FROM COERCION TO COMPENSATION
INSTITUTIONAL RESPONSES TO LABOUR SCARCITY IN THE CENTRAL AFRICAN COPPERBELT

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From Coercion to Compensation

Institutional responses to labour scarcity in the Central African Copperbelt*

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Abstract

There is a tight historical connection between endemic labour scarcity and the rise of coercive labour market institutions in former African colonies. This paper explores how mining companies in the Belgian Congo and Northern Rhodesia secured scarce supplies of African labour, by combining coercive labour recruitment practices with considerable investments in living standard improvements. By reconstructing internationally comparable real wages we show that copper mine workers lived at barebones subsistence in the 1910s-1920s, but experienced rapid welfare gains from the mid-1920s onwards, to become among the best paid manual labourers in Sub-Saharan Africa from the 1940s onwards. We investigate how labour stabilization programs raised welfare conditions of mining worker families (e.g. medical care, education, housing quality) in the Congo, and why these welfare programs were more hesitantly adopted in Northern Rhodesia. By showing how solutions to labour scarcity varied across space *and* time we stress the need for dynamic conceptualizations of colonial institutions, as a counterweight to their oft supposed persistence in the historical economics literature.

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1. Introduction

This paper explores how copper mining companies in the Central African Copperbelt - in cooperation or conflict with the respective colonial governments of Belgian Congo and Northern Rhodesia - secured mining labour in a context of endemic labour scarcity. From the start of mining activities under colonial rule (c. 1910) to the first years of independence (c. 1970) hundreds of thousands of African workers were involved in its operations. Yet, at the onset of copper mining activities this area was very lowly populated and the majority of subsistence farmers had little incentives to engage in contract labour, certainly not if this implied dislocation, partition of families, harsh working conditions and heightened mortality risks. The atrocities committed during the rubber and ivory campaigns in the Congo Free State made the activities of European mining companies highly suspect. When the mining industry eventually took off, first in the Belgian Congo (c. 1910 in the Katanga province) and some fifteen years later in Northern Rhodesia (c. 1925 in the Copperbelt province), new opportunities arose for local farmers to supply the mines with food in order to prevent the supply of wage labour. In the face of these disincentives, mining companies either had to use the stick to push African labour into the mines with force, or use the carrot, by sharing a substantial part of the copper receipts.

In the historical economics literature on the legacies of colonial rule in Africa, institutions mediating the extraction of labour, land and natural resources are often portrayed as having persistent long-term effects on economic and political development (La Porta et al. 1999, Acemoglu et al. 2001, Banerjee and Iyer 2005, Huillery 2011). However, the case of institutional responses to labour scarcity in the Central African Copperbelt demonstrates how colonial systems of labour coercion were transformed into systems of labour compensation as mining enterprises expanded production and desired higher investments in a stable, healthy and better trained workforce. As opposed to their oft supposed 'persistence', we seek to understand why labour market institutions went from coercion to compensation, and why institutional responses to labour scarcity varied across the colonial border. By documenting the changing combination of extractive and inclusive aspects in these emerging labour relations, we stress the importance of dynamic conceptualizations of colonial institutions.

In theory, when people refuse to voluntarily offer their labour at a given rate of remuneration, be it cash or in-kind wages, employers may resort to coercion if they possess sufficient power to enforce credible sanctions against non-compliance. Direct enforcement at 'gunpoint' is the clearest example. Indirect forms of coercion operate via constraints on alternative means of economic reproduction, for instance by land dispossession, by cutting-off existing trade relations or by imposing heavy monetary taxes. All these forms of coercion require institutional back-up by colonial authorities. The alternative strategy to 'proletarianize' labour is by offering wages above prevailing market rates, and guarantee living conditions that compensate for the sacrifices that workers (and their families) incur if they move into the mining compounds. Various scholars have documented how institutionalized forms of labour coercion in the Copperbelt area were partly transformed into, and partly complemented by, new forms of labour compensation, especially through the so-called labour stabilization programs (Perrings 1979, Parpart 1983, Cooper 1996, pp. 45-50; Ferguson 1999, Buelens 2007, Butler 2007, Houben and Seibert 2013). However, much less attention has been paid to the question why there were considerable differences in the institutional arrangements adopted in the Congo and Rhodesia to mediate the supply of labour and how these differences evolved over time.

We compute internationally comparable series of real wages of African copper mine workers to trace the temporal development of mine-workers' remuneration. Due to the recent surge in real wage studies of the colonial era, there are now several points of reference for assessing comparative levels and trends of copper mine worker's incomes, including payments in kind (Bowden et al. 2008, de Zwart 2011, Frankema and van Waijenburg 2012, de Haas 2015, Bolt and Hillbom 2015). Following the real wage methodology developed by Allen (2001, 2014), which uses standardized consumption baskets to compare the purchasing power of an annual adult male's wage income, we find that African copper mine workers' wages underwent impressive rises and that around the 1940s Copperbelt miners were among the best paid manual labourers in Sub-Saharan Africa. Our series also reveal that trends and levels of remuneration in the Congolese and Rhodesian mines were quite similar, suggesting that wage competition or wage coordination was at play. However, the quality of other welfare facilities such as medical care, schooling and housing was considerably higher in Katangese mines than in most of the Rhodesian mines, a difference that can be attributed to the wholehearted embracement of labour stabilization programs in the Belgian Congo, and a more hesitant adoption in Northern Rhodesia.

Both the quantitative and qualitative parts of this study derive form a wide range of primary historical sources such as individual company records, the monthly and annual reports of the Native Labour Department of the Belgian mining company Union Minière du Haut Katanga, the Year Books of Northern Rhodesia's Chamber of Mines, correspondence between company management and the government and between managers of different mining companies, reports of health inspectors, reports of the vice Consul of Northern Rhodesia in Katanga and the reports of the Inspector for Northern Rhodesian Natives in Katanga.[1]

We proceed in section two with a concise historical overview of the evolution of the mining industry in the Central African Copperbelt. In section three we discuss the practice of forced labour recruitment up to the temporary labour demand fall-out during the depression of the early 1930s. In section four we present our comparative real wage series. In sections five and six we analyse the Katangese-Rhodesian differences in other welfare conditions. Section seven concludes.

[1] For information on prices we also use British and Belgian trade statistics for Zambia and the Belgian Congo.

2. Copper mining in the Belgian Congo and Northern Rhodesia, c. 1900-1970

Copper constituted the backbone of the colonial and post-colonial economies of Northern Rhodesia (Zambia) and the Belgian Congo (Congo/Zaïre). At the eve of independence in 1960, copper produced in the Katanga province of the Belgian Congo accounted for 45% of total export value, and 8% of total world production (Northern Rhodesian Chamber of Mines Year Book 1960). In Northern Rhodesia, copper even generated more than 90% of total export value in 1964, and with ca. 12% of the world market this country became the second largest producer of copper after the US (Copperbelt of Zambia Mining Industry Yearbook 1964). In the wake of expanding mining operations considerable manufacturing sectors emerged and the once so remote Copperbelt region became home to vast concentrations of mine workers and their families, who settled in and around the mining compounds (Perrings 1979, Ferguson 1999, Buelens and Cassimon 2013, Austin et al. 2016).

Already in the mid-19th century European explorers had noted the use of copper in local ornaments, but in the 1890s missionaries started to popularize the mineral wealth of Katanga in their travel reports, raising the interest of British prospectors (Coleman 1971, Berger 1974). When the region came under control of the Belgian King Leopold II, he entrusted the administration of Katanga to a private company (*Compagnie du Katanga*), which was turned into the *Comité Spécial du Katanga* (CSK) when the colonial state took a majority share in the mineral concessions.[2] Unable to attract Belgian investors, the CSK joined forces with Robert Williams in 1900. Williams was a Scottish engineer who had also obtained prospecting rights in Northern Rhodesia (Katzenellenbogen 1973, p. 31). In 1906, the *Union Miniere du Haut Katanga* (UMHK) was founded as a result of a merger between the CSK and William's *Tanganyika Concessions Ltd*.[3] When Leopold II resigned and the Belgian state took formal control over the Congo in 1908, the semi-autonomous state of Katanga province was maintained and the UMHK retained its monopoly on copper mining for the entire colonial era.[4] Production started in 1912 and by the late 1920s the Belgian Congo had become the world's third largest copper exporter, accounting for c. 6% of world output (Perrings 1979). Through its holding in the CSK, the colonial state retained the

[2] Although Katanga had been assigned to the Belgian King Leopold II at the Berlin Conference of 1884-5, the condition of "effective occupation" stipulated in the Berlin Act demanded the signing of treaties with local chiefs and a permanent presence of government officials and police forces. Leopold's Congo Free State (CFS) and Cecil Rhodes' British South Africa Company (BSAC), the concession company that ruled over Northern Rhodesia until 1924, started a race to put up their flag in Katanga. Although the BSAC managed to sign a treaty with the local ruler *Msiri* first, this ruler was shot by a CFS expedition and the CFS proceeded to establish military control over the region (Perrings 1979, p.9).

[3] The company that had the monopoly in ore extraction and administrative power in Katanga was thus a merger between Belgian and British companies. However, Leopold II stipulated that it was to become a Belgian company in which at least 50% of employees had to be Belgians, and 60% of the material necessary for the exploitation of copper should be produced in Belgium. In addition, half of the mines' production should be exported to Belgium (Guene 2013, p. 71). In the 1960s the company became entirely Belgian.

[4] ZCCM Archives, 14 1 5A: "Report on study tour of Union Miniere Organization at Elisabethville, 1958".

rights to two-thirds of all profits generated by the mines and the Congolese railways and by 1958 the state still held c. 60% of the shares (Perrings 1979).

In Northern Rhodesia deposits of lead, zinc and copper were discovered in 1902, but large-scale investments in mining operations were halted until the mid-1920s, some fifteen years later than in Belgian Congo. Rhodesian copper deposits consisted of oxide ores yielding 3-5% pure copper, which were more costly to extract and refine than the 15-25% yields of the Katanga reserves. When the British Colonial Office took over control in Northern Rhodesia from the British South Africa Company (BSAC) in 1924, the BSAC retained its mineral concessions[5].

Until the mid-1920s Northern Rhodesia merely functioned as a labour reserve for mines and plantations in Katanga and Southern Rhodesia. The colony was also of strategic importance for food and coal supplies to the Katanga mines, for copper transports to coastal harbours and for railway connections with other parts of southern Africa[6]. The BSAC eventually succeeded in attracting two major investment groups to prospect and exploit the Rhodesian copper reserves: Beatty's *Selection Trust Limited*, a British concern with American financial and technical backing, and Sir Ernest Oppenheimer's *Anglo-American Corporation of South Africa*[7]. These companies discovered sulphide deposits containing copper ore which could be extracted with a new floatation process (Burdette 1990, p. 80). By 1930, four large mines were under construction: Roan Antelope (now Luanshya), Nkana (in Kitwe), Mufulira and Nchanga. The first copper was produced in Roan Antelope in 1931 and Nkana followed in 1932. Manufacturing

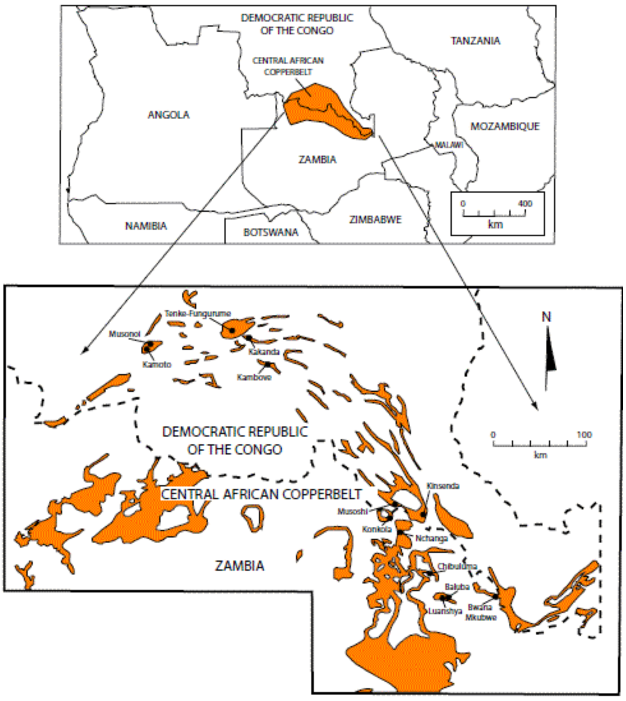
[5] The white settler community had pushed for this move hoping that it would be easier to voice their demands to the Colonial Office than to the BSAC. The BSAC in turn, was not vehemently opposing the handover since Northern Rhodesia had, until then, been a permanent drain on the company's accounts. The colony exported fewer goods than any other British colony except Nyasaland, so that tax receipts never sufficed to cover expenses of territorial control and administration (Burdette 1990).

[6] Before the completion of the Congo railway in 1931, all the copper from Katanga was exported via the Rhodesia Railways – then owned by the BSAC - to the port of Beira in Mozambique. The coal and coke needed for the mining operations was imported from a colliery south of the Victoria Falls in Northern Rhodesia. White farmers, mainly Afrikaners from South Africa, who had settled along the railway line that ran from Livingstone to Broken Hill in Northern Rhodesia supplied grain and beef to the Katanga mines. The Luapula, an African tribe living in the border region, specialized in the supply of fresh and dried fish. In 1917, Northern Rhodesia banned exports to Katanga and the Congo government was left with no other option than to promote African peasant production in Katanga to supply the mines. Attempts to attract Belgian farmers in the region had been jeopardized by tsetse flies (Perrings 1979, p. 146). In the 1920s, the UMHK looked for new supply areas in the interior of the colony connected by new railway lines, especially to the province of Kasai. Several grain mills and meat producing farms accommodated the increasing food demands of Katanga, but also cement industries and hydroelectric power plants. In the late 1920s, the new Governor of Katanga strived to make Katanga self-sufficient in food production, by calling in agricultural experts, importing cattle, and by setting up experimental farms and gardens cultivated by indigenous inhabitants (Burdette 1990).

[7] Edmund Davis, an associate of Rhodes, had discovered copper and lead in 1902 and staked copper claims for the mines of Roan Antelope, Rietbok and Bwana Mkubwa. He started in the 1920s by looking for financiers for the Bwana Mkubwa mine and found an interested investor. A. Chester Beatty, with his company from New York, the Selection Trust Limited. Sir Ernest Oppenheimer, who had founded the Anglo American Corporation of South Africa in 1917 also assisted in 1924. Beatty invested in the Roan Antelope and Mufulira mines and formed the Rhodesian Selection Trust as a holding company for activities in Northern Rhodesia. Oppenheimer's corporation developed the Nkana and the Nchanga mines, forming Rhokana Corporation Limited in 1931 to manage it (Parpart 1983).

plants were built to supply the mines with food, beverages, and tobacco, as well as to smelt and refine the ore on site. The two concession companies remained in control of the copper industry until 1970, when the Zambian Government took a 51% stake in the mines (Berger 1974).

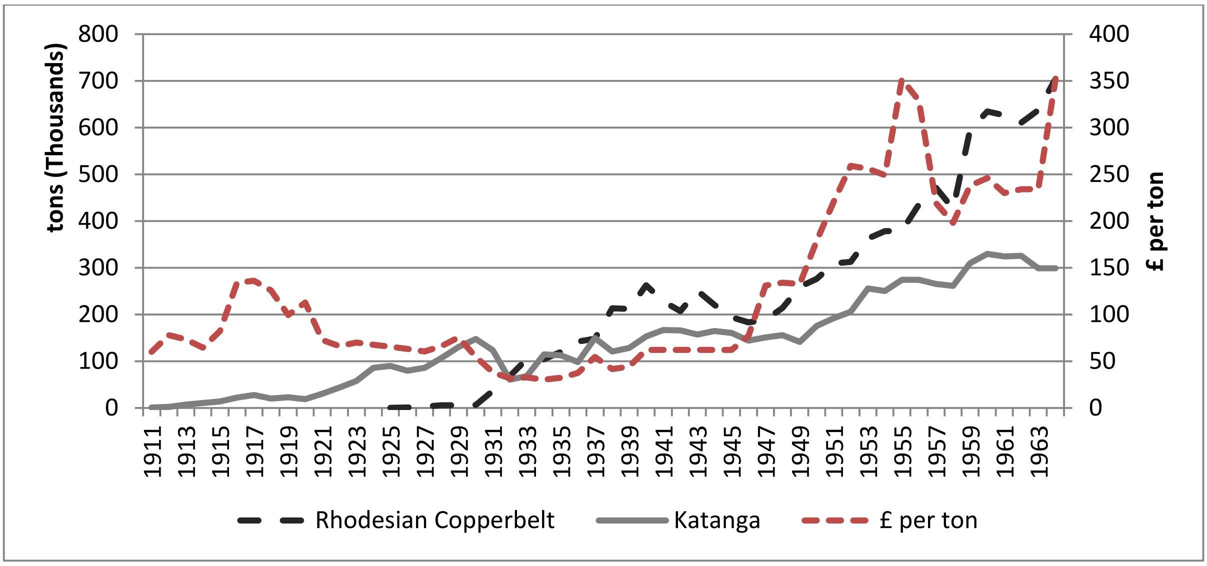
Figure 1: Map of copper deposits in the Central African Copperbelt



Source: Taylor, C.D., Schulz, K.J., Doebrich, J.L., Orris, G.J., Denning, P.D., and Kirschbaum, M.J., 2009, Geology and nonfuel mineral deposits of Africa and the Middle East: U.S. Geological Survey Open-File Report 2005–1294-E.

Due to rising demand from expanding automobile and electric industries in Europe and North America, copper prices had a solid floor in the 1920s, but right at the time the first Rhodesian copper was produced, the great depression hit world markets. Copper prices plummeted from 24 cents per pound in 1929 to 6.25 cents at the end of 1931 and the mines had to drastically scale-down their operations (Ferguson 1999). In Northern Rhodesia, the Bana Mkubwa lead mine, the Broken Hill zinc mine, and the copper mines of Nchanga and Mufulira all closed down just after they had started production. Construction work at Roan Antelope and Nkana was put on hold. The number of African employees which had reached a peak of 31,941 during the construction boom in September 1930, dropped to 19,313 in September 1931 and to 6,677 by September 1932 (Ferguson 1999). Output from the UMHK fell from 150,000 tons in 1930 to 60,000 tons in 1932 and the African labour force was reduced by over two-thirds, from an average of 18,517 workers in 1930 to 5,065 in 1932.

Figure 2: Copper production in thousands of tons and copper prices in £ per ton, 1911-1964



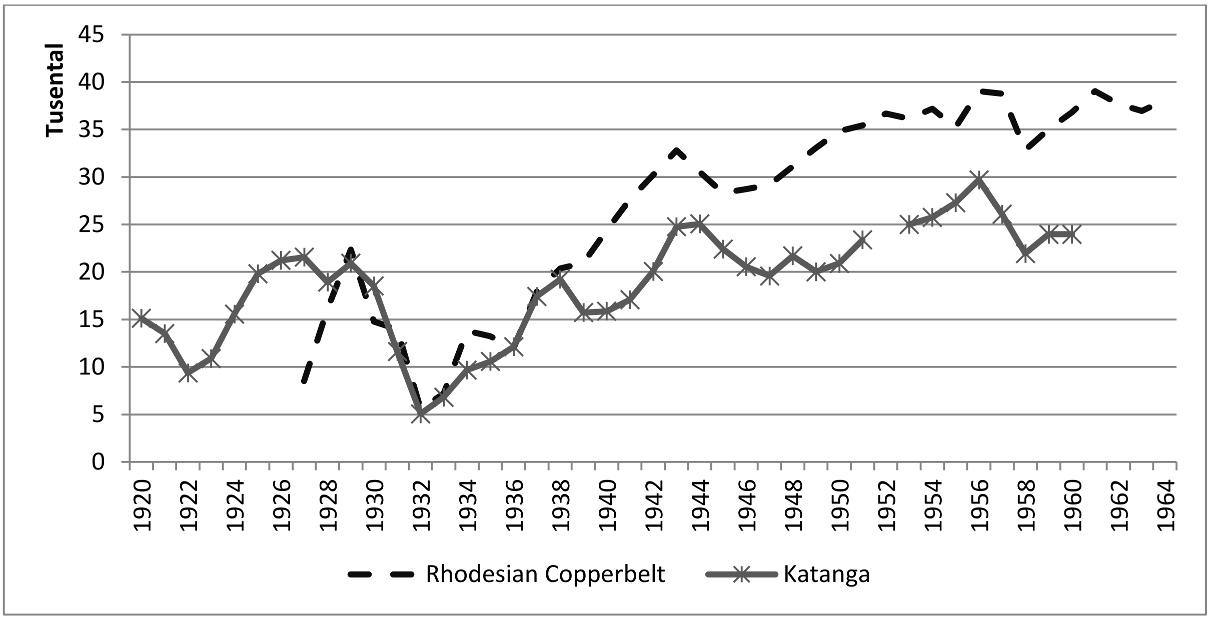
Sources: Sauerbeck (1953) for average annual copper prices; for copper production in Congo and Northern Rhodesia: Blue Books of Northern Rhodesia, Northern Rhodesian Chamber of Mines yearbooks, Statistical Yearbooks of Belgium and the Belgian Congo and Perrings (1979, p. 248-249).

The industry recovered quickly. Most of the mines in Northern Rhodesia were in operation again by October 1933. Copper price trends reverted and production doubled between 1935 and 1943 in the Rhodesian Copperbelt. Stimulated by heightened war demand, the mining labour force in the Rhodesian Copperbelt surpassed 30,000 in 1942 and reached a peak in Katanga of 25,000 in 1944 (see Figure 3).[8] With the availability of new techniques such as the floatation process, as well innovations in techniques of underground mining, the scale of operations in Northern Rhodesia could grow far beyond the surface mining operations in the open pit mines of the UMHK. Rhodesian output levels overtook the UMHK during the Second World War and by 1960 almost doubled production in the Katanga mines: 634.000 versus 329.000 tons (see Figure 2).

Production in the Copperbelt reached its zenith in the 1950s and 1960s. The ‘golden age’ of post-war growth in Europe and the Korean war boom of 1953 reinvigorated international demand for copper. Production expanded, profits rose and rising wages and consumption demand spilled over into local economic sectors. The Vietnam war again boosted copper prices and from 1963 to 1964 alone copper exports rose by 50% in the Congo and by 66% in Northern Rhodesia. The mining labour force expanded up to the beginning of the mid-1950s (see Figure 3) and urbanization rates rose as more and more families settled permanently in the region. The tide turned with the first oil crisis in 1973. Copper prices started to decrease and they did not recover until the mid-1990s. The Vietnam war had ended, the world economy went into a prolonged recession and industrial substitutes for copper, such as optical fibres for telecommunications, gained terrain.

[8] Possibly, the mines of Northern Rhodesia already engaged more indigenous workers much earlier than that, because the ore needed more unskilled labour to be processed than the ore in Katanga.

Figure 3: Average annual no. of African copper mine workers in Katanga (UMHK) and the Rhodesian Copperbelt



Sources: UMHK - Main d'oeuvre Africaine, Year Books and Northern Rhodesia's Chamber of Mines Year Books

As the budgets of both colonial and early post-colonial states had come to depend heavily on copper revenues, the collapse of copper prices exposed the classic resource curse mechanisms.[9] According to Buelens and Cassimon (2013), the Congo also lacked sufficient human capital to keep the mining sector going after independence, as bars on higher education for Africans in colonial times had seriously limited supplies of high skilled workers (see also Frankema 2013). Hence, when Mobutu decided to nationalize the copper mines in 1966-7, the Congo still had to call-in technical assistance from the Belgian-controlled UMHK to operate the mines. Political instability during the first years of independence scared off foreign investors. The Katanga secession war caused severe damage to infrastructure, disrupted production and ended with the Mobutu dictatorship in 1965. The war of liberation in the neighbouring Portuguese colony of Angola led to the closing of the Benguela railroad, cutting off Katanga from export markets and from imports of machinery and petroleum.

The collapse of copper prices was equally detrimental to the Zambian economy. In 1969, president Kenneth Kaunda, stirred up a conflict with the two mining companies over royalties and investments

[9] In 1957, taxes paid by the copper industry contributed to around 31% of fiscal revenue in the Federation of Rhodesia and Nyasaland (in 1960 it was around 22.5%). In the 1950s and 1960s, copper represented around 60% of exports of the Federation (Northern Rhodesia Chamber of Mines Yearbooks) and over 50% of Zambian government revenue were derived directly from the copper industry (Copperbelt of Zambia Mining Industry Year Book of 1964). For the Congo such estimates are harder to give, but there is no doubt that copper kept both the colonial and early post-colonial state on its feet (Abbeloos 2013).

and responded by reverting all rights of ownership of minerals as well as exclusive prospecting and mining licenses to the state. After de facto nationalisation the companies were merged into the Zambia Consolidated Copper Mines (ZCCM) in 1982. Although the first decade of independence after 1964 had seen considerable economic progress, developments abated when the price of copper collapsed. The Zambian government was forced to borrow in order to maintain public services and social provisions and when interest rates shot up after the second oil crisis in 1979, the country was dredged into a longstanding crisis, as so many other African countries. In the twenty years between 1974 and 1994, copper prices continued to fall relative to import prices. Per capita incomes declined by 50%, turning Zambia into one of the poorest countries in the world (Maddison 2010).

3. Labour recruitment by the UMHK before the Great Depression

The biggest challenge faced by the UMHK in the first two decades of its existence was to secure a steady supply of 10 to 20 thousand mining workers in an area with dispersed settlements of subsistence farmers who had virtually no incentives to take up work in the mines. The UMHK resorted to aggressive practices of labour recruitment, which were actively supported by an invested colonial state. In 1910, a government assisted recruiting agency, *the Bourse du Travail de Katanga* (BTK, later OCTK), was founded to recruit labour within the Congo, and especially in the central province of Kasai and the Lomami district in Katanga. In cooperation with local chiefs, colonial officials determined how many men could be recruited per village and the chiefs received compensation for each recruit.[10] The colonial government also raised hut and poll taxes to enhance wage labour supplies and imposed an identification system to trace defaulting workers.[11] The colonial state legitimized forced recruitment by a need to defeat "African laziness" (Houben and Seibert 2013). According to David Northrup recruitment activities followed a standard routine:

> "a recruiter from the mines went around to each village chief accompanied by soldiers or the mines' own policemen, presented him with presents, and assigned him a quota of men (usually double the number needed, since half normally deserted as soon as they could). The chief then rounded up those he liked the least or feared or who were least able to resist and sent them to the administrative post together by the neck. From there they were sent on to the district headquarter in chains... Chiefs were paid ten francs for each recruit" (cited in Hochschild 1998, p. 275).

[10] Another measure of the state to push indigenous into wage labour was the imposition of poll taxes. Increases in poll taxes were often connected to labour shortage in area. Furthermore, to discourage participation in the agricultural sector (with the consequence of pushing into wage labour), forced cropping and market restrictions were introduced; products had to be sold at fixed prices (Houben and Seibert 2013).

[11] Archives Africaines; M.O.I. 3547 (24): Report of the ministry of the colonies, Brussels, year 1919.

Recruited workers frequently deserted during the journey to the mines or shortly after arrival. According to official reports the most common causes for desertion were the desire to return with their families, especially to their wives; the high death rates among workers; the way indigenous workers were treated (payment issues, morbidity, physical punishment); the low quality nourishment; and the "mentality of the blacks".[12] Labourers from the central area of the Congo also had difficulties to adapt to the mountain climate of Katanga. In 1913-1917 annual mortality rates of mining workers ranged from 70 to 140 per 1,000 (Roberts 1976).

Despite the widespread use of force and repression, this recruitment system did not meet the demands for labour by the UMHK. Up to 1925, about half of the mine workers were recruited outside the Congo, in Northern Rhodesia, Mozambique, Nyasaland, Angola and Barotseland (see Table 1). The BSAC permitted labour recruitment for the Katanga mines in Northern Rhodesia because they provided traffic for the railways passing through the company's territory (Perrings 1979). Moreover, since there were limited opportunities for commercial agriculture - also because white farmers were given preference – the wages earned by labour migrants across the border enhanced the possibility to raise local taxes.

Table 1: Origin of labourers at the UMHK in percentages

	Rhodesia	Barotse	Angola	Congo	Nyasa and others	Rwanda-Urundi	Total of Foreigners
1920-1922	48.8	1.9	2.8	43.2	3.4		56.8
1923-1925	41.4	0.5	2.6	53.0	2.5		47.0
1926-1927	22.6	4.3	2.7	62.2	2.5	5.8	32.0
1928-1930				60.0		14.7	25.3
1931-1940				82.3		5.7	12.1
1941-1950				88.9		1.2	9.8
1951-1960				79.1		13.8	7.2

Source: UMHK - Main d'oeuvre Africaine, Year Books

Labour migration from Northern Rhodesia into Katanga was regulated by inter-state contracts arranging the posting of a permanent *Inspector of Rhodesian Labour* at the largest mine, the "Star of the Congo"/ Lumumbashi (until 1933), and giving Williams & Co. the exclusive right of labour recruitment in Northern Rhodesia. These contracts also stipulated that workers had to return to their home village at the end of their terms, where they would receive the last part of their wage according to the so-called "deferred pay system". This agreement guaranteed that Rhodesian workers were able to fulfil their

[12] Another report of the ministry of the colonies shows that one solution to the "labour crisis" that the ministry proposed - as a response to requests of the mining industry- was to raise the indigenous taxes, for which an identification system of the indigenous should be set in place (Archives Africaines M.O.I. 3547 no. 24). In 1919 a Dactyloscopic identity system had been introduced (Letter from the Minister of the colonies to General Governor, Archives Africaines, M.O.I. 3547 no. 24).

domestic tax obligations. Mine workers received contracts for 30 shifts to be fulfilled in a period of 35 to 40 days. The employer marked the completion of each days' work on a ticket. Salaries were paid after 30 shifts were completed. Workers were allowed to complete six tickets of 30 shifts and could prolong for another six tickets, but most of them didn't. A 1917 report by the inspector of Rhodesian Natives in Katanga states with regard to recruitment in North Eastern Rhodesia that,

> "their contract is for a period of seven months, and they actually work six tickets of thirty days – the extra month being added to allow for time spent in travelling and for occasional days off for sickness. Although Messrs. Robert Williams are authorised to recruit up to 400 natives on a nine or twelve month's contract, none have actually been engaged. The natives prefer the shorter period. Very few re-engage for a further six months after the expiration of their term of service."

By 1920 labour migration streams were well established and steadily growing; Rhodesians had a good reputation in Katanga for their accumulated experience. Official correspondence of the Belgian foreign office started to voice some concerns about violent recruitment practices in the Congo, Northern Rhodesia and Angola.[13] A 1919 report by Dr. Fisher, a missionary doctor in charge of the medical check of recruits, denounced the "brutalities perpetuated on natives" carried out during recruitments in Angola by Williams & Co. (see also Perrings 1977, p. 244-245). A 1925 report of the colonial government comments on the gap between laws and practices of labour recruitment stated: "Le recrutement par loi ne peut pas être forcé contre volontés de l'indigène, mais en pratique ils ont été forcé par les recruteurs"[14]. However, despite these concerns, the Belgian Congolese government in 1922 legalized the use of physical violence, such as whipping, to force workers to fulfil their labour contracts (Perrings 1979, Houben and Seibert 2013).

Indeed, it were not the concerns with coercive practices of labour recruitment that barred the regular flows of labour migrants to the Katanga copper mines, but rather the new prospects of mining operations at the Rhodesian side of the Copperbelt border. During the First World War, labour recruitment in Northern Rhodesia had been banned temporarily because of the heightened need for army recruits. Yet, from 1925 onwards the Rhodesian government imposed a permanent quota system, to retain labour resources within the colony. Table 1 shows how quickly the shares of "foreign" workers decreased in the Katanga mines, from ca. 60% in the early 1920s to about 10% in the 1940s. As we will show in the

[13] The office remarks that labour scarcity ought to be tackled by introducing labour-saving technology and by taking better care of mine workers, by selecting only the healthiest, by transporting workers in the best possible conditions, by providing adequate housing, clothes, nourishment and medical assistance. The office also asked for the duration of contracts to be extended to at least 6 months (letter of the colonial government to the mining companies' administration in 1920, Archives Africaines, M.O.I. 3547 no. 26).
[14] *Archives Africaines* M.O.I. 3548 no. 33

next section, there was a strong upward pressure on wages in the late 1920s which ended with the Great Depression.

The Great Depression further turned the prevailing system of labour recruitment on its head. The collapse of copper prices temporarily relieved the UMHK from chronic labour shortages. In some respects this was a repetition of the situation during the First World War, when copper production stagnated in the wake of declining copper prices.[15] Given the acute oversupply of mining labour, absenteeism and desertion rates dropped sharply and the mining companies could afford to disregard living conditions of Africans in the compounds. According to Parpart (1983, p. 49), the rate of accidents at work increased in the early 1930s. Confronted with competition for labour by the Rhodesian mining companies, the UMHK decided to stop recruiting outside the Congo and the mandated territories of Ruanda and Urundi all together in 1931 and to reduce the bargaining power of mining labour, the mining companies agreed in 1932 to coordinate wages.[16]

After the depression, forced recruitment of labour was unnecessary in the Rhodesian Copperbelt, since migrant workers came to the mines on their own initiative. The new underground mines that had to rely on more capital and skill-intensive technology, such as Roan Antelope, run by the Rhodesian Selection Trust, offered higher wages and better housing conditions in order to secure the scarcer supply of skilled workers. The costs of the recruiting agency, transport, housing and food during the journey to the mines, as well as the taxes that had to be paid in foreign countries, could be saved and invested in workers' wages to attract migrant labourers on a voluntary basis.

The long-term consequences of the depression for labour relations in Katanga were different however. Confronted with the loss of the Rhodesian pools of migrant labour, the UMHK had to continue to recruit labour from within the Congo until the 1960s, albeit under more humane conditions[17]. Perrings (1979) has estimated that from 1930 onwards around 5% of the UMHK workforce was supplied through pro-

[15] A 1916 report of the Inspector of native Rhodesia labour in the Katanga shows that this is the case: "[...] labour is very plentiful at the Katanga mines, and the rate of wages has consequently dropped. Natives are now engaging for work at 15 to 20 francs per month where formerly they demanded 25 francs or more."

[16] In 1935, the average monthly wage of mining workers in the Northern Rhodesian Copperbelt was 23.6 shilling, for workers on the railway 13.6; the Zambezi Saw Mills in the south paid 12.6 and farm labour only 5.10. "Although African wages, in real terms, probably did not increase much during the 1930s and 1940s, the difference between urban and rural incomes provided a substantial incentive for migration. Just after WWII annual village income, including the estimated value of subsistence farming, was thought to be about 4.14 per head, while the average income for a person in town was calculated as 16.17". (Phyllis Deane, Colonial Social Accounting, Baldwin, economic development and Export Growth; cited in: Berger 1974).

[17] A 1930 report of the health adviser on "labour conditions in the Katanga Province" describes recruitment from Ruanda Urundi by the Union Miniere directly or by the OCTK partly state owned recruiting company. Natives were very carefully selected by medical inspectors with regard to their physical capacity, those selected were vaccinated against typhoid, smallpox and meningococcal. They were also encouraged to bring their wives and children with them, who are also medically examined and vaccinated. In some cases money was even advanced to enable the unmarried to marry. Recruits and their families received jerseys and blankets for free and were transported by steamer and by rail to Elizabethville. They stayed for some weeks in acclimatization camps before starting work in the mines or elsewhere.

active recruiting. Moreover, food supplies by white settler farmers to the Katanga mines were now increasingly absorbed by Rhodesian mines. This opened up renewed opportunities for the rural population in Katanga to engage in commercial agriculture, which lowered incentives to engage in wage labour (Parpart 1983).

In section 5 we will look deeper into the adoption of labour stabilization programs in Katanga and take up the question why the combination of labour coercion and labour compensation was more pronounced in the Belgian Congo than in Northern Rhodesia. For now it suffices to note that the sudden loss of the Rhodesian labour pool to the UMHK initiated a fundamental change in the institutional response of the Belgian colonial state (the majority shareholder) to the problem of labour scarcity.

4. Real wages of African copper mine workers in comparative perspective

4.1 Method

To assess comparative levels and trends of labour compensation in the copper industry we adopt Allen's (2001, 2014) 'barebones subsistence basket' deflation method. This consumption basket offers a crude benchmark for cross-spatial and inter-temporal price comparisons to convert nominal wages into real wages. The basic rationale is to compute the number of consumption baskets that an annual adult male's wage can buy. This number is called the 'welfare ratio', where a ratio of 1 represents barebones subsistence (the absolute poverty line). Wage income is defined as the total sum of monetary compensation (i.e. salary) and expenses incurred by the employer for food rations, firewood and housing (in-kind payments). The barebones subsistence basket we use is equal to the one designed by Frankema and van Waijenburg (2012) for Sub-Saharan Africa (see Appendix A). The subsistence basket for one worker provides a minimum amount of calories (1,940) and a minimum of proteins (42 grams). It is assumed that a family consisting of a man, his wife and two/three children requires three baskets for survival, which implies 555 kg of maize, 9 kg of beef, 6 kg of sugar, 9 litres of palm oil, 9 metres of cotton, 3.9 kg of soap, 3.9 litres of kerosene, 3.9 kg of candles and 2 MBTU of charcoal.

Although mine workers varied their diet with different staple crops like cassava, millet, maize and possibly rice (for the wealthier ones), we stick to maize because it was the cheapest and most widely consumed staple food in this part of Africa (the rations provided by the company actually included maize or maize meal and sometimes cassava, but no rice). Allen (2001, 2011) and Frankema and van Waijenburg (2012) add 5% to the value of the subsistence basket to account for housing rent. Since workers were housed by the mining companies for free, but not all the companies recorded information on the costs of housings (construction amortization/reparations) per worker, we omit the rent both from the wage and subsistence basket calculations[18].

In the case of Katanga, wages, costs of rations and the prices used to construct the subsistence basket are those paid by the UMHK, reported in the yearly Reports of the Native Labour Department. Since our primary sources lack price data on coal, candles, cotton, soap and kerosene, we accommodate this hiatus by following the same procedure as Frankema and van Waijenburg (2012); we take import prices of cotton cloth, soap and kerosene from Congolese trade statistics (Annuaires Statistiques de la Belgique et du Congo Belge) and add 20% to its unit value to account for costs of transport, taxes and trade. We add 2.5% for candles to the total cost of the subsistence basket. Firewood was provided for free by the company.

For Northern Rhodesia, the price data used to construct the value of the subsistence basket derive from the Colonial Blue Books of Northern Rhodesia (1929 to 1948), which are retail prices for Livingstone. For scattered years after 1948 we have food prices reported by the mining companies and we interpolate the missing prices. To accommodate a lack of price information for cotton, palm oil, coal (fuel) and candles we use different methods. Since palm oil is produced in Africa, we use an average of African export prices reported in colonial trade statistics and subtract 20% for transport, taxes and trade costs. As for cotton cloth, which was usually imported, we use British African import prices reported in British trade statistics, plus a 20% margin. For coal and candles we add in total 10% to the cost of the subsistence basket (2.5% for candles and 7.5% for coal and firewood).

For Northern Rhodesia, the wage data for 1930 to 1949 derive from a report on the mine of Mufulira and the wage data for 1950 to1960 from the statistical yearbooks published by the Northern Rhodesian Chamber of Mines, which contain average wages paid to African mine workers in the Rhodesian Copperbelt. When we had only information on wages per shift, we multiplied these by 312 days to obtain annual wages, in line with the assumptions adopted by Frankema and van Waijenburg (2012). The Colonial Blue Books confirm that the weekly work hours were 48, corresponding to 6 days of work per week and 312 days per year[19]. The costs of rations (and wood) carried by the company derive from the same sources, except for the 1930s, when we used the Colonial Blue Books of Northern Rhodesia[20].

Before we discuss the results, we need to be very clear on what this real wage method measures and what it doesn't. The standard assumption of 312 shifts per year is defensible for stabilized workers, but circular migrant workers would probably only make between 100 and 200 shifts per year before turning

[18] The UMHK has reported for some years the value of amortization of constructions and reparation costs.

[19] Frankema and van Waijenburg (2012) also take a lognormal transformation (biased towards the lowest) when the lowest and highest wages of unskilled workers were given, which corresponds to the average wages in our sources.

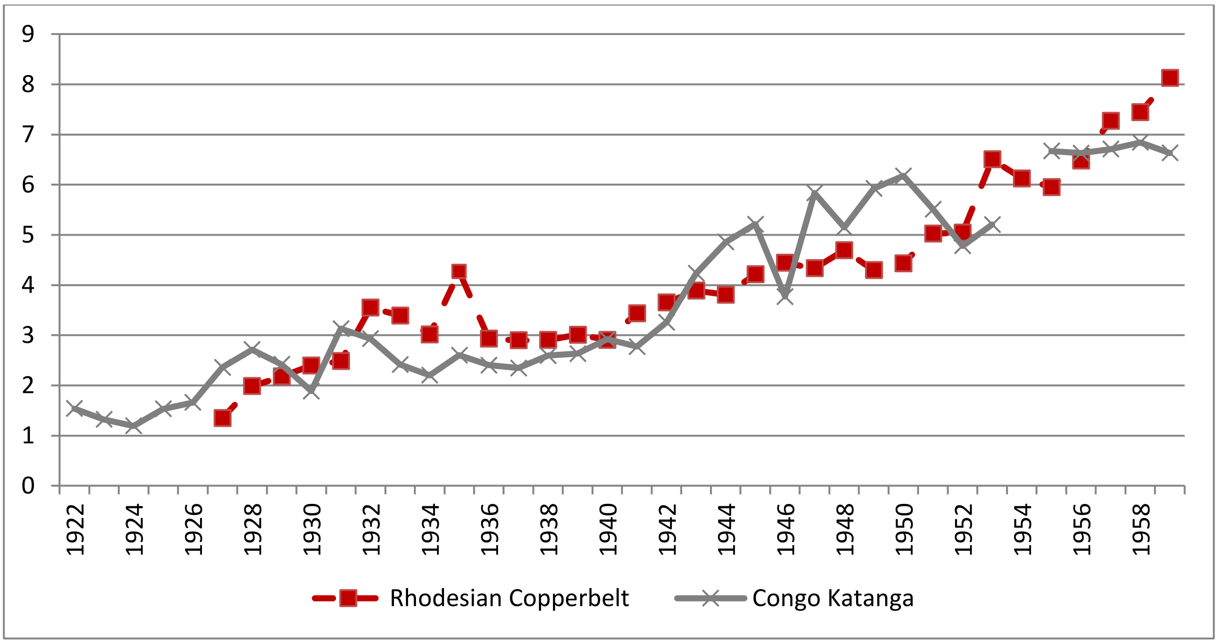
[20] Here a log normal transformation towards the minimum cost of rations was used. The range of the costs of rations published in the Blue Books is very large, usually ranging between 5 and 20 shilling per month.

back to their villages, where they would take up farming incomes and contribute to other forms of production and household income, along with their kinship. Moreover, as workers' wages would rise considerably above barebones subsistence, for instance when surpassing a welfare ratio of 3, part of their consumption will shift towards somewhat more luxurious commodities. What we measure, therefore, is not the real income of mine-worker families, nor their actual consumption patterns. What we capture is the development of comparative *purchasing power* of mining wages and indirectly also the comparative levels of labour compensation offered by the mining companies.

4.2. Results

The real wage series for copper mine workers in Katanga and the Rhodesian Copperbelt province are presented in Figure 5. Our results invoke three observations. First, we observe a notable long-term increase in the material compensation of African copper mine workers, which is consistent with the literature on the Central African Copperbelt, but has never before been cast in comparative quantitative terms. Welfare ratios rose from around barebones subsistence (1-2 baskets) in the early 1920s, to around seven or eight baskets in the late 1950s. This increase was impressive by all standards of welfare improvement in a colonial and non-colonial economic context.

Figure 5: Welfare ratios of copper mine workers in Katanga and the Rhodesian Copperbelt, 1922-1958



Sources: See Appendix C

Second, we identify distinct periods of real wage growth and stagnation that correlate with changes in the demand for mining labour. From 1922 to 1925 we observe a phase of rather stable and low real wages. In those years the UMHK was still the only company in the Copperbelt in search of labour. Real wages started to shoot up as soon as the restrictions to UMHK labour recruitment in Northern Rhodesia took effect. Competition from Rhodesian mining companies enhanced the bargaining power of African mine workers. The rise in real wages came to halt during the depression of the 1930s and remained fairly stable around a welfare ratio of three baskets. Wage rises were no longer needed to secure sufficient labour supplies and the agreement of 1932 between the mining companies in the Copperbelt suppressed wage competition. Yet, real wages did not collapse, as nominal wage cuts were compensated by declining consumption prices and reduced costs of food rations incurred by the mining companies[21]. With the onset of the Second World War copper prices boomed, and production volumes and the size of the mining workforce rose accordingly (See Figure 2). Real wages shot up again and this time the increase continued with a few interruptions up to the late 1950s.

Third, wage rates in Katanga and the Rhodesian Copperbelt follow a remarkably similar pattern, which reveals the degree of coordination between mining companies at both sides of the border. That said, our real wage series also hide an important difference in the composition of mine workers' wages. The UMHK paid considerably lower cash wages and compensated this by higher in-kind payments. These in-kind payments were reflected in both the quality and quantity of food rations (see Table 2). As we will argue in the next section, this difference squares with the labour stabilization policies adopted in the Belgian Congo, and the continued reliance on circular migrant labourers in Northern Rhodesia, who were keen on bringing home cash on return from the mines. The share of nominal wages paid in cash rose sharply in Northern Rhodesia in the 1950s with the introduction of so-called inclusive wage schemes, when housing and food rations for workers and their families were no longer provided for free (Northern Rhodesia's Chamber of Mines Year Books)[22].

Table 2: Share of wages paid in cash in Katanga and the Rhodesian Copperbelt, 1919-1959

Years	Katanga	Rhodesian Copperbelt
1919-1929	0.35	-
1930-1939	0.51	0.66
1940-1949	0.43	0.65
1950-1959	0.47	0.83

Source: UMHK - Main d'oeuvre Africaine, Year Books and Northern Rhodesia's Chamber of Mines Year Books

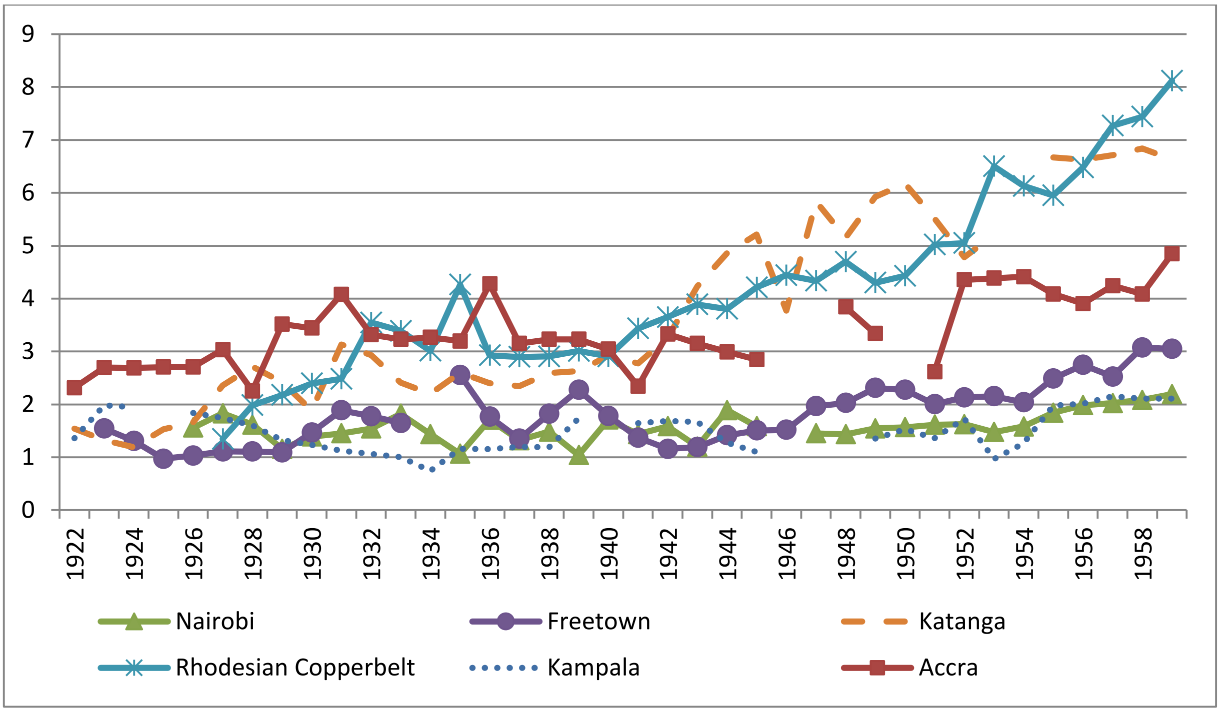
[21] The spike in Rhodesian welfare ratios in 1935 was caused by sharply falling maize prices, making the costs of food particularly cheap in that year.
[22] In Katanga only some attempts were made to provide inclusive wages for the best paid class of indigenous workers.

For some years we observe the exact contents of the food rations provided to the mine workers and their families (Yearly Reports of the UMHK Native Labour Department and Northern Rhodesia's Chamber of Mines Year Book 1956). These sources indicate that UMHK food rations contained higher caloric and protein values than the food rations granted in the Rhodesian Copperbelt (see Appendix B). For instance, already in 1925 the UMHK provided daily rations to married workers with two children with a caloric value of over 10,000 and over 300 grams of proteins, whereas a Northern Rhodesian Copperbelt mine in 1956 provided rations of a nutritional value of 9,000 calories (see Appendix Tables A.1-A.3). To put these figures into perspective, the family subsistence basket we adopt to compute real wages has a total nutritional value of 5,800 calories and 129 proteins per day.

This difference was also noted in a 1929 report by the British Vice Consul on Rhodesian labour in Katanga, which stated that "natives receive much more than they can eat. They are not allowed to sell their surplus food and consequently there is a good deal wasted. The authorities, however, consider that it is better that there should be this wastage than that natives should sell their food at the risk of underfeeding themselves." (Report on Rhodesian Natives in the Katanga by the British Vice Consul, October 1929, National Archives of Zambia, SEC1/1472, p. 2).

Figure 6 puts our real wage series in comparison with the welfare ratio's that have been estimated for urban unskilled wage workers in several West and East African cities such as Freetown, Accra, Nairobi and Kampala. This comparison reveals that after the rise in real wages in the second half of the 1920s, levels of labour compensation in the mines rose to the high end of the African spectrum. In the 1940s the gap grew to significant proportions, surpassing the real wage levels of Accra, which probably had the highest wages in West Africa at that time (Frankema and van Waijenburg 2012). By the 1950s copper mine workers were among the best paid manual workers in sub-Saharan Africa.

Figure 6: Welfare ratios in Katanga, Northern Rhodesia and various African capitals, 1922-1960



Sources: For Katanga and Rhodesian Copperbelt, see Appendix C; other African cities: Frankema and van Waijenburg (2012)

There are three key explanations as to why the real wages in the copper industry rose far above prevailing market wage rates elsewhere. First, real wage trends reflected the gradual realization that investments in long-term relationships with employees and their families would eventually pay off, and therefore had to compensate mine workers for settling with their families in an alien area, for conducting severe physical labour, and for continuous exposure to high risks of accidents, disease and mortality. Second, especially from 1940 to the late 1950s, copper mining was an exceptionally profitable industry. The copper companies had the means to offer wages that outbid European plantations, settler farmers or other urban jobs, and possibly also the African workers hired by the colonial governments themselves. Third, the increase in welfare ratios reflects a rise in acquisition of skills, which complemented the technological adoptions of the mining industry. During World War II, when the colonies were temporarily cut off from the metropolitan countries, companies had to upgrade the skills of their indigenous workers to replace Europeans (Buelens and Cassimon 2013, p. 237).

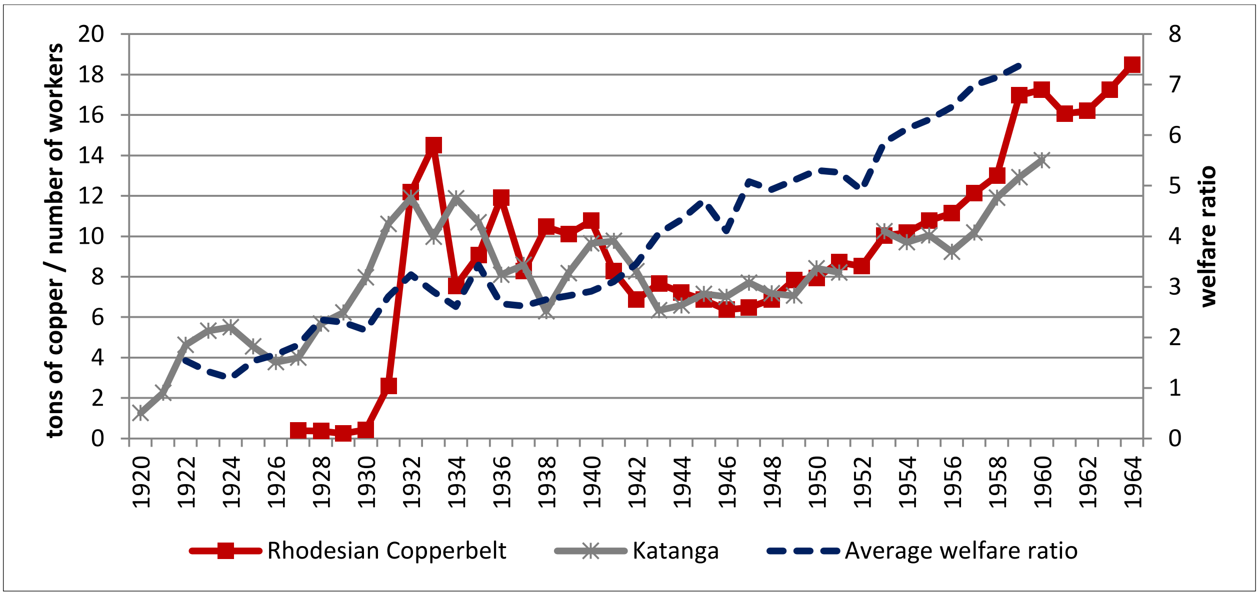
The accumulated profits of the Second World War demand boom were re-invested in technological improvements after the war. Rising mechanization fostered the productivity of labour in the mines of the Copperbelt, as is shown in Figure 7.[23] The productivity figures are high in the early 1930s, because

[23] The role of politics in improving the living conditions – e.g. by introducing minimum wages - should not be neglected. As a consequence of rising resistance to Belgian dominion during 1945 to 1958, the colonial administration felt that a content middle class was important to secure stability (Buelens and Cassimon 2013).

the labour force had been drastically reduced during the Great Depression. They are relatively high again during the Second World War, as the mines were producing at their full capacity. After the mid- 1940s, there is a steady rise in tons of copper produced per worker, reflecting the increasing use of labour-saving technology.

That copper-mine workers' wages rose to exceptional heights is also corroborated by a comparison with South African goldmine worker wages. In 1961 the nominal wages paid to African miners in the Copperbelt, all converted into current British Pounds, were over three times as high as in South Africa. Real wages indices in Table 3 show that the real levels of labour compensation in South Africa remained more or less stagnant between 1921-1961, while real incomes in the Copperbelt rose with a factor 5 to 6. Since we do not have comparable retail prices for primary commodities purchased by, or in the vicinity of, South African gold mines, we cannot directly compare real wage levels, but the annual nominal wage series in GBP show that wages in the South African mines were initially much higher than in the Copperbelt, to be overtaken in the 1950s. Deeper explanations for this remarkable difference in welfare development are beyond the scope of this paper, but it seems clear that South Africa's apartheid system had very different effects on material welfare growth than the stabilization programs adopted in the Copperbelt.

Figure 7: Productivity of labour (tons per indigenous worker)



Sources: For copper production in Congo and Northern Rhodesia: Blue Books of Northern Rhodesia, Northern Rhodesian Chamber of Mines yearbooks, Statistical Yearbooks of Belgium and the Belgian Congo and Perrings (1979, p. 248-249). For number of labourers: UMHK year books, Parpart 1983 (p. 167), Northern Rhodesia Chamber of Mines Year Books.

Table 3: Annual nominal wages and index of real wages of African mine-workers in South Africa, Rhodesian Copperbelt and Katanga, 1921-1961 (1926=100)

Year	Annual nominal wages in GBP			Wage ratio Rhodesian Copperbelt/ South Africa	Index of real wages (1926=100)		
	South Africa (gold mines)	Rhodesian Copperbelt	Katanga		South Africa (gold mines)	Rhodesian Copperbelt	Katanga
1921	33.0		6.4		86		93
1926	33.5	5.5	4.6	0.16	100	100	100
1931	33.0	12.9	13.5	0.39	103	185	189
1936	34.0	15.3	8.6	0.45	113	218	145
1941	35.0	20.4	27.8	0.58	106	255	167
1946	43.5	26.5	24.7	0.61	113	330	227
1951	54.5	54.7	51.5	1.00	108	373	332
1956	66.0	101.8	102.5	1.54	111	482	399
1961	73.0	257.1		3.52	110	604	399

Sources: Nominal wages and real wage index of gold miners in South Africa: Wilson (1972); Katanga: Yearbooks of UMHK Native Labour Department; Rhodesian Copperbelt: Official report on the mine of Mufulira (1930-1949); Year Books of Northern Rhodesia's Chamber of Mines (1950 to 1960). Exchange rate Franc to GBP: Perrings (1979, p. 243) before 1939, and Clio Infra database from 1945, interpolated in between

5. Labour stabilization

The main idea of labour stabilization was to settle (parts of) the African mining workforce with their families on the properties of the mining companies - in compounds or towns nearby - as to diminish the dependence on (foreign) migrant labour, lower the costs of recruitment and create an environment for long-term investments in workers' health, skills and offspring. In the final two sections of this paper we analyse the differences in the welfare facilities offered in the mines of Katanga and the Rhodesian Copperbelt. We argue that the wholehearted embracement of labour stabilization policies in the Belgian Congo, and its more hesitant adoption in Northern Rhodesia had three underlying causes.

First, although it may seem as if the UMHK had enjoyed a critical 'first-mover advantage' in the recruitment of mining labour, thus raising entry barriers to the mining companies in Northern Rhodesia who arrived some 15 years later, the opposite was true: the Rhodesian companies benefitted from the pioneering role of the UMHK. The recruitment quota imposed by the Northern Rhodesian government in 1925 meant that the Rhodesian mining companies could tap into a steady flow of circular labour migrants, while it restricted supplies to the mines in Katanga. The changing role of the colonial border in separating markets for migration labour, forced the UMHK to expand its recruitment activities *within* the territories under Belgian control. The UMHK continued to recruit labour up to the 1960s, albeit in decreasing numbers (see Table 4 and Table 1). The immediate response to the quota system imposed by

Northern Rhodesia was to extend the duration of labour contracts. For the Rhodesian mining companies the need to stabilize labour was lower[24].

Second, whereas the Belgian colonial state had a majority stake in the UMHK from its inception and continued to support the industry with recruitment services, infrastructural investments and all sorts of labour regulations (e.g. constraint on trade unionism), the Northern Rhodesian state maintained a (much) larger distance to the mining sector. In fact, fearing the social consequences of African "detribalization" (i.e. the complete severance of indigenous peoples from their tribal relations), the Northern Rhodesian colonial office opposed the idea of permanent settlement of mining workers in mining towns against the mining companies' plea for extending the duration of labour contracts. While the patriarchal culture of Belgian colonial governance reserved a key role for Catholic missions in the provision of welfare services such as education and health care, in Northern Rhodesia the government only pressed for missionary access to the mining compounds after the Copperbelt riots of 1935. Yet, missionary infiltration was regarded with much suspicion by the managers of the Rhodesian mines (Parpart 1983).

The third reason, to be further discussed in section 6, relates to the different relations between black and white mining employees. There were more white employees involved in the Rhodesian copper mines, and they sought to defend their positions by guarding a tight application of the industrial "colour bar". Skilled jobs, whether technical or managerial, remained the preserve of white employees, a right that was defended by the white workers' trade union. In the Belgian Congo, there was no effective European labour-union organization (Katzenellenbogen 1975, p. 418)[25], and during the interwar period the smaller minority of white employees was gradually being replaced by black workers, who were much cheaper to employ. Especially during the depression of the 1930s the replacement of white by black workers aided production cost cutting. Increasing investments in African worker skills were an integral part of labour stabilization programs in the Belgian Congo, and these obviously only paid off in a context of long-term, if not life-long, employment relations.

Table 4 shows how rapidly labour stabilization programs in Katanga materialized. After 1925, the ticket system that provided 6 months to 1 year contracts was replaced by three year contracts and the latter became mandatory in 1927. The three year contracts covered 98 per cent of the labour force by 1931 (Berger 1974). Three years was considered sufficient to make African workers adapt to an industrial

[24] Recruitment outside the Belgian Congo and the mandated territories of Ruanda-Urundi stopped all together in 1931 (Perrings 1979, Katzenellenbogen 1973).

[25] Indigenous trade unions were authorized in Katanga only from 1946, but did not have as much success as their Rhodesian counterpart. In 1948 only 10% of indigenous workers in one workplace in Lumumbashi had joined the Conferation des syndicats crétiens du Congo (Brion and Moreau 1998, p. 273).
South of the border, the British labour government after the war introduced indigenous labour unions and sent British Trade Union Council officials to train African unionists after WWII, whom they hoped would engage in negotiations rather than strike actions. It turned to be by far more strike prone than the Katanguese one, where indigenous workers seem to have been appeased by the "paternalistic system", backed by the state in alliance with church missions.

environment, to bring along their wife and children and to loosen their ties to their home communities. The percentage of women living in the compounds rose from about a quarter to three quarters in less than three decades and the share of un-recruited workers rose even faster. As a result, labour turnover rates decreased and length of service increased. In 1938, 12% was engaged for 10 years or longer and 65% for under three years. In 1950, 54.7% was engaged for over 10 years and 23.9% for less than 3 years (UMHK yearly reports on Native Labour).

Table 4: Labour stabilization in Katanga

	Females as % of male population in UMHK compounds	Share of unrecruited to total workers	Desertions (% of workforce)
1920-1925	28.00	25.63	7.67
1926-1930	37.25	45.23	5.00*
1931-1940	54.83	77.92	4.00*
1941-1950	74.08	84.42	2.91
1951-1965	81.67	90.00	na

* data are interpolated. Source: AGE 2, UMHK - Main d'oeuvre Africaine
Note : From 1928 on, the place of origin of non-Congolese or Rwandan was not specified anymore, but they were all categorized as "foreigners".

Stabilization measures also involved active support for marriage and child birth. The UMHK advanced money for a bride price to unmarried men upon signing a labour contract and paid bonuses for each new born child. Mothers and infants up to five were encouraged to visit the infant welfare clinic for medical checks, where they received ration tickets for milk, sugar and soap. When children went to school, from the age of five, they were provided three cooked meals per day at the messes. Rations were usually issued twice per week to the employees and wives received half the amount of their husbands (except when they were pregnant)[26]. As Table 5 illustrates, the investments in a new generation of mining employees by the UMHK quickly took effect.

[26] In 1930, the food rations of workers consisted of: 5kg maize meal or 6 kg cassava meal (or half and half), 1.5kg meat, 105g salt, 500g beans, 500g ground nuts or 300g palm oil, 1.5kg fruit and vegetables. For women, the weekly ration consisted of 2.5kg maize meal or 3kg cassava meal, 750g meat, 60g salt, 250g ground nuts or 150g palm oil, 750g fruits and vegetables. Firewood was supplied for free.

Table 5: Living conditions of indigenous labour at the UMHK in the 1920s

YEAR	Percentage married	Average number of children	Children per 100 workers	Birth rate per 1000 inhabitants
1924	14.8			
1925	18.8			
1926	22.1	940	31.9	20.0
1927	23.6	1,423	38.9	25.3
1928	30.6	2,105	44.7	30.6
1929	33.71	3,149	54.1	33.4
1930	40.84	4,457	66.8	46.8

Source: 1930 Report of the Health Inspector of Northern Rhodesia on Native Labour in Katanga

A quarterly report on “Rhodesian Natives in the Katanga” sent by the British Vice Consul in October 1929 stated that “the conditions under which natives work could hardly be bettered as regards feeding, hospitals, housing and general treatment. Conditions have much improved since I arrived here in 1925” and “there are many who think that the Union Minière are extravagant in regards their expenditure on hospitals and compounds. It will probably be found in the future that this apparent extravagance was justified”. On his tour in 1929 through the Belgian Congo and Angola the labour commissioner of Tanganyika noticed the excellent conditions in the labour camps and – in accordance with the poor view that officials in Northern Rhodesia had on “detribalization”- he added:

“Against this, however, there is noticeable an absence of comprehension of African mentality and psychology. The Belgian ideal is “stabilisation” of the worker – in other words, the accustoming of the African to industrial conditions, so that he will be healthy and contended in surroundings resembling those that might exist, in ideal circumstances, in a great mining area in Europe. Having realised the evils of “deracination” or detribalization, the Belgian Government appears to have evolved the phrase “stabilisation” as a species of innocuous alternative. It is difficult to see wherein the difference really lies.” (p. 3, National Archives of Zambia, SEC/29/14).

Education for boys and girls was provided mainly by Franciscan and Benedictine missions. The curriculum was designed for the company’s needs, with an emphasis on labour discipline and manual skills, apprenticeship departments and professional schools for talented boys from the age of 15, as well as domestic work for girls. As a compound manager of Roan Antelope (Mufulira Copper Mines Ltd.) wrote to the Native Labour Association in 1938, “in terms of welfare, Union Minière is undoubtedly ahead of us. Practically the whole work is carried out by the Roman Catholic priests and sisters [...] Women and children at U.M. are treated as being the mine’s strength and under their discipline and control. Schools are provided and women participate e.g. in horticulture” (ZCCM Archives, 10.7.10B). A 1958 report “on study tour of Union Miniere Organization” on behalf of the Copperbelt mines’ management directors, reports that “the most striking feature of the Union Minière Organization is the importance attached to the "African Labour Department" and, within that framework, to education and welfare".

Although Northern Rhodesian mines virtually banned forced labour recruitment in the 1930s, the welfare conditions in the compounds were, in most cases, poorer than in Katanga. Following the tax increase in the Copperbelt of 1935, riots broke out in which mine workers voiced their complaints about inadequate compensation for (lethal) accidents, inappropriate living conditions and insufficient rations, as well as the bad treatment by European supervisors and brutality of the African police force (Parpart 1983, pp. 59-60).[27] During this outbreak of labour unrest six African protestors were killed by mining police troops. The colonial government responded to the riots by pushing for better welfare programs and by creating arrangements for missionaries to perform their charity work in the compounds, a measure that wasn't well received by the managers of the mines[28].

The Northern Rhodesian mining companies hesitated to copy the labour stabilization programs of the Katangese mines, and instead looked at the model of the South African mining industry, which favoured a circular migrant labour force and a strict colour bar policy[29]. Rhodesian companies resented the costs of housing and feeding women and children when there was no pressing need to do so. The majority of Rhodesian miners used to combine several months of work in the mines with rural subsistence farming in their villages during agricultural high seasons. Yet, the events of 1935 also showed that not all dismissed workers had returned to their home villages[30], and that high unemployment rates in the mining towns were a potentially destabilizing factor.

In fear of African "detribalization" the Northern Rhodesian government kept promoting circular migrant labour. Opposition to the permanent settlement of mine workers was also fed – in the same vein as in South Africa - by a lack of faith in a stable future of the copper industry, inducing risks of high structural urban unemployment and towering welfare expenses on disability, unemployment, retirement and

[27] The tax rise was meant to compensate a reduction of taxes in the countryside with the surpluses generated by mine workers, whose wages were among the highest that were paid in the colony (Parpart 1983).
[28] The colonial office also became aware of the need to investigate social changes and African ways of life, which eventually resulted in the establishment of the famous ethnographic Rhodes-Livingstone Institute (Berger 1974).
[29] South African mines depended on migrant workers, and housed single men in barracks for a contract period of ten to twelve months. In 1930 married quarters were provided for only 1,474 specially skilled African workers out of a labour force of 200,000 men at the Rand gold mines. In this system the workers were sent back to their families for long spells between contracts, which was very wasteful in terms of training and efficient labour force. But it was enforced by legal and customary colour-bar restrictions which required the use of white workers in semi-skilled and skilled jobs. The South African Government exerted strong pressure to inhibit the growth of a permanent Africa mine labour force. It was popular in South Africa to argue that mining was a temporary industry and that it was bad policy to allow a primitive people to specialize in it. When ore deposits were deployed, the towns would be left with a large unemployed population that could not go back to their villages and had to be taken care off (Berger 1974).
[30] Probably especially those who had worked in Katanga and in Southern Rhodesia before and were used to a urban life.

wasteful urban administrations[31]. Moreover, short-term labour contracts and the deferred payment system were thought to enhance economic growth in the rural areas, thus spreading the copper wealth into more sustainable sectors of the indigenous economy.

Labour stabilization thus developed more slowly in the Rhodesian Copperbelt than in Katanga, although the rapid expansion of copper production during the 1940s and the increasing technology and skill-intensity of mining operations, made the extension of labour contracts inevitable (Heisler 1974, Little 1973, Cliffe 1979, cited in: Ferguson 1999). Technological advances and rising wage costs supported investments in labour-saving machinery and in complementary labour skills[32]. In the meantime, the colonial office retained a legal restriction on the provision of housing and the right of residence to workers without a labour contract. Only after independence urban settlement of miners became truly permanent, including a pension-system that offered life-long income security.[33]

Several reports comment upon the clashes between the government and the mining companies on the issue of labour stabilization. A 1942 report for the General Manager of Mufulira Mines Ltd. "Covering a wide and controversial number of subjects related to native labour" stated that the deferred payment system gave workers the "wrong impression of the wage they received" and that it reduced their purchasing power, because prices were higher in villages. Regarding "detribalization" the report declared that urbanization was inevitable and not necessarily bad if there was sufficient work (ZCCM Archives, 10.7.10B)[34].

In a 1945 "*memorandum on native labour"* by the managers of the four most important mines complaints were voiced about the 50,000 Northern Rhodesian migrant workers in Southern Rhodesia, and that the colonial government did nothing to restrain this migration[35]. They pleaded for a system that interchanged long-term labour contracts with long periods of leave to allow employees to go home. These home visits would facilitate the employees' return at the end of his working life and save the company the costs of retirement. The UMHK in the Congo had been paying nominal pensions of 50 francs per month since 1938, conditional upon the pensioners returning to their home villages and it was

[31] In 1936 a Nyasaland Report on the damaging effects of migration on village life was published. However, emigration for work, for instance in the mines, was encouraged in order for Africans to pay their taxes. The Provincial Commissioners estimated that over 50 per cent of the adult men were absent in Eastern and Northern Rhodesian Provinces and over 40 per cent in Barotseland. (National Archives of Zambia, SEC/LAB/17).

[32] It has been posited that in Katanga it was more profitable to have a stabilized labour force because there were many open cast mines where it proved already in the late 1920s both possible and profitable to use machines on a large scale. In Northern Rhodesia, until 1955, all mines were underground mines and there was less scope for mechanization (Roberts 1976).

[33] Ferguson (1999), on the other hand, claims that "stabilization" had already occurred in part much earlier, and many Africans had already lost their ties to their villages in the 1930s.

[34] Contrary to Katanga, schooling was entirely left to the government and there weren't schools in all the compounds. There were also issues mentioned concerning the supply of food. Native workers received cooked food rations. Should they rather receive a complete ration for themselves and their families by the company or would it be fine if the worker complemented the ration by buying his own food? Should food be distributed cooked or uncooked?

[35] ZCCM Archives, 10.7.10B.

assumed that the burden of their subsistence requirements would be met by their farming relatives (Perrings 1979, p. 240).

But labour stabilization was also inevitable from the worker's point of view. In the 1940s more and more workers preferred to stay in the mining towns instead of returning to the countryside. Parpart (1983) holds that in search for European life styles the wives of mine workers were even more keen on staying in the mining towns. Schooling for children provided by the United Missions in the Copperbelt (UMCB) since the late 1930s also made families more likely to stay. In the 1940s over 90% of the students at UMCB schools had been there for over five years (Parpart 1983, p. 89).

6. The industrial colour bar

In 1919, when parity between the Congolese and the Belgian franc was introduced, the Belgian franc started losing value against the major currencies. The exchange rate of the franc against the sterling pound continued to drop between 1920 and 1925 (Perrings 1979, p. 46). As most of the white skilled workers were paid in sterling (as were the indigenous workers from Northern Rhodesia and Nyasaland), this raised the incentives of the UMHK to replace them by indigenous workers from the Congo who were paid in francs. Furthermore, the sudden pressure to cut down operation costs during the Great Depression encouraged the replacement of expensive white workers by cheaper African workers in Katanga, and stimulated the development of training programs in industrial and supervisory skills for African mining employees. The promotion of black workers to positions that used to be the preserve of white employees, was a contested issue everywhere, but the principles of the colour bar appeared more flexible in the Belgian Congo than in Northern Rhodesia.

The European electorates in Northern Rhodesia bent towards a union with Southern Rhodesia, in part due to the desire to secure the system of race relations that prevailed there[36]. While the colonial government had legally abandoned the colour bar, the white voting community supported it in practice. In 1940, African mine workers went on a well-organized strike to fight wage discrimination between black and white workers[37]. The white mining workers' union responded by demanding the implementation of the "colour bar clause" that reigned in South Africa and Southern Rhodesia, which prohibited promotion of Africans to supervising or managerial positions. Although this clause was never

[36] Also, in practice, the companies, such as the Rhodesia Railways, a private company operating passenger and freight services throughout Northern and Southern Rhodesia, established a firm colour bar as the result of the pressures of the European Railway Workers Union. Government building contracts and Government services supported restrictive labour practices as well.

[37] However , the strikers were not victorious (given that the companies did not come to an agreement with the strikers) and the war appeased further collective protests for several years. The Emergency Powers established in 1942 made strikes illegal and memories of shootings and killings in earlier strikes also dampened the support for further protests.

adopted, the company's management did not dare to put more Africans on "white" positions (Berger 1974).

The Rhodesian mining companies resented the colour bar because it raised labour costs and eventually also made it more difficult to attract African workers. The 1945 "*memorandum on native labour"* stated that "A tendency still exists among Europeans to consider Africans as something sub-human that neither requires or is entitled to fair or reasonable treatment. Europeans of this class are definitely a menace in relation to African employees and should not be tolerated in an industry in which they are in close contact with Africans. People of such mentality can never make good "bosses"." According to the authors of the memorandum the main reason for the persistent belief in the colour bar by white settlers was to safeguard the labour market prospects of their children, while in the Belgian Congo it was acknowledged that "an African is as good as a white man". A Northern Rhodesian report of 1958 on the conditions of native labour in Katanga comments in the same vein that "the [UMHK] company recognises no colour bar whatsoever. Although no African has as yet been found fit to do the same work as the European supervisors, it is claimed that the Company would have no hesitation in appointing a suitable candidate".

In fact, the board of the UMHK had deliberately dismissed already in the early 1920s most of the white workers from South Africa and Britain and had them replaced by Belgians because the former were causing "trouble" with their mentality of striking and collective action (Parpart 1983). A Memorandum of African Labour in Katanga of September 1945 (cited in Perrings 1979, p.138), reveals the UMHK's reliance on indigenous workers in supervising positions[38]. The different application of the industrial colour bar was reflected in growing differences in the ratios of white to black workers at opposite sides of the border (see Table 6). In 1936, the white-black workers' ratio in Katanga of around 1:20 was less than half of the Northern Rhodesian ratio of 1:8. It should also be noted, that the high grade ore deposits in Katanga needed less skilled labour and demanded lower capital-labour ratios than the underground mines in Northern Rhodesia, which excavated deeper and lower-grade ores.

[38] "In 1945, at Kipushi mine in Katanga several men had reached the level of shift boss in charge of up to 40 men. Africans were handling cage movements at each level; all drilling was handled by Africans [...]. In the western mechanized open pits, the black/white ratio was reported to be as much as 80:1.All churn drills, pumps, ore trains and cranes were being operated by Africans, and three 4 cubic yard electric shovels stripping overburden were operated by Africans with one European supervisor. Similarly in the smelters the night shifts operated with minimal white supervision and all tapping and pouring of blister and wire bards was handled by black labour. In the pattern shops and foundry Africans were making patterns alongside European apprentices and in the central workshops at Panda some 60 electrically driven lathes, planes, drills, etc. were operated by Africans with only four white supervisors." (Parpart 1983, p. 238)

Table 6. Share of white to black labour

Year	Rhodesian Copperbelt	Katanga
1930	0.11	0.11
1932	0.17	0.13
1934	0.13	0.06
1936	0.13	0.05
1938	0.12	0.05
1940	0.12	0.06

Source: Yearly reports of the UMHK Native Labour Department and Perrings (1979)

The differences in the application of the colour bar were also reflected in the income earning opportunities and occupational mobility of African labourers (see Table 7). In Northern Rhodesia, the wage scheme for African employees was narrower, consisting of three wage scales (A,B and C) for surface and for underground labour. Grade A included all workers who had undergone some training, in highly responsible jobs and those literate in English (often "boss boys" or "senior boss boys"); Grade B was an intermediate group with a certain amount of mechanical skill and knowledge such as boss boys with blasting licenses, second-grade artisans or clerks, police and others. Grade C covered unskilled labour. Salaries increased with length of service. The maximum skill premium (including experience, not only training) defined as the ratio between the highest and lowest paid African worker in an underground mine was around 5.3: 80*s* for grade A worker, after 72 completed tickets, versus 15*s* for grade C worker at his first ticket. In 1948 a more elaborate system of seven wages scales was adopted to raise the premium for skilled black workers and create a special scheme for surface employees and underground workers. Wage differentiation went up a bit, but was again reduced in 1955, when the companies went from 9 to 14 wage categories.

Wage mobility in the UMHK mines was larger because African labourers were allowed to perform skilled jobs that were reserved for white employees in Northern Rhodesia. In Katanga, already in 1913, the wage structure was amplified from the standard rate for indigenous to a scaled wage structure with six grades: (1) underground, (2) surface, (3) pick and shovel men and those on briquetteries, (4) agricultural workers, (5) porters, (6) unskilled labour. The three mining grades were at the top of the wage scale varying between 30 francs (23/6 s.) and 15 francs (11/8 s.) (Perrings 1979). In 1928, the UMHK adopted a more complex wage structure under which the wage for each category was raised according to proficiency and length of service. To support labour stabilization, starting rates were higher if workers engaged for longer periods. For voluntary mining workers, there were five classes and the cash wage rate ranged from 2.50 francs (maximum) for the 5th (lowest) class, first term, to 25 francs for the 1st class with 72 or more months of service, which gives a skill premium of 10. Voluntary workers were paid higher wages than recruits because of direct competition with the mines across the border.

For recruited labour, the possibilities to ascend were lower. Recruits from Ruanda-Urundi earned between 1.50 francs in the first term when contracting for one year, and 3.00 francs after 30 months, when engaging for 2 years (see Perrings 1979, p. 264). [39]

Table 7: Wage range by time period, minimum and maximum wage in Katanga and the Rhodesian Copperbelt

Katanga:

Year of reform	No of wage scales	Min per day (francs)	Max per day (francs)	Average per day (francs)	Max over Min
1913	6	30.00	15.00	?	2.00
1928	5	2.50	25.00	3.97	10.00
1949	21	In 1950: 7.50	In 1950: 158.00	In 1950: 18.74	21.00

Rhodesian Copperbelt:

Year of reform	Number of wage scales	Min per ticket (shilling)	Max per ticket (shilling)	Average wage per ticket (shilling)	Max over Min.
1929	3	In 1941: 15	In 1942: 80	24	5.33
1948	9	In 1950: 50	In 1950: 320	In 1950: 66	6.35
1955	14	In 1957: 234	In 1957: 924	In 1957: 303	3.85

Sources: UMHK - Main d'oeuvre Africaine, Year Books and Northern Rhodesia's Chamber of Mines Year Books, and Perrings (1979)

7. Conclusion

In this paper we explored varying institutional responses to labour scarcity in the Central African Copperbelt. We have shown that dynamic conceptualizations of colonial institutions with respect to the extraction of labour and natural resources are needed to pin down the changing systems of labour recruitment, and associated welfare developments. Binary concepts such in terms of extractive versus developmental institutions are difficult to adopt in a system where labour coercion and labour compensation are both integral elements of the institutional matrix devised by copper mining companies to confront the issue of labour scarcity.

The results of our comparison between the copper mines in the Belgian Congo and Northern Rhodesia, as well as the analysis of changes in levels of labour compensation over the course of the colonial era

[39] In October 1929, the Report on Rhodesian Natives in the Katanga by the British Vice Consul stated that "Wages are generally lower in the Katanga as compared with Northern Rhodesia. Raw voluntary labour on the mines starts at 2 francs a day, but wages are soon raised if the native shows any aptitude, and the higher skilled labour at the mines may receive anything up to 14 francs a day".

can be summarized in three. First, compared to real wages of city-dwellers in a number of Sub-Saharan African capitals, the compensation levels of African copper mine workers rose impressively and became comparatively favourable from the 1940s onwards. By the time of independence the Copperbelt miners were among the best paid manual labourers in Sub-Saharan Africa. Second, there were hardly any differences in remuneration levels between mines in Katanga and Northern Rhodesia, although the latter tended to pay higher amounts in cash, while the former offered higher rations. The similarity in real wage levels was the result of a mutual agreement to moderate competition for wage workers in an era where labour coercion gradually gave way for labour compensation. Third, the quality of other welfare facilities such as medical care, schooling and housing was considerably higher in Katangese mines than in most Rhodesian mines.

Confronted with endemic shortages of mining labour, the UMHK made more extensive use of both strategies, the carrot and the stick. Unlike the Rhodesian mines, the UMHK continued to recruit labour up to 1960, receiving continued support from the colonial government. The Rhodesian mines, on the other hand, relied fully on voluntary migrant workers, most of whom were circular migrants. Within the mining compounds, the UMHK offered living conditions that were suited to stabilize the mining workforce, invest in their health, education, housing conditions, skills and in their offspring. African workers in the Katangese mines were also granted more opportunities of promotion. Living conditions in the Rhodesian mining compounds also improved, but welfare policies were less systematic and coordinated. These differences in approach can be attributed to a wholehearted embracement of labour stabilization programs in the Belgian Congo, as opposed to a contested and rather hesitant adoption of stabilization policies in Northern Rhodesia.

In addition to the different nature and magnitude of the labour scarcity problem, it has become clear that the Congolese mining industry adopted a more “paternalistic” management style, which was amongst others reflected in the close cooperation with Catholic missionaries who assisted in the provision of education and medical care. The UMHK remained a state-owned company during colonial times, while private companies dominated the copper industry in Northern Rhodesia. In Katanga, extensive medical and schooling services were co-financed by the colonial state. Conflicts of interest between the colonial state and private companies in Northern Rhodesia revolved around labour stabilization, the colour bar and the presence of missionaries at mining compounds. Finally, both white and black trade unions were absent in the Belgian Congo until after WWII, and their influence as well as workers’ affiliations to them remained moderate. In Northern Rhodesia white labour unions for a long time prevented the advancements of Africans into higher ranks. Ironically, those trade unions also set an example for the creation and functioning of the African Miners Union, which managed to negotiate some substantial improvements in working conditions in the late colonial era. Historical developments often produce this type of dialectics, and this one of the reasons why colonial institutions are difficult to cast in static conceptualizations.

Appendix A: Barebones subsistence basket for a family of two adults and two children

			nutrients per kg times three		nutrients family per day	
	unit	quantity per family per year	calories	Protein	Calories	protein
maize	kg	555	10,800	240	5,475	123
meat	kg	9	7,500	600	63	6
Palm oil	liter/kg	9	26,520	0	219	0
sugar	kg	6	11,250	0	63	0
cotton	meter	9				
soap	kg	3.9				
kerosine	liter/kg	3.9				
candles	kg	3.9				
firewood	btu	4				
total					5,817	129

Source: Frankema and Waijenburg (2012)

Appendix B:

Yearly family food basket in 1925 (provided by Union Miniere du Haut Katanga)

	Worker (man) in kg	Wife in kg	Child aged 7 to 14 in kg	Child aged 2-7 in kg	Total family in kg	Nutrients per kg		Nutrients per family per day	
						Calories	Proteins	Calories	Proteins
Maize and cassava flour	309.92	182.00	136.50	91.00	719.42	3,650	70	7,294.12	139.89
Groundnuts	26.00		19.50	13.00	58.50	921.38	40.30	921.38	40.30
Rice	26.00				26.00	93.17	19.21	93.17	19.21
Beans (haricots)	26.00				26.00	14.44	1.08	14.44	1.08
Meat	78.00	52.00	39.00	26.00	195.00	1,354.17	108.33	1,354.17	108.33
Vegetables	78.00				78.00	86.67	1.95	86.67	1.95
Salt	5.46	5.46	3.90	3.12	17.94				
Palm oil		15.60			15.60	383.07		383.07	
Total						10,147.01	310.77	10,147.01	310.77

Source: own calculations from Union Miniere yearly report on Indigenous labour of 1925

Yearly family food basket 1956 (for one worker and two children), Northern Rhodesia

					Nutrients per kg		Nutrients per family per day	
	Worker (man) in kg	Wife in kg	2 children in kg	Total family in kg	Calories	Proteins	Calories	Proteins
Bread	61.97			61.97	2600	100	447.57	17.21
Maize Meal	236.08	229.671	235.56	701.31	3,650	70	7110.51	136.37
Meat	70.82	23.556		94.38	2,500	200	655.42	52.43
Fish (frozen)	11.80			11.80	1,000	220	32.79	7.21
Groundnuts shelled	35.41	11.778		47.19	5,670	248	743.24	32.51
Beans	23.61	11.778		35.39	200	15	19.66	1.47
Vegetables	30.99			30.99	400	9	34.43	0.77
Fruit	30.99			30.99	520	3	44.76	0.26
Total							9088.37	248.24

Source: Northern Rhodesia's Chamber of Mines Year Book 1956

Appendix C: Data Sources

Wage Data for Katanga: Yearbooks of UMHK Native Labour Department 1920-1965

Price data for Katanga: Yearbooks of UMHK Native Labour Department 1920-1965, Annuaires Statistiques de la Belgique et du Congo Belge

Maize: Yearbooks of UMHK Native Labour Department

Meat: Yearbooks of UMHK Native Labour Department

Palm Oil: Yearbooks of UMHK Native Labour Department

Salt: Yearbooks of UMHK Native Labour Department

Cotton cloth: 5% of total cost of subsistence basket

Soap: Congolese Import Statistics *(*Annuaires Statistiques de la Belgique et du Congo Belge) plus 20% of its value ; other, 2.5% of total cost of subsistence basket

Kerosene: Congolese Import Statistics *(*Annuaires Statistiques de la Belgique et du Congo Belge) plus 20% of its value for selected years ; other, 2.5% of total cost of subsistence basket

Candles: 2.5% of total cost of subsistence basket

Charcoal: provided for free by UMHK

Wage data for the Rhodesian Copperbelt : Official report on the mine of Mufulira (1930-1949); Year Books of Northern Rhodesia's Chamber of Mines (1950 to 1960)

Price data for Rhodesian Copperbelt: Colonial Blue Books of Northern Rhodesia, which are retail prices for Livingstone (1929 to 1948) (TNA CO100/30-96)

Maize: Colonial Blue Books (1929 to 1948), 1955 report on costs of living by Mufulira Mining Ltd.

Meat : Colonial Blue Books (1929 to 1948), 1955 report on costs of living by Mufulira Mining Ltd.

Palm Oil: British trade statistics, average export price of colonies in Africa, minus 20% margin

Salt: Colonial Blue Books (1929 to 1948), 1955 report on costs of living by Mufulira Mining Ltd.

Cotton Cloth: British African import prices reported in British trade statistics, plus 20% margin

Soap: Colonial Blue Books (1929 to 1948), 1955 extrapolated

Kerosene: Colonial Blue Books (1929 to 1948), 1955 report on costs of living by Mufulira Mining Ltd.

Candles: 2.5% of total cost of subsistence basket

Charcoal: 7.5% of total cost of subsistence basket

Literature:

Acemoglu, Daron., Johnson, Simon and Robinson, James. A. (2001). "The Colonial Origins of Comparative Development: An Empirical Investigation." The American Economic Review 91 no. 5: 1369-1401.

Allen, Robert C. (2001). "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War." Explorations in Economic History 38, no. 4: 411- 447.

Allen, Robert C., Bassino, J. P., Ma, D., Moll-Murata, C., & Van Zanden, J. L. (2011). "Wages, Prices, and Living Standards in China, 1738-1925: In Comparison with Europe, Japan, and India." Economic History Review 64, no. 51: 8-38

Berger, Elena (1974). Labour, Race, and Colonial Rule, the Copperbelt from 1924 to Independence. Oxford: Oxford University Press.

Brion, R and J.-L. Moreau (1998), Société Générale de Belgique, 1822-1997, Antwerp: Fonds Mercator.

Browne, G. St. J. Orde. (1967). The African Labourer. 2nd ed. London: Frank Cass and Company Limited.

Buelens, Frans, and Stefaan Marysse (2009): "Returns on investments during the colonial era: the case of the Belgian Congo." The economic history review 62(1): 135-166.

Burdette, Marcia M. (1990). “Industrial Development in Zambia, Zimbabwe and Malawi: The Primacy of Politics”, In: (ed. Zbigniew A. Konczacki, Jane L. Parpart and Timothy M. Shaw): Studies in the Economic History of Southern Africa. 2 vols. Vol. 1. London: Frank Cass.

Butler, Larry J. (2007).Copper Empire: Mining and the Colonial State in Northern Rhodesia 1930-1964. Palgrave Mc Millan.

Coleman, Francis (1971). The Northern Rhodesia Copperbelt 1899 - 1962. Manchester: Manchester University Press.

De Haas, Michiel (2014). Measuring Rural Welfare In Colonial Uganda: Why farmers would not work for wages. AEHN Working Paper Series No. 18

Feinstein, Charles (2005). An Economic History of South Africa: Conquest, Discrimination and Development. Cambridge: Cambridge University Press.

Ferguson, James (1999). Expectations of modernity :Myths and meanings of urban life on the Zambian Copperbelt (first edition in 1959). Berkeley, California: University of California Press.

Frankema, Ewout and Frans Buelens (eds). (2013). Colonial Exploitation and Economic Development: the Belgian Congo and the Netherland Indies in Comparison. London: Routledge.

Frankema, Ewout and Marlous Van Waijenburg (2012). Structural Impediments to African Growth? New Evidence from Real Wages in British Africa, 1880–1965. The Journal of Economic History, 72, pp 895-926.

Guenne, Enid (2013). Copper, Borders and Nation-Building: the Katangese Factor in Zambian Political and Economic History. University of Leiden Master thesis

Higginson, J. (1988). "Bringing the workers back in: worker protest and popular intervention in Katanga, 1931-1941. ." Canadian Journal Of African Studies / Revue Canadienne Des Études Africaines no. 22 (2):199-223.

Higginson, J. (1988). "Disputing the Machines: Scientific Management and the Transformation of the Work Routine at the Union Miniere du Haut-Katanga, 1918-1930." African Economic History no. 17:1-21.

Hoschschild, David (1999). King Leopolds's Ghost. Houghton Mifflin Harcourt.

Houben, V., & Seibert, J. (2013). "(Un) freedom Colonial labor relations in Belgian. Colonial Exploitation and Economic Development: The Belgian Congo and the Netherlands Indies Compared". In: Colonial Exploitation and Economic Development, pp. 64-178 (Ch. 8).

Huillery, E. (2011). "The impact of European settlement within French West Africa : did pre-colonial prosperous areas fall behind?" Journal of African economies, 20(2): 263-311.

Katzenellenbogen, Simon Ellis (1975). The miner's frontier, transport and general economic development. In: P. Duignan & L.H. Gann (ed.). Colonialism in Africa (1870-1960). Vol. 4: The economics of colonialism. Cambridge: Cambridge University Press

Katzenellenbogen, Simon Ellis (1973). Railways and the copper mines of Katanga. Clarendon Press.

La Porta, R., Lopez-De-Silanes, F., Schleifer, A. and Vishny, R. W. (1999). The quality of government. Journal of Law, Economics and Organization 15, pp. 222–82.

Maddison, A. (2010). Historical Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD http://www.ggdc.net/maddison/.

Parpart, Jane L. (1983). Labour and Capital on the African Copperbelt. Philadelphia: Temple University Press.

Perrings, Charles. (1977). " 'Good Lawyers But Poor Workers': Recruited Angolan Labour In The Copper Mines Of Katanga, 1917-1921." Journal of African History no. 18 (2):237-259.

Perrings, Charles. (1978). "Labour migrancy: concept and reality in the mining industry of Katanga 1911-1941." Enquêtes et documents d'histoire africaine no. 3:39-103.

Perrings, Charles. (1979). Black Mineworkers in Central Africa. Industrial strategies and the evolution of an African proletariat in the Copperbelt 1911-1941. London: Heinemann.

Roberts, Andrew D. (1976). A history of Zambia. New York: Africana Publishing and Co.

Rodney (1972). How Europe underdeveloped Africa. London: Bogle-L'Ouverture Publications

Rönnbäck, K. (2014). Living standards on the pre-colonial Gold Coast: a quantitative estimate of African labourers' welfare ratios. European Review of Economic History. 18(2), 185-202.

Sauerbeck, Augustus (1951), "Wholesale Prices in 1950." Journal of the Statistical Society of London 114 (3): 408-422.

Unknown. (1947). "Social Policy of Union Minière du Haut Katanga." African Affairs no. 46 (183):87-89.

Van Zanden, Jan Luiten. (2009). The skill premium and the 'Great Divergence'. European Review of Economic History, 13(1), 121-153.

De Zwart, Pim (2011). South African living standards in global perspective, 1835–1910. Economic History of Developing Regions, 26(1), 49-74.