS as well as tabulated in Excel.

Description of sites

Located in the gold-rich region of Geita just south of Lake Victoria, our three case study settlements were chosen to illustrate different stages and forms of mining. They were:

Ikuzi, a recent artisanal gold rush site, appeared on a green field site proximate to the traditional village of Ikuzi. It first experienced a gold rush in July 2010 when an estimated 13,000 miners arrived following news of a gold strike. At the time of our survey a year later roughly 1000 miners remained on site, while the nearby village numbered 3900 people.

Nyarugusu, a mature artisanal site, was proximate to a small abandoned colonial mine, revived as an artisanal gold rush site in 1983. By the early 1990s Nyarugusu's surface deposits were depleted. Shafts with wooden supports had been built to depths of 40–60 metres. At the time of our survey, Nyarugusu and its satellite settlements had expanded to 25,000 people, the size of a small town. A gold strike in nearby Nyaruyeye, only 10 km away from Nyarugusu, took place in 2011.

Geita, site of the large-scale Geita Gold Mine that had been shut down in 1966 re- opened in 2000 under the ownership of AngloGoldAshanti. It employed 3,600 employees by 2012. Geita town became the fastest growing urban area in East Africa, numbering 100,000 people at the time of our survey. The town was also surrounded by artisanal mining sites.

These three sites are illustrative of different stages of the mining process and migrant family formation as evidenced in Table 1.

Table 1. Key demographic characteristics of surveyed households (% of total households).

Sites:	Ikuzi	Nyarugusu	Geita	ALL Average
No. of Households:	**36**	**36**	**36**	*108*
HHH's locational characteristics				
% born on site	2.8	0.0	8.3	*3.0*
Mean year of arrival	2009	1988	1997	*1998*
Mean years resident	1.7	23.3	21.6	*15.5*
Age/Sex				
Mean age HHH	40	52	47	*46*
Female HHH	19%	19%	22%	*20%*
Sex ratio (m/f) HH	1.30	1.04	1.24	*1.19*
Households' demographic characteristics				
Mean members/HH	3.1	6.4	6.3	*5.3*
Dependency ratio %	10%	36%	40%	**29%**
3-generation families	3%	11%	36%	*17%*

Source: UPIMA survey, 2012
HHH - Head of Household and HH - Household

Ninety-seven percent of household heads sampled were migrants. In-migration at the artisanal rush site (Ikuzi) had taken place very recently, whereas the mature artisanal site (Nyarugusu) started experiencing substantial in-migration decades before. Similarly, migrant arrival in Geita stretched back in time.

The household demographics differed considerably with Ikuzi having a strong male-dominated sex ratio and the lowest average household head age. The percentage of female household heads was fairly even, albeit slightly higher in highly urbanized Geita town.

Family formation was under-developed at Ikuzi, where the household size was half of what was reported in the other two settlements. Ikuzi's low household dependency ratios and incidence of three-generational families displayed the classic characteristics of a rush strike site, contrasted with Nyarugusu and Geita.

Migration to a gold rush site: Ikuzi

Miners' mobility

Artisanal mining, usually referred to as 'small-scale mining' in Tanzania's legislative framework, is legal, but local government authorities are not required, nor in a position, to keep count of the incoming and outgoing migrant population of their settlements. Settlement establishment and expansion arising from a gold rush generally develops with limited official awareness, let alone recognition and infrastructural support for the settlement. Migrants largely fend for themselves.

Miners' willingness to migrate wherever gold strikes occur generates uncertain, open-ended decision-making. During the 2000s, rising mobile phone use in rural Tanzania accelerated the speed and number of people migrating to newly discovered mineral sites. Table 2 compares Ikuzi respondents' reasons for migration relative to the other settlements and juxtaposes the number of settlements they stayed in previously. Miners' presence was occupationally most pronounced in Ikuzi and residential mobility of Ikuzi, measured in terms of the number of places they had previously lived, was higher (3.8) than the mature artisanal gold site at Nyarugusu (2.3).

The initial move to a mining rush site is part of a livelihood search on the basis of constrained information about the nature and environment of the work itself, whereas a migrant's decision to venture to subsequent sites requires analytical insights regarding the new site's opportunities and risks, the age of the migrant, and the stage of his or her family life cycle. Often travelling considerable distances in their quest for gold, most miners saw material hardship and separation from family as part of mining.

Table 2. Household heads' birthplace areas and reasons for migration to mining site (% of sampled HHHs).

Settlement site	Ikuzi	Nyarugusu	Geita	ALL average
No. of households	**36**	**36**	**36**	***108***
Birthplace area (%)				
Current settlement	0	0	8	***3***
Within home district	0	6	3	***3***
Neighbouring district	31	8	14	***18***
Distant district	69	86	74	***76***
Reason for migration (%)				
Artisanal mining	69.4	50.0	0	***39.8***
Large-scale mining	0	0	5.6	***1.9***
To find employment	5.6	27.8	19.4	***17.6***
Professional transfer	2.8	5.6	19.4	***9.3***
To do business	13.9	0	0	***4.6***
To farm	0	0	0	***0.0***
To join family	0	16.7	41.7	***19.5***
To retire	0	0	2.8	***0.9***
Other	5.6	0	2.8	***2.8***
No. of previous residences excluding birthplace				
1	4	10	9	***23***
2	5	13	10	***28***
3	9	9	5	***23***
4	6	3	3	***12***
5	4		6	***10***
6	5		1	***6***
7	3		1	***4***
8	0	1		***1***
10			1	***1***
Mean average/HHHs	3.8	2.3	3.2	***3.1***

Source: UPIMA survey, 2012
HHH - Head of Household

Marriage, age and number of children influenced the willingness of a migrant to move on. Sources of information prompting the decision to go to another mining site usually came from fellow colleagues rather than relatives and friends. In the case of miners, second and subsequent moves increasingly committed them to a mining lifestyle, becoming part of a mining fraternity with specific work norms and a career path (Bryceson and Jønsson 2010). For most seasoned artisanal miners, mining was synonymous with mobility between sites. Traders and service provisioners shadowed miners' movements.

Young women followed male artisanal miners' influx. Many migrated independently, often to join friends, usually with the expressed hope of finding a 'rich miner' (Bryceson, Jønsson, and Verbrugge 2013). In the meantime, they initiated income-earning activities, selling cooked food, working as barmaids, and operating guesthouses. Female entrepreneurs tended to migrate shorter distances than men, often relying on chain migration.

Entrepreneurs' arrival at gold rush mining sites was not as speedy or numerous as artisanal miners. In Ikuzi, some artisanal mining pit managers had entrepreneurial skills[5] and speculatively invested in trade or services. Three of our key informants were multi-tasking entrepreneurs who emphasized how uncertain their business operations were:

> The life of a miner or a business man living from customer sales is that of moving all the time. Nevertheless, I have become addicted to this business because of its high profits.
>
> (T.K., 34-year-old used clothes salesman, primary school education from distant district. Interviewed 6 July 2011).
>
> Miners have decreased a lot since I first arrived a year ago. Then they were sleeping all over the place and my guesthouse was full every day with guests paying 2000 Tsh per day. One night I earned 44,000 Tsh. These days

> I'm lucky if I can charge 1000 Tsh for a night and most of my guests pay when they get lucky in the mines or with their other activities.
>
> (K.X. 50-year-old woman, guesthouse owner from distant district, no formal education. Interviewed 6 July 2011).

Artisanal gold rush mining is a motor force for rapid settlement growth and economic stimulation in rural local economies, but inversely once gold availability shrinks, settlements are likely to contract. Throughout the up and downturn, housing and basic needs infrastructure are problematic.

Beyond the issue of finding gold or successful income-earning from trading or service provisioning, day to day living in mining settlements is a challenge. Rapid, high population influx into gold settlements exerts mounting pressure. Ikuzi rush site had no infrastructure, and quickly outgrew its natural water sources. The ensuing lack of sanitation raised the risk of ill health. Given the site's remoteness and lack of housing, over 90 % of the surveyed migrants rigged up make-shift shelters of rain-proof tarpaulin sheets. Furthermore, their uncertainty about how long the gold rush would last and whether they would be evicted from the site deterred them from investing in better shelter.

Whereas the majority of residents of Ikuzi were miners, in the other two settlements, miners were fewer in number and represented contrasting patterns of residential mobility.

Occupational patterns of the three settlements are compared in the next section.

Nyarugusu: residential stability in a post-rush gold settlement

A relatively settled family-based migrant population prevailed in Nyarugusu. Well past its gold rush phase that peaked in the late 1980s, Nyarugusu's evolution and survival as a mining settlement were laced with quandaries. The population had grown to roughly 25,000 but their household economic survival demanded occupational flexibility. Others, mostly better-off residents, had migrated out as Nyarugusu's gold deposits became increasingly difficult to access. One of Nyarugusu's original inhabitants described the changes that ensued over the years.

> When I moved to Nyarugusu in 1968 it was very scarcely populated bushland … agriculture was the main activity … Gold rushes happened throughout the 1980s and Nyarugusu's population grew. Gold strikes still happen occasionally now, but you don't see signs of wealth anymore. Most people who got rich earning good money in Nyarugusu chose to build houses in Mwanza, Bariadi and Shinyanga. Only a handful built modern houses in Nyarugusu. (K.M., 72-year-old male local farmer. Interviewed 6 September 2011).

Those who stayed behind made adjustments to their working lives. The knee-jerk reaction was to rely more heavily on agriculture (Table 3). Several household heads' main occupation became farming, which almost doubled between 2002 and 2012, while mining shrank by a third, to rank on a par with farming. Heads of households were more likely to be using Nyarugusu as their residential base and commuting to a more distant mine site for work. Meanwhile, Nyarugusu became more service-oriented, often relying on customers from the more distant gold sites in the district to stock up on their consumer needs and hear the local gossip about mining strikes in Nyarugusu's bars and tea shops.

Nyarugusu's settlement stability and function as an urban service centre located within a rich gold area made it a gateway for miners headed for new gold rush sites. On 20 August 2011, gold was discovered in Nyaruyeye (10 kilometres away). Two weeks later 2000 gold rush miners had already amassed.

A woman restaurant owner normally based in Nyarugusu describes her dash to take advantage of Nyaruyeye's business prospects.

> Since 2010, the Nyarugusu population was static, then one week ago the population increased significantly. This current rush has been extremely good for my business. My main customers are miners … When the gold rush stops, the customers vanish and my business will decline back to 'business as usual'. Residents are predicting that the gold rush will last for another month only but we pray for it to continue longer. (T.J. 35-year old restaurant owner from Mwanza city, lower secondary education. Interviewed 4 September 2011).

Nyarugusu's anomalous position as settlement and hub of artisanal mining over the decades, and the harmful consequences of gold rushes are ruefully described by a local mining official:

Table 3. Past and existing primary and secondary income sources of heads of household by gold mining site (%): 2002 and 2012.

	Occupation	Mining	Trade	Services	Farming	Not working
Ikuzi*						
2012	Main	69	19	6	6	0
	Secondary	17	25	5	36	17
Nyarugusu						
2012	Main	42	5	11	42	0
	Secondary	33	17	3	42	5
2002	Main	61	3	8	22	6
	Secondary	5.6	11.1	0.0	41.7	41.7
Geita						
2012	Main	11.1	13.9	47.2	25.0	2.8
	Secondary	11.1	19.4	11.1	27.8	30.6
2002	Main	5.6	16.7	36.1	22.2	19.4
	Secondary	2.8	2.8	8.3	22.2	63.9

Source: UPIMA survey, 2012
* The Ikuzi gold rush settlement did not exist in 2002. Gold was discovered in 2010.

> Nyarugusu is the oldest artisanal gold mining settlement in Tanzania. In terms of investments made by miners from their earnings, the gold output from Nyarugusu did not benefit the settlement over the long term because miners did not have plans to seriously invest in Nyarugusu village … So many miners, not licensed to claims, migrate from one gold rush to another, sinking as many pits as possible, facilitated by mobile phone communications. There are many adverse environmental implications. Look at the new rush; hundreds of women selling water and food, no toilets. Thousands of miners who need trees for sinking their pits without being sure that there is gold where they choose to mine. Rivers are destroyed as the water flow is blocked and people downstream suffer in various ways; either through less water or through a contaminated water source.
>
> (Secretary of the Mwanza Regional Miners Association headquartered in Nyarugusu. Interviewed 8 September 2011).

His criticism of itinerant artisanal miners was embroidered by a 72-year old based on his long overview of residents' unfolding lives:

> Access to water is an enormous problem. It's extremely expensive. There are more women than men [here]. The people that are really poor are the orphans who have lost both of their parents to AIDS. (K.M., Interviewed 6 September 2011).

A group of successful miners remarked reflectively:

> There are problems with Nyarugusu's infrastructure and if you ask yourself how that can be possible with all the gold leaving this area, you fail to find a suitable answer. It plays a part in why many miners prefer living and investing their money elsewhere (Focus group of four miners from nearby district: A.J.(35 years) who mined since 1996 at nine locations; M.(60 years) mined since 1972 at 13 locations; M.J.(29 years) mined since 2003 at eight locations; J.J.(34 years), mining since 1997 at eight locations. Interviewed 4 September 2011).

A Nyarugusu woman trader candidly confided:

> I'm only in Nyarugusu to harvest profits. It is not an ideal place to raise a family. Children are easily tempted to engage in gold mining or other related activities and forget about schooling. (T.J. 35-year old woman migrant with lower secondary education. Interviewed 4 September 2011).

The persistence of Nyarugusu as a settlement is a testimony to the residents' creativity and endurance. They came as fortune-seekers decades ago but relative to others who moved on to bigger more cosmopolitan urban centres they tended to choose a more sedentary existence. However, they were located in a place where they could try their luck again in nearby rush sites, whereas those with entrepreneurial acumen strategically provisioned goods and services to the itinerant gold rush miners passing through Nyarugusu on their way to the new rush sites. Thus, Nyarugusu households could directly or indirectly participate in the new gold rush further afield and avoided 'crashing out', but generally remained dissatisfied with their material circumstances.

Geita: rapid urbanization in Tanzania's large-scale gold mining hub

A company-owned gold mine was first established in Geita in 1936 and closed in 1966 five years after national independence due to declining profit. AngloGoldAshanti's decision to reopen the town's large-scale gold mine in 2000 triggered a population surge of migrants from all over Tanzania. At the time of our survey, Geita's cosmopolitan population of over 100,000 was growing at 11% per annum. In addition to people seeking employment at Geita Gold Mine (GGM), a wide spectrum of people flowed into service sector and trade occupations, mostly as informal labourers.

The foreign-owned reincarnation of large-scale mining, GGM, was a massive, highly (OMIT 2000) capitalized operation. In 2011, there were three operating pits with 1800 full-time staff, plus 2000 GGM-subcontracted employees. South African-style dormitory accommodation was not offered for its non-professional staff. They resided in Geita town instead. GGM encouraged its staff to own houses through provision of a supplement of 15% of their salary and a half-year salary advance as a loan to enable them to hire builders for house construction. House plots, but not houses, were purchasable from individual land developers. In contrast, the professional and managerial staff were availed suburban-style housing in the 'GGM village', which accommodated 300 mining families and an international primary school for expatriate children.

A young trained accountant described how he was recruited by GGM and his terms of employment and housing.

> After graduating in 2008 … I applied and got a job at GGM. I just got married last month and we are expecting a child … I've recently decided to build a house in Geita and bought a plot. I aim to build a three bedroom house for 20 million shillings … Loans are available from GGM, but I think they are not worth taking because you can only borrow a maximum of three months' basic salary to be repaid within 12 months. Instead I've started saving every month for house construction.
>
> (G.M., 30-year-old GGM employee, born in distant district. Interviewed 3 August 2011).

Artisanal mining in Geita thrived between 1966 and 2000 when there was no large-scale mine but artisanal miners worked on various Geita sites informally. At the time of our survey, a substantial number of artisanal mining families operated on the margins of GGM's mining concession. Their living conditions were far less secure than that of GGM employees. A local artisanal miner describes his work constraints:

> These days all the best mining sites are within the GGM area, leading to a lot of problems. Many of Geita's artisanal miners are forced to steal the gravel from within the GGM area. Even the Katoma area where we are currently allowed to mine is within the GGM concession. We expect to be evicted any day.[6] In the meantime I'm teetering towards poverty. If I don't earn enough money for a week, my family is in big trouble. (S.S.T., 24-year-old married artisanal miner, born in Geita region, primary school educated. Interviewed 10 July 2011).

The service sector was populated primarily by migrants from neighbouring or distant regions who saw Geita as a point of departure for their business career, as described by a young migrant primary school graduate from rural Kilimanjaro.

> I came to Geita town in 2007 after finishing school, hoping to benefit from the opportunities created by GGM. I'm now married with a wife and two children … I started an electronic business, which collapsed, so I switched to selling used spare parts mainly for Japanese cars, supplied from Mwanza city. Lack of reliable customers and very low turnover are problematic … I've bought a plot in Geita town and I'm building a family house in Mwanza city, with the aim of starting a profitable business in Mwanza. I have no plans to stay in Geita or raise my family here. Lots of business people who've managed to accumulate good capital are moving their business to Mwanza or Dar es Salaam in search of better business opportunities.
>
> (F.K., 26-year-old businessman. Interviewed 3 September 2011).

A local 37-year-old bar owner, offered insights into Geita's popular bar culture and contradictory tendencies between economic development and impoverishment. Having witnessed the beginnings of the early establishment of GGM, he was optimistic.

> I came to Geita in 2002. I [received] … on-the-job blasting training … but now I run a bar. The main challenge for my business is capital access from the bank and loans from my customers. Usually customers pay cash on their salary days, then quickly start drinking on a loan basis until their next salary. They are not reliable about paying their debts, which makes my business vulnerable to collapse. Most are local residents, salaried employees, farmers and artisanal miners. The salaried employees working for GGM and government offices are the biggest customers … But if my business becomes profitable, my plans are to continue building a five-room house here in Geita.
>
> (D.K. a 37-year-old, born in a nearby district, married with one wife and three children. Interviewed 3 September 2011).

What is salient in most interviews is the respondent's house-building efforts, particularly in Geita, a large city, where one's housing reflects the degree of comfort and status attained. Table 4 shows marked differences in housing standards between the three settlements.

Standards of housing varied drastically between settlements. Geita's houses of brick or cement with a fixed corrugated roof and more convenient forms of water supply contrasted with Ikuzi's very basic makeshift shelter and own-fetched water supply. Nyarugusu fell between the two, with the advantage of more bedrooms, but far less durable houses made of mud walls and fewer fixed corrugated roofs.

Nonetheless, appearances can deceive. The miners of Ikuzi were in the habit of building houses elsewhere, and averaged 2.4 houses per household head, as opposed to only 1.4 in Nyarugusu and Geita.

This points to the difficulties of comparing household wealth in mining settlements. The mining population's work-related mobility results in their housing assets being spread over different sites. Furthermore, the mining settlements were subject to capital flight and consequent lack of material development over the years.

A local gold buyer and miner reminiscences about the influence of GGM and changes in the nature of artisanal mining.

> I was born in 1961 in Nyamonge village, which today is located within the GGM concession area … GGM employees coming from other areas of Tanzania have had a significant effect on Geita, but locals, who are not employed with GGM, feel left out. Mining has made Geita very different from other settlements without mining activities. The environment is bad. There's too much dust, blasting, poisonous black rain and HIV. Corruption

Table 4. Housing standards and water supply of surveyed households (% averages).

Site	Ikuzi	Nyarugusu	Geita	ALL
No. of households	**36**	**36**	**36**	***108***
Roofing %				
Tarpaulin	91.7	0	0	***31***
Thatched	0	11.1	0	***4***
Makeshift corrugated iron	2.8	13.9	2.8	***7***
Fixed corrugated iron	2.8	66.7	97.2	***56***
Combination or other	2.8	8.3	0	***4***
Walls				
Makeshift	69.4	0	0	***23***
Mud	25	69.4	2.8	***32***
Combination or other	5.6	0	0	***2***
Brick or cement	0	30.6	97.2	***43***
Mean average bedrooms in house	2.0	5.7	4.3	***4.0***
Main form of water supply (%)				
Own fetched	94	3	31	***43***
Purchased from seller	0	39	31	***23***
Neighbour's well	0	41	11	***17***
Own piped supply	0	0	8	***3***
Own well	0	11	17	***9***
Borehole	0	0	0	***0***
Public pipe supply	0	0	0	***0***
Other	6	6	2	***5***

Source: UPIMA survey, 2012.

> within the local government has become rampant … The behaviour of young men in the mines is not good, with lots of alcohol and drug abuse … I would not like my children to become artisanal miners; it is not a healthy job.
>
> On the plus side, many artisanal miners … [especially those who have become] involved with ore processing have managed to buy cars, motorbikes and build houses. The things to spend money on if you are clever are: 1) building a house, 2) school fee payment for your children's education, 3) farming, and 4) investments in shops, bars and guest houses …
>
> I have been able to build a house with five rooms … .I will continue to live in Geita … even though I do not see Geita as a good place to raise a family; it's a place to seek money.
>
> (E.M., 50-year-old local artisanal miner-cum-gold buyer, primary school education, with wife, 3 children and 4 grandchildren. Interviewed 10 July 2011).

Contrasting settlement migration and housing patterns

The preceding survey findings and key informant interviews document: Ikuzi's gold rush in which miners willingly endured physical hardship for profit; Nyarugusu's economic diversification and survival in the face of declining gold availability leading to the settlement's transition into a commercial centre at the service of other gold rush sites; and Geita city's rising supremacy as the fastest growing urban area in Tanzania propelled by the re-establishment of a large-scale international gold mine, alongside marginalization of artisanal mining. The international gold boom of 2000–2013 catalyzed the mobility of the settlement residents. They deliberated on whether they should 'stay or go', based on assessment of the relative locational opportunities and costs of further mobility. Their options were: moving to other gold sites, seeking opportunities and status by moving up the rural to urban mining career ladder or remaining in a hopefully viable settlement for the sake of family, having already made valued *in situ* housing investments.

Since the 2010 gold discovery, Ikuzi residents' focused concentration on gold mining stands out with 69% of household heads engaged in goldmining as a primary activity in 2012 (Table 3). Gold rush miners in Ikuzi were uncertain how long the gold rush would last and whether they would be evicted from the site, so over 90% of them rigged up make-shift rain-proof tarpaulin shelters.

Nyarugusu household heads' occupational profile in 2002 was similar to that of the Ikuzi rush site with 61% engaged in mining (Table 3). By 2012, with a depleting gold supply, mining had slumped to just 42% of primary occupations, on a par with farming. Geita's mining profile almost doubled from 6 to 11% between 2002 and 2012. In this cosmopolitan setting, the service sector expanded, dominating both periods. Interestingly, farming also grew marginally as primary and secondary income sources, hinting that Geita's high cost of living had spawned an underclass unable to make ends meet.

Miners and residents who benefitted from rising gold prices and buoyant service and trade sectors were liable to prioritize investment in better housing (Table 4). This was not evident in Nyarugusu due to the settlement's enlarged scale and advanced stage of mining. A stock of local, self-built houses reflected decades of housing investments in Nyarugusu. No one slept under a tarpaulin. Houses, however, were differentiated between those with permanently fixed corrugated iron roofing as opposed to those with roofs held in place by heavy rocks. In most cases, households had mud as opposed to concrete block walls. The building material quality and permanence of housing in Geita town was superior. Built mostly of brick or cement, only one household had a house with mud walls.

Multiple house ownership in different locations is another indicator of mobility (Table 5). Ikuzi miners had the strongest tendency to own multiple houses, not surprisingly given their makeshift accommodation at mining sites. Their residential anchor was coalescing elsewhere, which applied to traders as well. Everyone tolerated the bad infrastructure on the mining site, trying to make investments for future improved living conditions some other place.

Nyarugusu residents were the least likely to have housing elsewhere, with the exception of miners. Geita tended to have lower house ownership amongst service provisioners and traders. The farmers and retired household heads, registering the highest incidence of additional houses, were household heads who had been born or lived in Geita before the city's gold-led population boom. They had

Table 5. Household heads with multiple ownership of houses (%).

Location	All house-holds	1st owned house	2nd owned house	3rd owned house	4th owned house	5th owned house	Average no. of houses per
Main occupation	Count	%	%	%	%	%	HHH
IKUZI							
Trade	7	*86*	*57*	*14*	*0*	*0*	
Services	3	*100*	*33*	*0*	*0*	*0*	
Farming	0	*0*	*0*	*0*	*0*	*0*	
Mining	26	*92*	*46*	*15*	*4*	*4*	
Retired	0	*0*	*0*	*0*	*0*	*0*	
Total houses owned %		33	17	5	1	1	1.6
NYARUGUSU							
Trade	0	*0*	*0*	*0*	*0*	*0*	
Services	6	*83*	*17*	*0*	*0*	*0*	
Farming	15	*100*	*0*	*0*	*0*	*0*	
Mining	15	*93*	*20*	*7*	*7*	*0*	
Retired	0	*0*	*0*	*0*	*0*	*0*	
Total houses owned %		34	3	1	1	0	1.1
GEITA							
Trade	2	*50*	*12*	*0*	*0*	*0*	
Services	17	*65*	*17*	*0*	*0*	*0*	
Farming	6	*83*	*75*	*0*	*0*	*0*	
Mining	4	*75*	*43*	*0*	*0*	*0*	
Retired	7	*86*	*25*	*14*	*0*	*0*	
Total houses owned %		26	9	1	0	0	1.0
ALL SITES							
Trade	9	*78*	*44*	*11*	*0*	*0*	
Services	26	*73*	*15*	*0*	*0*	*0*	
Farming	21	*95*	*5*	*0*	*0*	*0*	
Mining	45	*91*	*40*	*11*	*4*	*2*	
Retired	7	*86*	*43*	*14*	*0*	*0*	
Total houses owned %		93	29	7	2	1	1.2

Source: UPIMA survey, 2012
HHH - Head of Household

privileged access to land and renting out rooms. In every settlement, miners were most likely to have house investments elsewhere, followed by traders (Jønsson and Bryceson 2017, 2019).

Overall, interviews with residents' revealed disappointment and misgivings about the poor living conditions in their settlements. They saw potential profits of the mining site being tainted by the high cost of living, occupational dangers, environmental pollution, anti-social or immoral behaviour and crime. In short, the gold boom had yet to measure up to the optimistic expectations that had led them to the mining settlement.

Gold boom conundrum: securing a fortune or accommodating reality

Our interviewees provided several rationalizations for living accommodation at a location where, to greater or lesser degrees, they felt uncomfortable, insecure and unable to shelter their families without qualms about their safety and welfare. This included:

First, mining mobility generated trade-offs between work and home life that constrained residential stability and home-making. Perceived housing needs were strongly associated with migrants' age and family life stage. Those in the Ikuzi gold rush site were younger, 50% were unmarried and most of the others had no children. By comparison, married men and dependency ratios in Nyarugusu and Geita were far higher (Table 1), imposing emotional and financial pressures on household heads to provide *in situ* decent, safe housing for their families.

Second, mining opportunities rather than domestic comfort were prioritized. From the outset, individual migrants gravitated to the mining sites to participate in gold-related activities directly as miners or indirectly as entrepreneurs or service providers. Residential accommodation in terms of having a bed and roof over one's head was a 'by the way' practical need, subordinate to their compulsion for 'getting ahead'. Any energy expended on obtaining comfortable accommodation was severely subject to the constraints of time, money and poor housing availability.

Third, mining settlements' inhospitable locations were associated with exasperation and worry about provisioning basic needs in the face of unreliable water supplies and high food prices. Those with families viewed the incidence of prostitution, heavy drinking and crime, as a threat to safety and public morality. Under these circumstances, most residents in Ikuzi and Geita intended to delimit their residence to the time necessary to achieve getting ahead financially or until a more hospitable location with promising economic opportunities materialized elsewhere.

Fourth, multiple house ownership gave families a useful springboard for economic diversification and accumulation strategies, affording them alternative options if and when their economic opportunities waned. Possible options included becoming an urban landlord. Speculative urban housing investment could prove profitable in the long run. Or housing investments in rural homes areas could be used to build up good will and help support extended family members. Investing in housing outside of the mining site afforded an opportunity for successful miners and entrepreneurs to avoid displaying their wealth where it could attract jealousy leading to theft or witchcraft.

Generally, mining was viewed as a source of attraction and revulsion. Migrants actively engaged in mining, trading or service provisioning at mining sites as a means towards the enhancement of their families' material standards of living, realizing that residence in mining settlements could jeopardize family well-being. There was a deep sense of unease with efforts to minimize exposure to the corrupting influences of the mine settlement on families. In other words, many if not most migrants did not feel at home in mining settlements and therefore aimed to earn as much as they could there for eventual investment in house-building at a preferred location.

Returning to Shiller's (2019) thesis, people looking for wealth-enhancing opportunities are enticed by overstated narratives, which in this case were 'gold-gilded'. Shiller (2015) documents bubbles of 'irrational exuberance' bursting as mass movement of investors coalesces to the point where the shared belief in a commodity's spiraling upward value cannot be sustained. A crash is inevitable.

The relevance of Shiller's work to Tanzanian mining settlement residents' experience of the gold boom is two-fold. First, the boom marked a historically unprecedented rise of the gold price beginning in 2000 that eventually experienced a downturn in 2013. Second, miners', service providers' and traders' dash to gold sites constituted bandwagon movement subject to the fallacy of composition. Miners' age-old speculative optimism about gold discovery, thwarted by insufficient geological and practical site-based information, led them to be incapable of distinguishing possibility from high probability. Thus, Tanzania's gold settlement residents were susceptible to crashes.

Our survey and interviews ended in 2012 at the peak of the gold price. In 2013 the international price of gold declined by 38%, bottoming to 57% in 2015 then rose to only 37% below the 2012 nominal value in 2018 (Figure 1). At the time of writing, Tanzania's artisanal and industrial sectors have not experienced a mass crash, as industrial mines are still operating and artisanal miners continue to find gold mining more profitable than most other income-earning opportunities.

Nonetheless, Shiller's crash ending scenario is undoubtedly relevant to some individuals, albeit our sampling of informants at mining sites is the wrong place to encounter such people. People residing at mining sites tend to complain yet retain an optimism that their luck will change, believing they are on a slow but steady trajectory upward or their savings will ultimately ensure them a grand retirement in a desirable location.

The 'dash-cash-crash' gold boom trajectory has to be traced at the level of individual miners, traders and service providers, stage by stage. They gather *en masse* at discovery sites to earn cash. They manage to earn cash through mining, trading or service provisioning. Their welfare depends on earning sufficient cash and spending their earnings wisely on necessities, setting aside some savings

for investment or the proverbial rainy day. Those that do, are likely to start accumulating to afford to build a house. Once they succeed, some continue along this virtuous path with further house building, tending to locate their house-building away from the mining site, with some progressing upwards along the urban hierarchy to small towns, district towns and ultimately the regional capital, Mwanza.

Those unable to adhere to this virtuous cycle of investment, spatial mobility and upward social mobility but nonetheless remain afloat become 'adapters' who 'stay behind' at gold discovery sites. They generally devise diversified work portfolios that combine two or more activities involving mining, agriculture, trade or service provisioning.

Finally, there are those who experience the full 'dash-cash-crash' and have to turn their back on residence in mining settlements. Individuals 'crash' at various stages of mining and settlement. At an early stage, they are likely to be latecomers to the gold rush not able to gain a good position for gold panning or excavation. Others encounter financial breakdown, poor health, theft, loneliness, incompetence or simply bad luck along the way. They are forced to exit, returning home or moving out of the mining zone to seek another livelihood, usually with very little starting capital. Unfortunately, there is no way of estimating how many individuals or entire households crash out since official recording of migrant arrivals and departures at sites does not exist. The 10-year population census interval is too long to be a reliable guide to population change, given a gold rush population inflow could have arrived and departed within that period without trace. Survey findings are not revealing either, because those who crashed and left the surveyed mining site are not on hand to be counted, or report their departure and its underlying causes.

Conclusion

This article has focused on the construction of new livelihoods, settlements and housing amidst high mobility, rapid population agglomeration and urbanization spurred by a 21st century gold boom in northwest Tanzania. Gold booms are a particularly revealing context for the exploration of rationality. They are perceived to promise people material success in challenging unfamiliar environments, necessitating migration and risk-taking,[7] but the risks tend to be irrationally discounted.

Tanzania's gold boom infused irrational exuberance in large numbers of people, who moved towards gold strike sites, spurred by aspirations of achievement and betterment. They formed mass concentrations of people that inevitably generated advantageous economies of scale as well as uneven and clashing welfare outcomes amongst the burgeoning or contracting populations of mining settlements. Spatial mobility was driven by the lure of finding a better mining location.

Despite frequent complaints about material deprivation in the mining settlements and the shortcomings of housing in the transition from tent to houses of temporary or permanent materials, it was evident that many of the surveyed households were benefitting financially and were improving their accommodation circumstances over time. The gold boom contributed to lifting Tanzania out of two decades of entrenched agrarian stagnation between 1980 and 2000. Under the influence of the 2000–2013 gold boom, the primacy of agricultural exports in the country gave way to rising mineral export. Successful gold miners not only built comfortable homes at preferred locations but went on to invest in entrepreneurial ventures in rural and urban areas (Jønsson and Bryceson 2017). Joining Tanzania's expanding middle class, most educated their children for careers that did not involve participation in artisanal mining.

But there are uncounted others, not on hand to be interviewed, who have crashed and returned to their villages or went elsewhere, abandoning mining with a sense of loss and wasted effort. In the absence of state welfare, their most likely option is an agrarian subsistence fallback. Unless their stories are told and reverberate far and wide, 'bandwagon' migration to gold boom sites will continue to hold tantalizing promise for masses of credulous profit-seekers, with unpredictable consequences.

Notes

1. *Urban migration*: Tacoli, McGranahan, and Satterthwaite (2015); United Nations (2018); *International migration*: Massey et al. (1998); Castles (2000)).
2. Latin American cases have been documented as well (Bury 2007; Godfrey 1992).
3. E.g. An '*el dorado*' narrative catalysed the international movement of tens of thousands of miners to the 1848 California gold rush (Rohrbough 1998; Bryceson 2018a).
4. Currently 66% reside in rural areas, decreasing in the context of high national urban growth.
5. See Hilson, Hilson, and Maconachi (2018b) discussion of mining entrepreneurship.
6. The Katoma miners were evicted the following year and their pits back-filled by GGM.
7. Similar patterns exist elsewhere in Africa, Latin America and Asia (Lahiri-Dutt 2018) and there are parallels between 21st century African gold boom sites and 19th century Californian and Australian gold rushes (Bryceson 2018a).

Acknowledgments

We are grateful for the support of the University of Glasgow, the UK Department for International Development (DfID) and the Economic Research Council for funding (ESRC RES-167-25-0488). Thanks go to Crispin Kinabo for his collaboration, the key informants and surveyed miners and residents of the three mine settlements for their willingness to participate in this study.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Deborah Fahy Bryceson http://orcid.org/0000-0002-2136-0078
Jesper Bosse Jønsson http://orcid.org/0000-0002-3894-5427
Mike Clarke Shand http://orcid.org/0000-0002-0085-4896

References

Aizawa, Y. 2016. "Artisanal and Small-scale Mining as an Informal Safety Net: Evidence from Tanzania." *Journal of International Development* 28 (7): 1029–1049. doi:10.1002/jid.v28.7.

Akerlof, G. A., and R. J. Shiller. 2009. *Animal Spirits: How Human Psychology Drives the Economy and Why It Matters for Global Capitalism*. Princeton: Princeton University Press.

Banchirigah, S. M., and G. Hilson. 2010. "De-agrarianization, Re-agrarianizataion and Local Economic Development: Re-orientating Livelihoods in African Artisanal Mining Communities." *Policy Sciences* 43 (2): 157–180.

Bank of Tanzania. 1992-2017. *Annual Reports*. Dar es Salaam: Tanzanian Government Printers.

Botchwey, G., G. Crawford, N. Loubere, and J. Lu. 2019. "South-South Irregular Migration." *International Migration* 57 (4): 310–328. doi:10.1111/imig.12518.

Bryceson, D. F. 2018a. "'Artisanal Gold Rush Mining and Frontier Democracy: Juxtaposing Experiences in America, Australia, Africa and Asia'." In *Between the Plough and the Pick*, edited by K. Lahiri-Dutt, 31–61. Canberra.

Bryceson, D. F. 2018b. "Deagrarianization and Depeasantization in Africa: Tracing Sectoral Transformation and Rural Income Diversification." In *Routledge Handbook of African Development*, edited by T. Binns, K. Lynch, and E. Nel, 368–377. London: Routledge.

Bryceson, D. F., and J. B. Jønsson. 2010. "Gold Digging Careers in Rural Africa: Small-scale Miners' Livelihood Choices." *World Development* 38 (3): 379–392. doi:10.1016/j.worlddev.2009.09.003.

Bryceson, D. F., J. B. Jønsson, and H. Verbrugge. 2013. "Prostitution or Partnership? Wifestyles in Tanzanian Artisanal Gold-mining Settlements." *Journal of Modern African Studies* 51 (1): 33–56. doi:10.1017/S0022278X12000547.

Bryceson, D. F., and D. MacKinnon. 2012. "'Eureka and Beyond: Mining's Impact on African Urbanisation', in Bryceson, D.F. And D. MacKinnon (Eds)." *Journal of Contemporary African Studies* 30 (4): 513–527. doi:10.1080/02589001.2012.719376.

Bury, J. 2007. "Mining Migrants: Transnational Mining and Migration Patterns in the Pervian Andes." *The Professional Geographer* 59 (3): 378–389. doi:10.1111/j.1467-9272.2007.00620.x.

Carstens, J., and G. Hilson. 2009. "Mining, Grievance and Conflict in Rural Tanzania." *International Development Planning Review* 31 (3): 301–326. doi:10.3828/idpr.31.3.5.

Castles, S. 2000. "International Migration at the Beginning of the Twenty-first Century: Global Trends and Issues." *International Social Science Journal* 165: 269–281. doi:10.1111/1468-2451.00258.

Chachage, C. S. L. 1995. "The Meek Shall Inherit the Earth but Not the Mining Rights: The Mining Industry and Accumulation in Tanzania." In *Liberalised Development in Tanzania*, edited by P. Gibbon, 37–108. Uppsala: Nordiska Afrikainstitutet.

Fritz, M., J. Mcquilken, N. Collins, and F. Weldegiorgis. 2018. *Global Trends in Artisanal and Small- Scale Mining*. Winnipeg: International Institute for Sustainable Development.

Geenen, S. 2015. *African Artisanal Mining from the inside Out: Access, Norms and Power in Congo's Gold Sector*. London: Routledge.

Godfrey, B. J. 1992. "Migration to the Gold-mining Frontier in Brazilian Amazonia." *Geographical Review* 82 (4): 458–469. doi:10.2307/215202.

Grätz, T. 2009. "'Moralities, Risk and Rules in West African Artisanal Mining Communities: A Case Study of Northeastern Benin." *Resources Policy* 34: 12–17. doi:10.1016/j.resourpol.2008.11.002.

Hilson, G., A. Hilson, and R. Maconachi. 2018b. "Opportunity or Necessity? Conceptualizing Entrepreneurship at African Small-scale Mines." *Technological Forecasting and Social Change* 131 (131): 286–302. doi:10.1016/j.techfore.2017.12.008.

Hilson, G., A. Hilson, R. Maconachie, J. McQuilken, and H. Goumandakoye. 2017. "Artisanal and Small-scale Mining (ASM) in sub-Saharan Africa: Reconceptualizing Formalization and "Illegal" Activity." *Geoforum* 83 (83): 80–90. doi:10.1016/j.geoforum.2017.05.004.

Hilson, G., and R. Maconachie. 2017. "Formalising Artisanal and Small-scale Mining: Insights, Contestations and Clarifications." *Area* 49: 443–451. doi:10.1111/area.12328.

Hilson, G., T. R. Zolnikov, D. R. Ortiz, and C. Kumah. 2018a. "Formalizing Artisanal Gold Mining under the Minamata Convention: Previewing the Challenge in Sub-Saharan Africa." *Environmental Science and Policy* 85 (85): 123–131. doi:10.1016/j.envsci.2018.03.026.

Jønsson, J. B., P. Appel, and R. T. Chibunda. 2009. "A Matter of Approach: The Retort's Potential to Reduce Mercury Consumption within Small-scale Gold Mining Settlements in Tanzania." *Journal of Cleaner Production* 17 (1): 77–86. doi:10.1016/j.jclepro.2008.04.002.

Jønsson, J. B., and D. F. Bryceson. 2009. "Rushing for Gold: Mobility and Small-scale Mining in East Africa." *Development and Change* 40 (2): 249–279. doi:10.1111/dech.2009.40.issue-2.

Jønsson, J. B., and D. F. Bryceson. 2017. "Beyond the Artisanal Mining Site: Migration, Housing Capital Accumulation and Indirect Urbanization in East Africa." *Journal of Eastern African Studies* 11 (1): 3–23. doi:10.1080/17531055.2017.1287245.

Jønsson, J. B., and D. F. Bryceson. 2019. "Getting Grounded? Miners' Migration, Housing and Urban Settlement in Tanzania, 1980-2012." *Extractive Industries and Society* 6 (3): 948–959. doi:10.1016/j.exis.2019.05.007.

Keynes, J. M. 1936. *The General Theory of Employment, Money and Interest*. London: Macmillan.

Kindleberger, C. 1978. *Manias, Panics and Crashes: A History of Financial Crises*. London: Macmillan.

Kulindwa, K., O. Mashindano, F. Shechambo, and H. Sosovele. 1998. *Mining for Sustainable Development in Tanzania*. Kitco.com (Accessed 13 January 2019). Dar es Salaam: Dar es Salaam University Press.

Lahiri-Dutt, K., ed. 2018. *Between the Plough and the Pick: Informal Mining in the Contemporary World*. Canberra: Australian National University Press.

Lange, S. 2011. "Gold and Governance: Legal Injustices and Lost Opportunities in Tanzania." *African Affairs* 110 (439): 233–253. doi:10.1093/afraf/adr003.

Maclin, B. J., J. T. D. Kelly, R. Perks, P. Vinck, and P. Pham. 2017. "Moving to the Mines: Motivations of Men and Women for Migration to Artisanal and Small-scale Mining Sites in Eastern Democratic Republic of the Congo." *Resources Policy* 51: 115–122. doi:10.1016/j.resourpol.2016.12.003.

Maconachie, R., T. Binns, P. Tengbe, and R. Johnson. 2006. "Temporary Labour Migration and Sustainable Post-conflict Return in Sierra Leone." *GeoJournal* 67 (3): 223–240. doi:10.1007/s10708-007-9056-1.

Massey, D., J. Arango, H. Graeme, A. Kouaouci, A. Pellegrino, and J. E. Taylor. 1998. *Worlds in Motion: Understanding International Migration at the End of the Millennium*. Oxford: Clarendon Press.

Okoh, G., and G. Hilson. 2011. "'poverty and Livelihood Diversification: Exploring the Linkages between Smallholder Farming and Artisanal Mining in Rural Ghana'." *Journal of International Development* 23 (8): 1100–1114. doi:10.1002/jid.v23.8.

Ouoba, Y. 2017. "Artisanal versus Industrial Mining: Impacts on Poverty in Regions of Burkina Faso." *Mineral Economics* 30 (3): 181–191. doi:10.1007/s13563-017-0117-8.

Rohrbough, M. J. 1998. *Days of Gold: The California Gold Rush and the American Nation*. Berkeley: University of California Press.

Shiller, R. 2015. *Irrational Exuberance*. Princeton: Princeton University Press.

Shiller, R. 2019. *Narrative Economics*. Princeton: Princeton University Press.

Tacoli, C., G. McGranahan, and D. Satterthwaite. 2015. *Urbanisation, Rural-urban Migration and Urban Poverty*. London: IIED Working Paper.

Tanzania. 2011. "Draft Final Report on Baseline Survey on Artisanal and Small-scale Mining (ASM) Activities." In *Consortium of MTL Consulting Co., Tan Discovery Mineral Consulting Co. and Paulsam Geo-Engineering Co., World Bank Credit Support no. 4584-TA*.

UNCTAD. 2015. *Commodities at a Glance: Special Issue on Gold*. Geneva: United Nations.

UNDP. 2019. *Human Development Indicators and Indices: 2018 Statistical Update*. New York: United Nations Development Programme.

United Nations 2018. *Sustainable Cities, Human Mobility and International Migration*. New York, USA. Accessed 1 June 2019. (undocs.org).

Urry, J. 2000. *Strangers in the Ethnic Homeland: Mobilities of the 21st Century*. London: Routledge.

US Geological Survey. 2012. "IndexMundi." Accessed 13 December 2019. https://www.indexmundi.com/minerals/?product=gold

Verbrugge, B., and S. Geenen. 2019. "The Gold Commodity Frontier: A Fresh Perspective on Change and Diversity in the Global Gold Mining Economy." *Extractive Industries and Society* 6 (2): 413–423. doi:10.1016/j.exis.2018.10.014.

Werthmann, K. 2009. "Working in a Boom-town: Female Perspectives on Gold Mining in Burkina Faso." *Resources Policy* 34 (1–2): 18–23. doi:10.1016/j.resourpol.2008.09.002.

World Bank 2015. "IDA Project Paper on Proposed Additional Credit to the U.R. of Tanzania for the Sustainable Management of Mineral Resources Project." In *Report no. PAD 1177*.