UNDERSTANDING THE ROLE OF COMPETITION IN RETHINKING REGIONAL INTEGRATION IN AFRICA FOR INCLUSIVE AND SUSTAINABLE DEVELOPMENT

Paper for the African Economic Research Consortium: Rethinking Regional Integration in Africa for Inclusive and Sustainable Development

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Abstract

This paper addresses the role of competition and competition law enforcement at a regional level in deepening regional economic integration and trade. In many key industrial products markets are highly concentrated both at national and regional levels due to scale economies and therefore are susceptible to cartelisation or monopolisation. The cement industry, which is the focus of this study, illustrates the importance of understanding firm behaviour in an oligopolistic context, and especially where there is both multi-market contact and cross ownership. This is best illustrated perhaps by LafargeHolcim which has cement plants in seven of the countries examined here. Its decisions at group level directly impact on trade and investment across the region. This paper assesses how new entry and competition enforcement have affected cross-border trade and domestic prices in the countries of the East African Community and Southern African Development Community. Dangote is the most significant and most disruptive entrant, having established plants in four countries at scale (Ethiopia, South Africa, Tanzania and Zambia) and pursuing an aggressive pricing strategy to build market share. Our assessment points to reductions in real prices following entry and more effective competition. Real prices declined by between 10.9 and 11.7 per cent in Kenya between 2014 and 2018, and by more than 40 per cent in Zambia between 2014 and 2016. These mark-ups are economically significant and in line with studies of the effect of the cement cartel in South Africa and Germany.

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1   Introduction

Regional integration is seen as a vehicle for growth, economic diversification and addressing Africa's youth employment challenges (African Union Commission, 2015). The latest effort by African leaders to deepen regional integration, and thus industrialization, is the African Continental Free Trade Area (CFTA).[2] Despite the many regional economic communities (RECs), and the fact that every African country is a member of at least one REC, African countries trade little with each other, with intra-Africa trade around 12-15 percent of Africa's total trade, way below other regions of the world (Hoekman et al., 2017). This weak intra-Africa trade is largely attributed to low levels of intra-industry trade within the continent. One of the possible obstacles to deepening integration could be the lack of harmonised enforcement of competition policies within the RECs, which has enabled incumbent firms to thwart integration efforts.

This paper presents qualitative and quantitative analyses of the effects of entry and competition in enhancing integration of markets, with reference to the cement industry in Southern and East Africa.[3] Many key industries such as fertilizer, sugar, poultry and cement exhibit high concentration, both within countries and regionally (Roberts, 2016). In addition, the lead firms in these industries are part of multinational groupings and compete against one another in several markets (World Bank, 2016; Bernheim and Whinston, 1990). High levels of concentration and multimarket contact mean a greater likelihood of coordination to divide markets and undermine vigorous competition, potentially negating the benefits from REC participation. This suggests the need for appropriate regional competition enforcement (Roberts, Simbanegavi and Vilakazi, 2017).

Few studies have considered the impact of anti-competitive conduct in cement (and other industries) in Africa, aside from South Africa. Therefore, this paper is an important contribution to understanding the extent of harm arising from these arrangements, and the role of policies and competition agencies in addressing these issues as part of a broader regional integration and industrial development agenda. We consider developments in Southern Africa and East Africa, including a focus on Zambia, Kenya and Tanzania on which we have been able to compile monthly or quarterly pricing data, information on entry and expansion of rivals. We assess the relationships with trade flows with neighbouring countries and with imports from outside Africa.

Cement was selected as it is a key input to construction and infrastructure development. Production is in relatively large-scale plants typically located close to limestone deposits. Further, cement is a relatively homogenous product and its production is characterised by high sunk costs. As such, there are relatively high levels of concentration and the closest supplier for a given urban area may be across the border. The oligopolistic characteristics and

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[2] Eight key regional economic blocks form the foundation for an economically integrated Africa. These are: Arab Maghreb Union (AMU), Community of Sahel-Saharan States (CEN-SAD), Common Market for East and Southern Africa (COMESA), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), and Southern African Development Community (SADC).

[3] The research relies on a mixed methodology using qualitative and quantitative data gathered through detailed firm-level interviews with companies in South Africa, Tanzania and Zambia. We analyse key trends and changes in the price outcomes in the countries of interest and juxtapose these with changes in market structure and other market characteristics over time.

geography both mean intra-industry trade is likely to be important. These are features that are present to varying extents in other industries where the scale of investments mean that national markets will be very concentrated and regional integration can mean more competition.

The cement industry has also had a record of collusion, both in the southern Africa region, and around the world (Competition Tribunal South Africa, 2015; Connor, 2014). The sector has been the subject of investigations by competition authorities in several countries in southern and East Africa, as well as large mergers (notably of Holcim and Lafarge in 2015 to create LafargeHolcim[4]) and entry challenging the incumbent producers. Following the Competition Commission of South Africa uncovering the cartel arrangements which affected the Southern African Customs Union (SACU) market until 2009, Zambia's Competition and Consumer Protection Commission (CCPC) initiated an investigation of excessive pricing and price discrimination against Lafarge Zambia, with the case being finalised in 2017 (CCPC, 2017). At the same time, a new producer, Dangote Cement, entered the market (at significant scale) in Zambia, South Africa, Tanzania and Ethiopia around 2015. The impact of this entry, as well as that of other companies in South Africa, Kenya and Ethiopia has been significant, with important price and non-price effects, as analysed in this paper.

Along with a focus on the impact of entry in the region, the paper considers the role of local industrial and trade policies. The assessment shows that the removal of import restrictions on cement has enabled the flow of cheaper cement across borders, such as from Zambia to Malawi, with significant reductions in local prices in neighbouring countries. In terms of the cartel overcharge, we find overcharges of up to 40 percent in Zambia, and between 10.9 and 11.8 percent in Kenya during the apparent 'cartel' periods. These impacts are broadly in line with recent empirical studies of the impact of the cartel in South Africa on cement prices by Govinda et al. (2016), Theron and van Niekerk (2017), and Boshoff and Van Jaarsveld (2019) who estimated mark-ups from the cartel in the range of 7.5% to 19.9%. These estimates, while large, are likely to understate the dynamic impact of these arrangements in the wider regional market.

The paper is structured as follows: section 2 provides a brief overview of the relevant literature on competition and integration, cartels and cartel overcharges, and recent studies in the region. Section 3 provides background on the structure of cement markets in East and Southern Africa. Section 4 analyses southern Africa and the impact of entry into Zambia and South Africa of Dangote, while section 5 analyses developments across East Africa, with a focus on Kenya and Tanzania. Section 6 estimates the price overcharge in Zambia and Kenya and section 7 concludes.

2 Competition, cartels and regional integration

2.1 Competition and regional integration

To understand the development of regional markets we must analyse the extent of competition (the market structure and conduct of firms, across borders) and competitiveness (the development of productive capabilities) as well as the distribution of gains from integration. This involves analyzing the investment, production and pricing decisions of large firms, some

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[4] We refer to the companies separately in the paper where the data relates to when they were separate entities.

of which are part of international corporate groupings. Strategies of multinational firms can influence trade flows. For example, Lafarge's subsidiary in Zambia was allocated the DRC cement market in exchange for not competing with the Lafarge business in Tanzania (in Mbeya) in the Burundi and Rwanda markets (UNCTAD, 2005; Ellis, et al., 2010). In addition, as the evidence of the cartels uncovered in South Africa shows, cartels and anti-competitive conduct tend to span multiple countries (Roberts et al., 2017). Such anticompetitive conduct is amplified where there is multi-market contact and common shareholdership.

Thus, regional integration does not necessarily result in increased trade. Regional cartels can operate by dividing markets on a country-by-country basis, thus thwarting the main avenues through which regional integration can enhance welfare – increased product variety and increased competition.[5] For example, cartels have operated in this way across southern Africa in cement, concrete products and fertilizer (Vilakazi and Roberts, 2019). In general, market power of large firms, whether exerted unilaterally or through coordination with each other, causes harm to consumers and, where products are intermediate inputs, to downstream industries, and thus harms economic development. For example, higher prices in fertilizer, cement and telecommunications undermine the competitiveness of key activities in agriculture, infrastructure and services.[6] With strong competition enforcement, regional economic integration can deliver substantial economic benefits to the RECs.[7]

As countries growth and industrialise, investments are required in larger-scale production plants to realise scale economies and lower production costs. Regional integration makes such investments more attractive due to the wider market that can be accessed. Large firms thus shape the economy in making the investments required in productive capacity, and providing the upstream inputs and services required by smaller businesses. In many areas, large firms are also the main routes to market (for example, in the case of supermarket chains). It is therefore critical whether large firms extract rents through anti-competitive conduct or whether the profits earned reward effort, creativity and entrepreneurship.

While much of the regional integration agenda has focused on reducing tariff and non-tariff barriers as well as on improving infrastructure, it is well recognised that in oligopolistic and monopolistically competitive industries trade flows are strongly influenced by the degree and nature of competition. The gains from trade in models that assume perfect competition are the effects of specialisation and exchange, which are much smaller between countries that have similar endowments and productive structure. However, with imperfect competition and scale economies, gains from integration of similar economies can be substantial. Imperfect competition allows for differentiated products and, together with regional integration, promotes intra-industry trade and thus greater variety for consumers (Ruffin, 1999). Notwithstanding these potential gains, incumbent firms in national markets will lobby for national policies and

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[5] Indeed, Schröder (2007) and Agnosteva et al. (2017) show that regional integration can, under certain conditions, improve cartel discipline.

[6] Recent studies have highlighted the extent to which there are price mark-ups due to low levels of competition (see, for example, World Bank 2016). Food in African cities has also been found to be around 35 per cent more expensive than in comparator countries (Nakamura et al., 2016), and it is likely that competition issues are partly to blame. Competition enforcement in South Africa has revealed the wide extent of cartel conduct in that economy. What is less well appreciated is that many of these cartels were regional in scope, operating across southern Africa (Kaira, 2017; Roberts et al., 2017).

[7] Studies of the European single market have found substantial gains from increased competition, in terms of both static and dynamic effects (Dahlberg, 2015; Henrekson et al, 1997; Berthelon, 2004).

trade barriers and/or engage in anticompetitive practices in order to protect their market power and profits.[8]

As noted earlier, to the extent that larger regional markets constrain the market power of the dominant national monopolies and oligopolies, regional integration provides direct gains to consumers and downstream firms.[9] This is dependent on effective regional enforcement against anti-competitive co-ordination between firms, such as to divide markets on national borders. Such enforcement requires co-operation across competition authorities, and regional competition bodies. Encouragingly, there has been a rapid increase in the number of African countries with competition authorities, with more than half the countries in Africa establishing authorities over the past two decades, along with regional competition authorities in some parts of the continent (such as Comesa Competition Commission, EAC Competition Authority and the competition authority of WAEMU). There is need to strengthen these institutions in order to enhance the quality of competition enforcement.

There is also a set of questions relating to increasing competition through reducing barriers to entry, especially as it relates to growth of smaller firms, thus widening economic participation. This links to policies at the national level, however, a policy agenda to open-up markets will be more influential if also pursued at a regional level, linking with development finance, skills development and lowering regulatory barriers to smaller firms.

2.2   Cartels and overcharges

Firms in oligopolistic markets have multiple strategies at their disposal to mitigate competition. For example, incumbent firms can agree to divide the market among themselves, so that each firm becomes a de facto monopolist on their turf. They can also engage in price fixing and/or tacit collusion. Indeed, the defining feature of oligopoly is that firms realise that their own payoffs not only depend on their own actions, but also on the actions of competitors. Cartels allow firms to price above the competitive level wherein firms price above and/or supply quantities below those which would maximise short term profits in order to sustain higher profits in the medium term.[10] In key input markets such as cement, collusion can raise the costs of downstream activity such as infrastructure development.

An interesting question is how regional economic integration affects cartels. Studies of the European single market have found substantial gains from increased competition, in terms of

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[8] Malawi and Zimbabwe have, at times, imposed tariffs on imports of cement from REC member countries following pressure from local cement producers (see Section 4). The sugar industry in most countries is associated with interventions and regulations which have seen countries exporting to deep-sea markets while protecting their domestic market to the disadvantage of downstream sectors such as confectionary (das Nair et al., 2017).

[9] However, support for regional integration will quickly dissipate if the majority of the gains are in the larger economies and industrial centres, even if the prices charged to consumers across countries are competitive. This has fundamental implications for the broad policy agenda required to sustain support for integration.

[10] Collusion is more likely in markets with few firms, relatively homogenous products, high barriers to entry, stable demand conditions, firm symmetry, multi-market contact between firms, and cross-ownership, and where there is sharing of disaggregated information (Bernheim and Whinston, 1990; Motta, 2004; Harrington, 2006). A number of these characteristics are true of the cement industry. The foremost source of information on international and domestic cartels, including on cartel overcharges, is Connor (see Connor, 2014). Unfortunately, the dataset focuses largely on the US, EU and other developed jurisdictions such as Canada for which there is a richer history of enforcement against and documentation of cartel conduct and overcharge (Connor, 2014: 34).

both static and dynamic effects (Dahlberg, 2015; Henrekson et al, 1997; Berthelon, 2004). However, as shown by Schroeder (2007), lowering the costs of regional trade as part of economic integration has ambiguous implications for cartel stability. It can make collusion more difficult to sustain, although it can make price setting cartels more stable if unit trade costs are reduced (Schroeder, 2007; see also Agnosteva et al., 2017). Regional integration is thus no substitute for robust competition enforcement. In addition, colluding firms can lobby to maintain trade barriers in order to make coordination more stable.

Various cartels have been uncovered in the cement industries of countries in Europe including Germany, Norway, Austria and Poland. In each case, there has been a clear overlap in the firms that are involved in each country. Indeed, the largest cement producers globally, including Lafarge, Holcim and Heidelberg, have operations and have been prosecuted for cartel conduct throughout the world (Connor, 2014). Hüschelrath et al. (2013) carried out a study of the German cement cartel. They find fairly large overcharges, ranging from 20.7% to 26.5%.[11,]

In Africa, several studies have been carried out for the cement market in South Africa.[12] Govinda et al. (2016) estimate the cartel overcharge in the South African cement market using the *during and after* approach to discern the counterfactual price. They consider the period January 2008 to December 2012. The cartel was uncovered in 2009. They find overcharges of between 7.5% and 9.7% and conclude that the busting of the cement cartel saved South African consumers between $104 million and $132 million per annum. Since the cartel spanned all SACU countries and beyond, the estimated consumer savings can be considered a lower bound as the study does not consider the effects outside South Africa. Theron and van Niekerk (2017) and Boshoff and Van Jaarsveld (2019) also study the South African cement cartel, but consider a much longer period and allow for a period of adjustment or regime switching from cartel to a post-cartel competitive market (to take account of long-term contracts and other reasons for inertia). Theron and van Niekerk (2017) find overcharges of between 8.7% and 17.9%, and Boshoff and Van Jaarsveld (2019) estimate mark-ups from the cartel of 19.2% to 19.9%.

The evidence above confirms the findings in the international literature that cartel overcharges, and thus welfare losses, are quite large, even when abstracting from the harm arising from cross-border anti-competitive conduct. To mitigate potential harm from cross-border anti-competitive practices, competition considerations ought to be an integral component of regional economic integration.

3   Background on the cement industry in Southern and East Africa

The cement industry in Southern and East Africa is highly concentrated with a small number of cement companies operating across the countries considered (Table 1). Three companies have dominated, Lafarge (from 2015 LafargeHolcim), Afrisam (spun out of Holcim before the merger with Lafarge) and PPC (Amunkete. al, 2016). In many countries on the continent a

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[11] There is a growing number of studies in South Africa which have estimated cartel overcharge for various cartels in the domestic market. The foremost of these are by Mncube (2013) on wheat flour, Khumalo et al. (2014) on precast concrete pipes, and Boshoff (2013) on the bitumen cartel. They all find fairly large overcharges.

[12] The legal cement cartel in South Africa that existed prior to 1995 gave rise to an illegal arrangement from late 1998 which affected not only South Africa but the whole of SACU.

single producer had a share of more than 50% (World Bank, 2016). Smaller and less industrialised economies tend not to have large-scale production and instead are importers (such as Botswana, Burundi, Lesotho and Swaziland which are thus not recorded in Table 1).

It is also important to distinguish between producers who manufacture clinker from limestone, which is the main cement ingredient, from those who buy the clinker (including importing) and simply have grinding plants to manufacture the finished cement. The grinding businesses can be smaller-scale, and firms who do not produce their own clinker tend to be less effective independent competitors, and could be viewed as a competitive fringe. They may also operate as satellites for a clinker producer in another area. Including the grinding plants means the markets may appear less concentrated than they really are when taking into account just the lower-cost clinker manufacturers (see Table 1).

Considering plants with clinker manufacturing, LafargeHolcim and PPC have the largest capacity at just over 10mn tonnnes each, followed by Dangote at 9.3mn tonnes and Afrisam at 6.8mn tonnes (Table 1). This is followed by the 4.7mn tonne capacity of Brazil's Intercement which owns plants in South Africa and Mozambique, and the locally owned Tororo with 3.4mn capacity in plants in Uganda and Kenya, and ARM with 2.6mn capacity in plants in Kenya and Tanzania.

Table 1. Capacities of main producers, associated businesses, and grinding plants (in italics) (mn tonnes), by country, 2017

	LafargeHolcim	Afrisam	PPC	Dangote	Others
Zambia	1.4 (Lusaka & Ndola)			1.5 (Ndola)	ZPC 0.7 Scirocco 0.3
Zimbabwe	0.4		1.4		Sino 0.3 *Livetouch 0.4*
South Africa	3.2	4.6	6.8	2.8	Intercement NPC 1.6 Mamba 1
Malawi	0.3				*Shayona 0.2*[13] Cement Products 0.5
Namibia					Ohorongo (Schwenk) 1
Mozambique					Intercement Cimpor 3.1[14] *Heidelberg 0.4*
Kenya	Bamburi 1.6 EAPC 1.3				ARM 1.0 Mombasa (Tororo) 1.6 *National 1.0* *Savannah 1.5*
Tanzania	Mbeya 1.1	Tanga 2.2		Mtwara 3.0	TPCC (Heidelberg) 1.9 ARM 1.6 *Camel 0.2* Lake 0.6
Uganda	Hima 0.8				Tororo 1.8 Kampala 1.2 *Simba (National) 1.0*
Rwanda			Cimerwa 0.6		*Kigali Cement (ARM) 0.1*
Ethiopia			Habesha 1.4	2.0	Derba 1.7 Messebo 1.5 Mugher 0.7 East 0.4 National 0.4

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[13] Calculated from its 650 ton per day production and 300 days of production in a year
[14] African Review. (2015). *Cimpor to expand presence in Mozambique*. Available at: http://www.africanreview.com/construction-a-mining/cement/cimpor-to-expand-presence-in-mozambique

The position of Dangote is the largest change in the industry in many years from its entry around 2014/15 across the region with large-scale and efficient plants (in Tanzania, Zambia, South Africa and Ethiopia). There had also been several smaller entrants into some countries such as Zambia (ZPC and Scirocco), Malawi (Cement Products and Shayona), Kenya (where National Cement and Savannah Cement entered in 2011 and 2012, with grinding plants), Tanzania (Lake Cement entered in 2014 and ARM expanding from Kenya with a clinker plant in 2015). In Ethiopia, the entry of Dangote followed that of Derba in 2012 (see Tefera and Roberts, 2019).

Cement prices have varied substantially across countries and over time (Figure 1). If competition is effective, as one would expect of regionally integrated markets, one would not expect large spatial price dispersion to persist as such large price differences present arbitrage opportunities that can easily be exploited, bringing convergence in prices.[15] The figure, however, indicates very substantial price differences between countries, including neighbours. For example, prices in Zambia prices remained substantially above those in Tanzania as well as in South Africa for much of the period, despite all three being in the Southern African Development Community which established a free trade area in 2008. Prices in Kenya were substantially above those in Tanzania until 2012/13, despite being neighbours and members of the East African Community. The figure does then reflect a substantial convergence in 2015-2017.

Figure 1. Estimated ex-factory (producer) prices
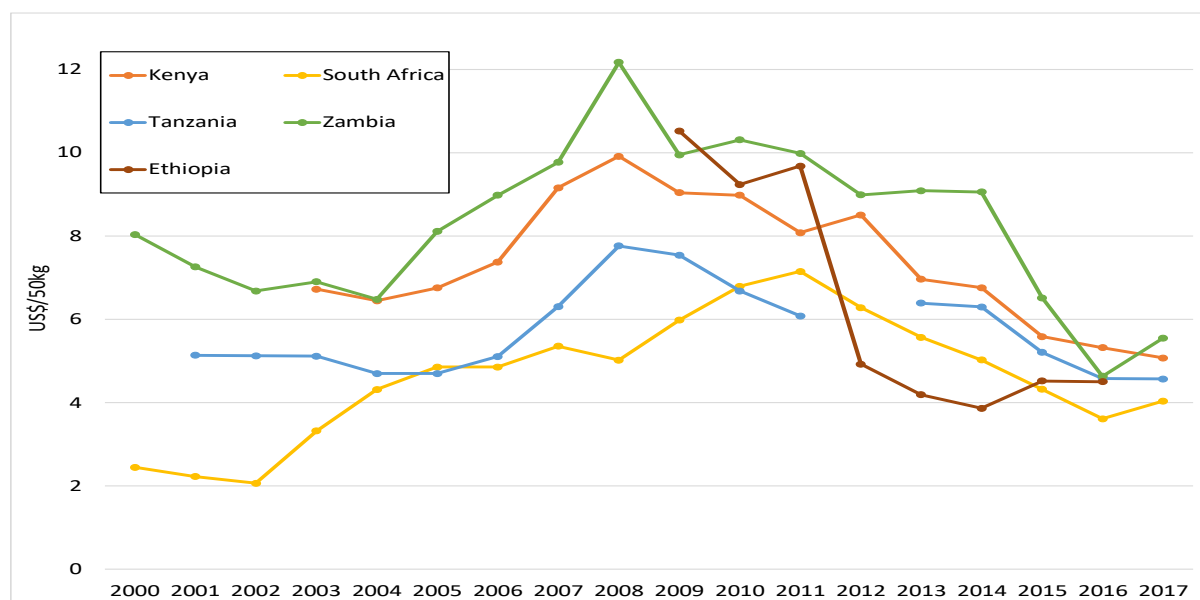
Source: Authors calculation from Amunkete et al. (2016), cement producer interviews, Statistics South Africa, Tanzania National Bureau of Statistics, Zambia Central Statistical Office (CSO), Kenya National Bureau of Statistics (KNBS) data, Ethiopia Central Statistical Agency data.

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[15] The price trends in US$ are impacted by exchange rate fluctuations as stronger currencies during the resource boom translated into higher US$ prices for cement. We therefore also analyse local price trends to abstract from exchange rate effects.

The main costs of cement manufacturing are energy and the mining of limestone (where limestone is available, as it is in all of these countries). In addition, transport costs are substantial given that the product has a low value to mass ratio. These factors imply that the regional dimensions of competition are potentially limited.

In some countries, such as Ethiopia, the high prices around 2009 were due to supply constraints and the need to import to meet the demands of a booming economy (Tefera and Roberts, 2019). Prices were thus at inland import prices in 2009 to 2011, and were similar to both Zambia (which was a net exporter) as well as Kenya, in these years. With major new capacity coming on stream in Ethiopia in 2012 prices fell and there was no need for imports, with instead small exports from 2014. In Kenya and Zambia prices remained high relative to other countries up to 2015, even while there were both exports and imports in most years, as we assess in more detail in sections 4 and 5.

4   Assessing regional competition and entry in Southern Africa

We now focus in more detail on countries in Southern Africa subject to data availability. The Southern African Customs Union (SACU) is treated as a whole given that it has been a long-established free trade area, reflected in the cement producers organising a cartel across the whole of SACU. The cartel which operated across SACU has been analysed for its effects in South Africa after being uncovered by the the South African Competition Commission in 2009 (Govinda et al, 2016; Theron and van Niekerk, 2017). It provides insights into how collusion operates on a regional basis. We then consider the market outcomes and trade in other countries in the region, focusing in particular on Zambia.

Southern African Customs Union

Under the SACU cartel, market shares were fixed by the producers for sales to the SACU region as a whole. This understanding was reached following the end of the legal cartel in 1995 and a period of competition from 1996 to around 1998 when producers met to agree to coordinate once more (Boshoff and Van Jaarsveld, 2019; Vilakazi, 2019). The producers continued to meet to agree on the terms of how the cartel should operate through until 2002. The agreement on market shares for SACU removed price competition between the suppliers. The neighbouring countries to South Africa largely did not have production capacity themselves. The companies in the SACU cartel had a presence in other countries in southern and East Africa (Table 1 and Figure 2). These included the producers in the south of Mozambique, where NPC-Cimpor had a plant, and in Zimbabwe where there were Lafarge and PPC plants. Imports from these countries therefore posed no competitive threat. The four companies, Lafarge, PPC, Afrisam and NPC-Cimpor (subsequently InterCement) could push up prices until deep sea imports became attractive, and further motivated for anti-dumping duties to reduce this competitive threat (Vilakazi, 2016).

The cement cartel existed up to 2009 and significantly influenced competition between the main players outside of South Africa, especially in the SACU countries. The cartel was sustained by, among other things, detailed information exchange among the colluding parties. The complex information exchange arrangements involved tracking information on exports as well (Mncube et al., 2017). It is also known that the players allocated region and country markets – for example, PPC agreed with other members that it would not compete in northern KwaZulu-Natal region in South Africa in exchange for Lafarge not competing with PPC in the

Botswana market (Competition Commission of South Africa Press Release, 11 November 2009). This raises questions as to whether similar understandings were reached regarding other African countries, for example Zambia and Malawi, where these firms had presence.

Figure 2. Cement plants in Southern Africa, 2016
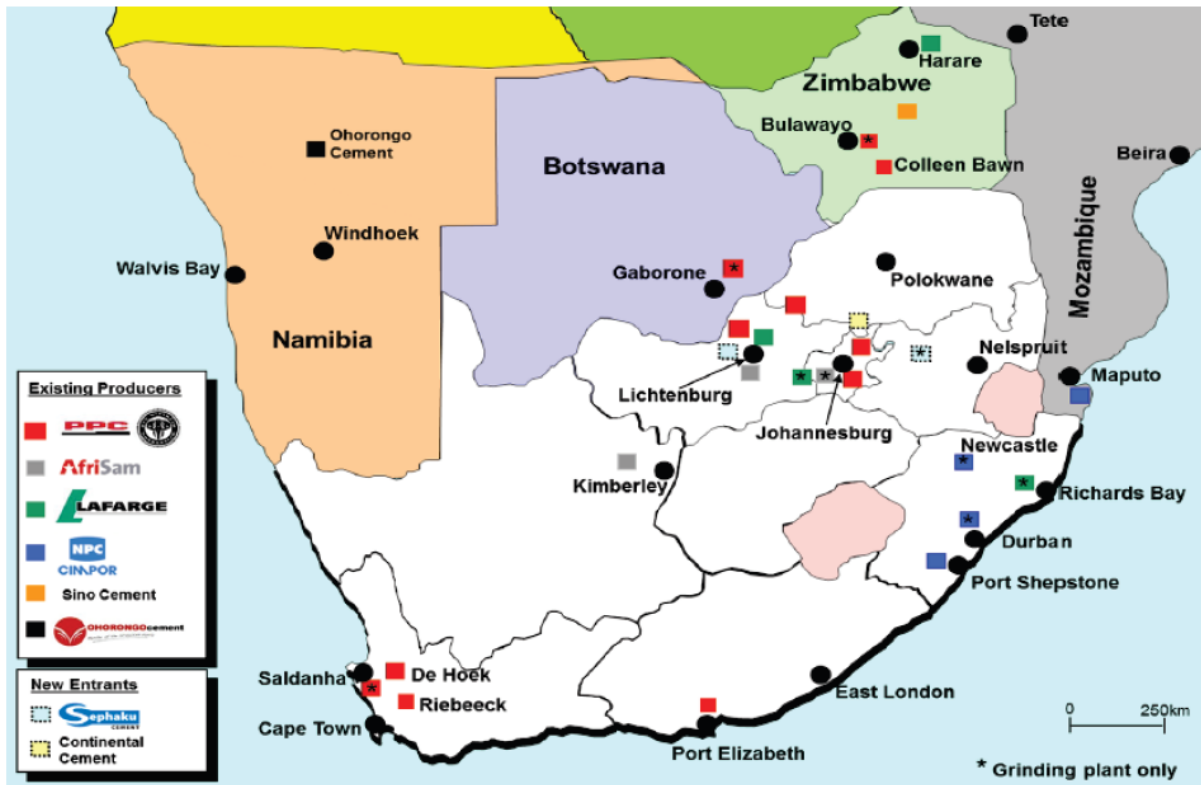

Source: AfriSam (2017)

Notwithstanding substantial transport costs, trade has been important, taking into account the location of limestone resources relative to the main areas of demand and economies of scale. Botswana, Lesotho and Swaziland rely on imports (and the cartel effectively allocated these countries to a single company who exported to them) and, until 2011 when the entrant, Ohorongo Cement, started production, Namibia was in the same situation (Table 2). Ohorongo Cement was also located in order to supply Angola.

Table 2. Timeline of entry and capacity expansions

2011	Namibia: Ohorongo starts cement and clinker production
2012	Malawi: Cement Products Limited began production of cement at Njereza with a production capacity of 0.4 mtpa
2014	SA: Sephaku (Dangote), with cement production starts January 2015 using own clinker production
2015	Malawi: Shayona Cement commissioned a second phase grinding plant SA: Mamba (Continental) Cement starts production Zambia: Dangote starts production
2016	Zambia: Lafarge commissioned a plug and grind cement plant that increased cement production at the Ndola plant by 0.1 mtpa Zimbabwe: PPC Harare was commissioned
2017	Lesotho: Afrisam commissioned a cement blending and packing facility in Maseru Zimbabwe: Livetouch Investments began production at its 0.4 mtpa grinding facility in Redcliff
2018	Mozambique: Limak cement opened a new plant in Matola

The effect of the ending of the cartel can be seen in the nominal and real price trends for South Africa (Figure 3). Under the cartel, prices were increased twice yearly (in January and June) and discounting was limited. Nominal prices fell noticeably for the first time at the beginning of 2011 and in 2017 remained below the levels in 2010, implying substantial reductions in real terms consistent with the mark-ups which have been calculated. In South Africa, which exports substantial quantities of cement to its SACU neighbours, the entry of Sephaku Cement[16] and Mamba (Continental) Cement in 2014 and 2015, respectively, significantly increased the supply of cement and placed further downward pressure on prices.

Figure 3. Producer Price Index, Ordinary and Extended Cement, South Africa
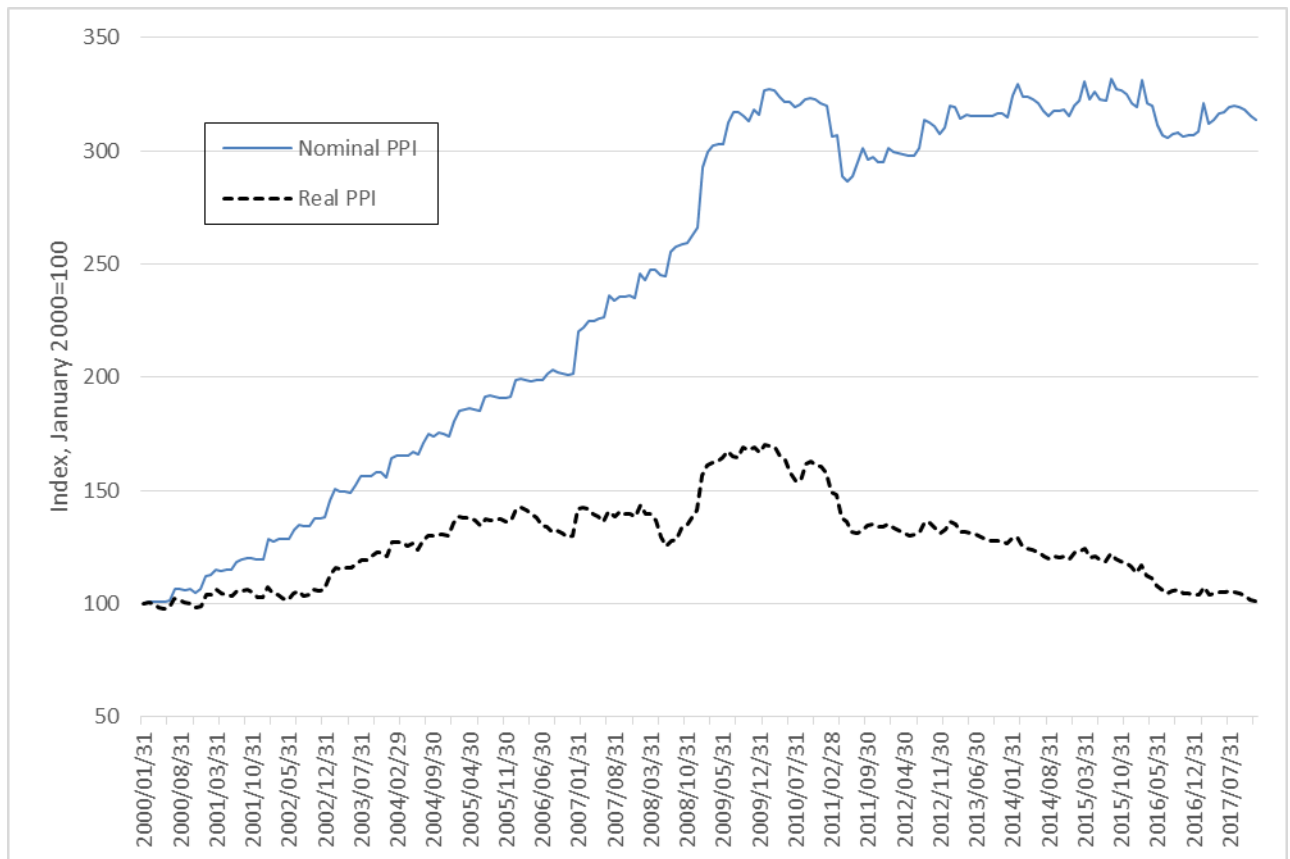
Source: Statistics South Africa
Note: Deflated using the PPI for domestic output for South Africa (All Groups) between 2000 and 2012 and the PPI for Final Manufactured goods between 2012 and 2017 (as there is not a single series throughout).

Sephaku and Mamba Cement have their plants located in the North-West and Mpumalanga provinces of South Africa (Figure 2 above), close to Gauteng and also well positioned to export to Botswana, Lesotho and Swaziland. It is therefore competition in terms of cross-border trade because of entry in South Africa which has reduced prices in these countries. In Namibia Ohorongo would be a national monopoly if it did not face competition from South African producers.

The entry of Dangote's Sephaku Cement illustrates the obstacles and incumbent strategies which have to be overcome. Sephaku had apparently initially not sought to compete vigorously

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[16] First bag produced in January 2014, but started producing using its own clinker in January 2015.

with the incumbents in simple price terms.[17] However, retail hardware chains, as an important route to market for cement manufacturers in South Africa, refused to stock it or placed onerous requirements.[18] For example, Massmart's Builders Warehouse required a R5 million listing fee before they could stock Sephaku Cement. Faced with this barrier in the main existing routes to market, Sephaku Cement decided to disrupt the market using independent retail traders and small retail stores and price about R10/bag (around US$1 at the time) *below* the prevailing market price.[19] Sephaku Cement was able to gain significant market share by undercutting its rivals and attracting customers away from the main retail chains.[20] As the price war continued, and margins dropped, Builders Warehouse began to stock Sephaku Cement when it became clear that the other manufacturers would not match the same wholesale price that Sephaku Cement was offering.[21] It still did require that Sephaku Cement pay large amounts per store to have their cement stocked.[22]

Deep sea imports have also played a role in South Africa in capping local prices. Between 2010 and 2015, there was significant growth in imports to South Africa, primarily from Pakistan, that competed with local cement products. At their peak in 2014, imports made up about 11% of total cement consumption in the country (Vilakazi, 2016). In 2015, the International Trade Administration Commission of South Africa (ITAC) determined that Pakistan cement was being dumped into the SACU market and imposed anti-dumping duties ranging between 14.2% and 77.1% on these products (ITAC, 2015). However, in 2015 and 2016 prices in South Africa were being reduced due to increased local competition. High port charges, tariffs, and overland transport costs to inland countries limit the competitive discipline that is provided by deep sea imports.

Zambia

Zambia has had just one major producer, Lafarge Zambia (now LafargeHolcim), until 2015. Lafarge acquired the business in 2001 from the Commonwealth Development Corporation and had a production capacity in 2017 of 1.4 million tonnes per annum in three plants. It has been a *de facto* monopolist (given the volumes of two small local fringe producers), setting local prices until the entry of Dangote which started production in 2015.[23]

The small producers are Scirocco Enterprises (Amaka brand) which started manufacturing cement in 2005, mainly for its own block-making business.[24] Its volumes have been very small and even with investment in expanded production of cement, it only produced around 300 thousand tonnes per annum in 2018. Zambezi Portland Cement (ZPC) entered in 2009 with a

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[17] The initial entry strategy was to price its cement at below the top two cement products in a given market but above the lowest one, maintain the price for about a year before increasing it. (Interview with Sephaku Cement, 29 May 2018.)

[18] Interviews with Builders Warehouse, 11 May 2018 and Sephaku Cement, 29 May 2018.

[19] Interviews with Sephaku Cement, 29 May 2018, and Builders Warehouse, 11 May 2018.

[20] Interview with Builders Warehouse, 11 May 2018.

[21] Interview with Builders Warehouse, 11 May 2018.

[22] Interview with Sephaku Cement, 29 May 2018.

[23] Prior to Dangote's entry Lafarge had 64% in terms of installed capacity in Zambia, while by revenue, its share was as much as 75% (Sutton and Langmead, 2013).

[24] Interview with Scirocco Enterprises, 17 May 2018.

plant in Ndola (Amunkete et al., 2016) and even with additional capacity investments had a capacity in 2017 of 700 thousand tonnes per annum.[25]

In real terms, retail (consumer) cement prices trended down from 2000 to 2006 before increasing in 2007 and 2008 when there was strong demand, stimulated by the resource boom and high copper prices (Figure 4). After stabilising around 50 to 60 Kwacha per 50kg bag (in 2009 prices),[26] in 2015, at the same time as the entry of Dangote, retail prices reduced to around 35 Kwacha, that is, by around 36%. In terms of factory-gate prices it appears as if Dangote initially matched the LafargeHolcim prices and then in 2016 and 2017 reduced prices further to around 30% and 23% below those charged by LafargeHolcim in 2016 and 2017 respectively.[27]

Figure 5. Consumer prices for cement in Zambia
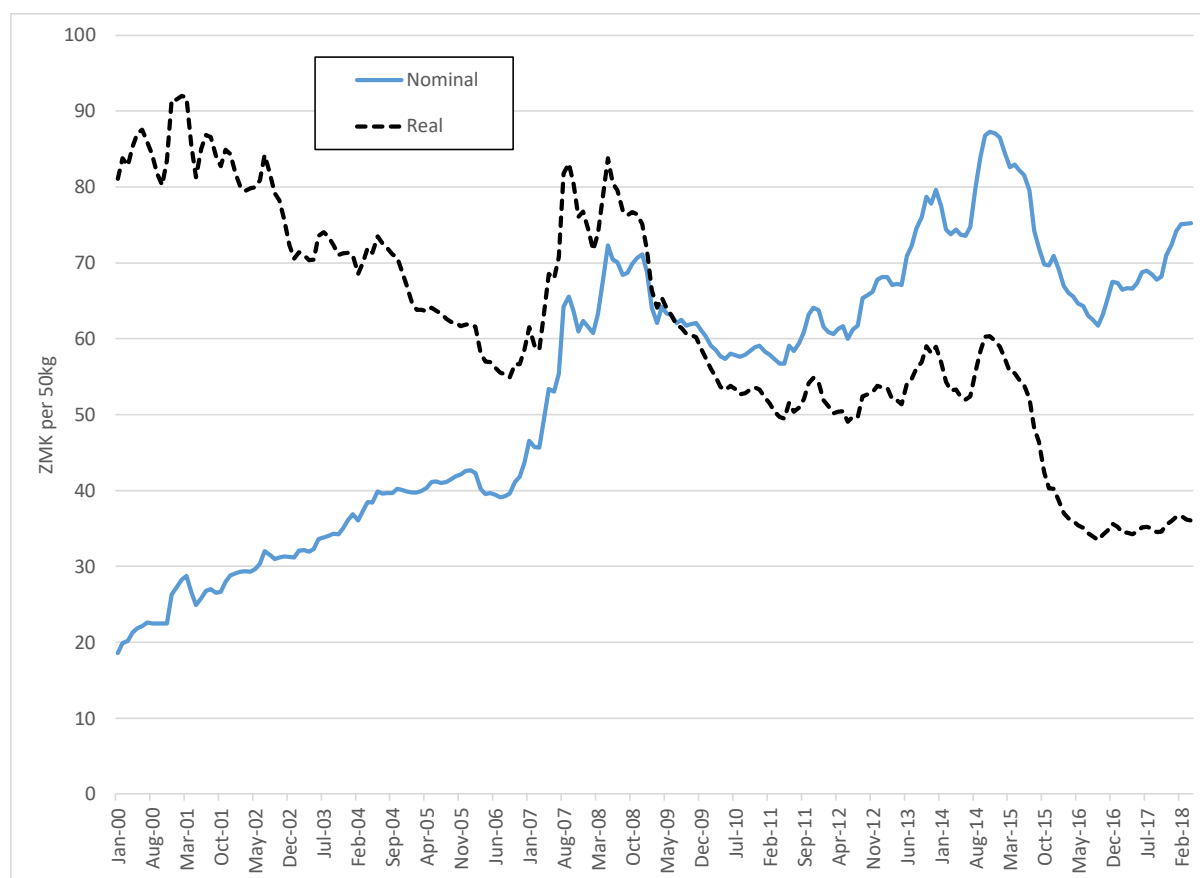
Source: Calculated from Zambia Central Statistical Office
Note: Deflated by general CPI, constant 2009 prices[28]

LafargeHolcim has a plant close to Lusaka (at Chilanga) and in Ndola while Dangote Cement is located in Ndola, about 325km away from Lusaka. Although Dangote Cement does transport and sell its cement in Lusaka, the logistics costs mean that LafargeHolcim is in a stronger

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[25] Interview with Zambezi Portland Cement, 17 May 2018.
[26] Note, these prices are all expressed in new Kwacha.
[27] Interviews with cement producers.
[28] Note, non-food CPI data is available however the series only begins in 2003. For completeness, the non-food CPI has been applied to the nominal Kwacha prices and the estimated real cement price series from 2003 is not significantly different from that reflected in the chart.

position in this market.[29] The Lusaka market is the largest market in Zambia, and prices are higher than in Ndola.

The Dangote plant has up-to-date technology meaning it has substantially lower operating costs. Dangote Cement has also invested in efficient logistics, including its own fleet of trucks, evidence of the importance of routes to market in being an effective competitor.[30] Dangote's trucks can drop cement in their depots and stores in Lusaka and return to Ndola via Maamba where they pick up coal to be used in its plant, thereby rationalizing the long distance travelled. Dangote's transport arm appears to have facilitated its entry across different markets in Zambia and lower prices across all the major regions in Zambia.

Malawi

Although we do not have a price series for Malawi, based on interviews it is evident that this country also saw substantial price reductions from levels that were the highest in the region. Following the entry of Malawi Cement Products Ltd in 2012, producer prices fell by around 25% in real terms over 2013 to 2015, and even more in US$ terms.[31] This begs the question as to how the prices had remained at such elevated levels until that time when cement could, in theory, have been imported from Zambia, Tanzania or Zimbabwe. Even considering transport costs, the price differences are extremely large. Part of the answer likely lies in the fact that Lafarge was a major producer in all of these countries (with the closest plant in Mbeya, Tanzania).

Zimbabwe

Zimbabwe has two major cement manufacturers, Lafarge Zimbabwe and PPC Zimbabwe. Lafarge has one plant in Harare while PPC has three plants in Harare, Bulawayo and Colleen Bawn, with a smaller producer, Sino Cement, starting production in Gweru in 2001. PPC was Zimbabwe's first cement company having begun operations in 1913 as Premier Portland Cement (Pvt) Limited. PPC then acquired the company in 2001 with a total production of about 0.8 mtpa. In 2016, PPC launched a new plant in Harare. Lafarge acquired its business in Zimbabwe in 2000 as part of the global acquisition of Blue Circle Cement by Lafarge in the late 1990s.

Regional trade, entry and pricing

For each of the countries, there was a price reduction following entry by a new producer in the region. Of the four countries, Zambia and Malawi experienced the most significant drops in price following entry (of more than 30% in real terms) although South Africa also experienced price reductions. The substantial cross-border price differences notwithstanding countries being in the same regional economic community strongly indicates that companies were dividing markets across the region and not only in SACU where it had been uncovered.

We examine trade flows to assess likely coordination by the major companies and the effects of entry, focusing on Zambia given the pricing data we have described above. Trade flows

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[29] Interview with Dangote Cement, 17 May 2018.
[30] Interview with Dangote Cement, 17 May 2018.
[31] The retail price reported by Cashbuild for 2017 was around MWK7500 or around US$10. While nominal prices were around 25% lower at the beginning of 2013, the exchange rate depreciation over the period implies prices in 2013 of around US$15.

may be due to economies of scale and cross-border competition (such as in Krugman's reciprocal dumping model). Geography is important given the substantial transport costs for cement and the location of the main plants for cement relative to the sites of demand. Production costs and investment clearly also play a role. Countries have also intervened extensively in cement trade to protect local producers, reflecting the lobbying power of the industry. The trade data do not provide a straightforward picture, which may also reflect some trade flows being intra-company, for example, from Lafarge Zambia to Lafarge in Malawi (including of clinker).

Notwithstanding the large-scale plants in Zambia, imports have outstripped exports in many years, with the great majority of imports being from the Rest of the World and not from other countries in SADC. This is consistent with the local pricing being up to the ceiling set by deep-sea imports transported to this land-locked country. Interestingly, manufacturers in Zambia reported significant imports into Zambia from Zimbabwe reflecting further cross-border competition although the trade data indicate that the imports are sources from other countries than Zimbabwe and possibly being trans-shipped.[32]

At the same time, Zambia had substantial exports, mainly to the DRC (with a huge spike in 2013). The export levels in the other years from 2010 to 2018, are roughly equivalent to around 20-25% of local production.[33]

Figure 5: Zambian cement trade, from main sources and destinations
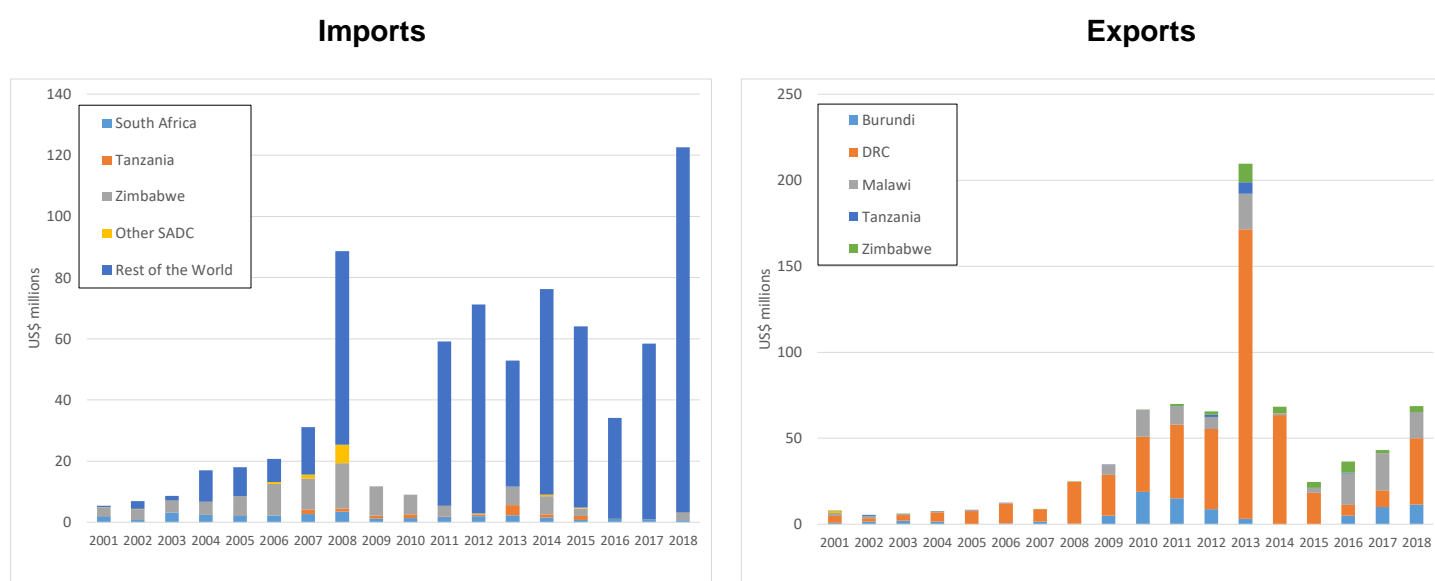
Source: ComTrade data
Note: Product HS code: 2523

The exports to the DRC are consistent with the reliance of the DRC copper belt on imports from Zambia, as well as with the allocation of this market by Lafarge to its Zambian operation

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[32] PPC has been undercutting LafargeHolcim's prices in the south of Zambia by almost ZMK 12 (about US$ 1) from the start of 2018. Interview with LafargeHolcim, 17 May 2018. Due to the import restrictions mentioned above, LafargeHolcim could not retaliate with exports into Zimbabwe.
[33] For example, exports in 2017 were around 600 000 tonnes of the 2.2mn tonnes estimated production in 2017, according to Dangote. 600 000 tonnes is equivalent to US$60mn at $100/tonne or US$5/bag, while the higher prices in earlier years indicate lower exports in volume terms.

(UNCTAD 2005; Ellis et al., 2010). There are still obstacles for importers into the DRC which means that while a bag of cement at the border town of Kasumbalesa costs about US$5-6, the price of cement in the capital of Katanga province, Lubumbashi, is two to three times higher at between US$12-15.[34] However, at the same time, the DRC Government was reported in 2017 to have issued an import ban on certain products including cement to discourage smuggling and protect local industry, with a new plant having come onstream in 2016.[35]

In 2016 and 2017 the Zambian exports were predominantly to Malawi, following the Zambian Dangote plant coming on stream, and in cross-border competition with the producers in Malawi (including Lafarge). Malawi had also removed an import restriction which had been in place to protect the local cement market from competition from neighbouring countries including Zambia.[36]

In 2016, Zimbabwe imposed a duty on imported cement as a measure to protect the domestic cement industry. This followed the establishment of PPC's new plant in Harare in 2017 (PPC, 2017).[37] Further measures were suggested by Zimbabwe's Ministry of Industry and Commerce as well as the Cement and Concrete Institute of Zimbabwe including the introduction of a protection tariff that would price imported cement to the cost of the local product. Proposals also included the issuance of import licences to local producers, a review of all issued permits in the country and a reduction in duties placed on raw materials (Nyoni, 2017).

The evidence is predominantly that trade and regional integration has not led to the more competitive prices which have been seen since 2015, in particular. Instead, the high prices and imports from outside the SADC indicate that local firms have been exerting their market power to the fullest extent, which has been the landed pricing of deep-sea imports. The major change has come from a new large-scale rival in the form of Dangote cement from 2015. To the extent that the investment by Dangote in Zambia has been supported by the wider regional SADC market promised by regional integration then this has been a factor in greater competition.

5   Assessing regional competition and entry in East Africa

The cement industry in East Africa appears, on the surface at least, to be somewhat similar to southern Africa. The firms in the industry have been organised into an association, the East African Cement Producers Association, which covers Kenya, Tanzania, Burundi, Rwanda and Uganda (the members of the East African Community).[38] Lafarge has subsidiaries and

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[34] Interview with Dangote Cement, 17 May 2018.
[35] 'DRC temporarily bans import of key consumer goods' (28 August 2017), *News24*. Available at: https://www.news24.com/Africa/News/drc-temporarily-bans-import-of-key-consumer-goods-20170828 (Accessed: 29 August 2018. The ban was also put in place to protect domestic local industries, noting the entry of a new cement producer at Bas Congo in 2016 (much further inland), which had a plant capacity of just over one million tonnes per annum https://www.pidg.org/project/nyumba-ya-akiba-cement/.
[36] 'Malawi relax cement imports to benefit consumer' (21 March 2016), *Nyasa Times*. Available at: https://www.nyasatimes.com/malawi-relax-cement-imports-to-benefit-consumer/ (Accessed: 8 March 2018)
[37] Nyoni, M. 'Cheap imports choke cement producers' (15 March 2017), *News Day*. Available at: https://www.newsday.co.zw/2017/03/cheap-imports-choke-cement-producers/ (Accessed: 7 June 2018)
[38] Burundi and Rwanda joined in 2009; South Sudan also joined the EAC in 2016, we do not include it here.

associated companies in Kenya, Tanzania and Uganda (Table 1). Another European producer, Heidelberg, is the second largest producer in Tanzania, followed by Afrisam's plant, while PPC has invested in a plant in Rwanda (Cimerwa). Dangote has entered in Tanzania, as well as in Ethiopia (not an EAC member and not analysed further here). There are, however, also regional producers. Kenya's ARM and National Cement have expanded into Tanzania and Uganda respectively (National's Uganda business called Simba Cement). There are also local producers Tororo Cement and Kampala Cement in Uganda, and Mombasa Cement (a subsidiary of Tororo Cement) and Savannah in Kenya.

The market therefore appears to have many competitors. This is a significant change from 2012 when there were just four producers in Kenya and four producers in Tanzania (Amunkete et al., 2016) and, when ownership links are taken into account, six companies effectively accounted for production across the countries, namely: Lafarge, ARM, Afrisam, Heidelberg, National, and Tororo/Mombasa. Many companies subsequently entered, including Dangote, and there have been investments in expanded capacity as well as in upgraded facilities, as reflected in Table 3.

Some of the businesses are regionally integrated, as clinker production in one country is used in a grinding and blending plant to produce cement of different strengths in a neighbouring country. There is clinker production in Tanzania, Kenya, Rwanda and Uganda, however, the number of clinker plants is fewer than the grinding plants. Kenya has had a shortage of clinker with the demand being met by imports and some companies simply operate grinding plants. Tanzania has been exporting clinker, however, power shortages have constrained its production. In Uganda and Rwanda there are also grinding plants which process imported clinker.

Table 3. Entry and capacity expansions

2009	Kenya: Mombasa Cement (subsidiary of Tororo) starts production, with 0.8 mtpa capacity
2010	Uganda: Hima Cement (subsidiary of Bamburi) expands production from 0.35 mtpa to 0.85 mtpa.
2011	Kenya: National Cement (Simba Cement brand, Devki Group) starts production with grinding plant
2012	Kenya: Savannah Cement starts production, with grinding plant Tanzania: ARM grinding plant starts production
2013	Kenya: National Cement expands grinding plant to 1 mtpa. Kenya: Mombasa Cement doubles clinker capacity from 0.8 mtpa to 1.6 mtpa
2014	Rwanda: ARM bought out remaining 65% stake in Kigali Cement for full ownership Tanzania: TPCC (Heidelberg) commissioned a new cement mill with a capacity of 0.8 mtpa, increasing its cement capacity to 2.2 mtpa Tanzania: Lake Cement (Nyati) begins operations with 0.6 mtpa capacity
2015	Tanzania: Mbeya Cement (Lafarge) invested in new vertical cement mill and upgraded packers which increased its production Tanzania: ARM Cement commissions new 1.2 mtpa clinker plant in Tanga Uganda: Kampala Cement begins production Tanzania: Dangote starts production, at Mtwara, 3.0 mtpa capacity (Q4 2015)
2016	Rwanda: Cimerwa (PPC) commissioned its new 0.6 mtpa plant Tanzania: Tanga Cement (Afrisam) increased clinker capacity to 1.25 mtpa with new kiln
2017	Ethiopia: Habesha Cement began production in May

2018	Kenya: National Cement commission's 1.2 mtpa clinker plant at Merrueshi, Kajiado County
	Uganda: Hima (Lafarge) expanding capacity from 0.8 mtpa to 1.6 mtpa
	Uganda: Simba (National Cement) started production, grinding plant
	Uganda: Tororo Cement expanded from 1.8 mtpa to 3 mtpa

The plants are clustered around a small number of locations (Figure 6). In Kenya they are located either close to Nairobi, to the south around the Athi River where there are limestone deposits, or close to Mombasa. In Tanzania they are located in Tanga and close to Dar es Salaam, apart from the Lafarge plant in Mbeya and the Dangote plant in Mtwara. The Uganda plants are mostly around Tororo, on the border with Kenya. It can readily be seen that many of the plants have natural markets across a border, as readily as in the same country in which they are located.

Figure 6. Geographical locations of main cement plants in East Africa, 2017
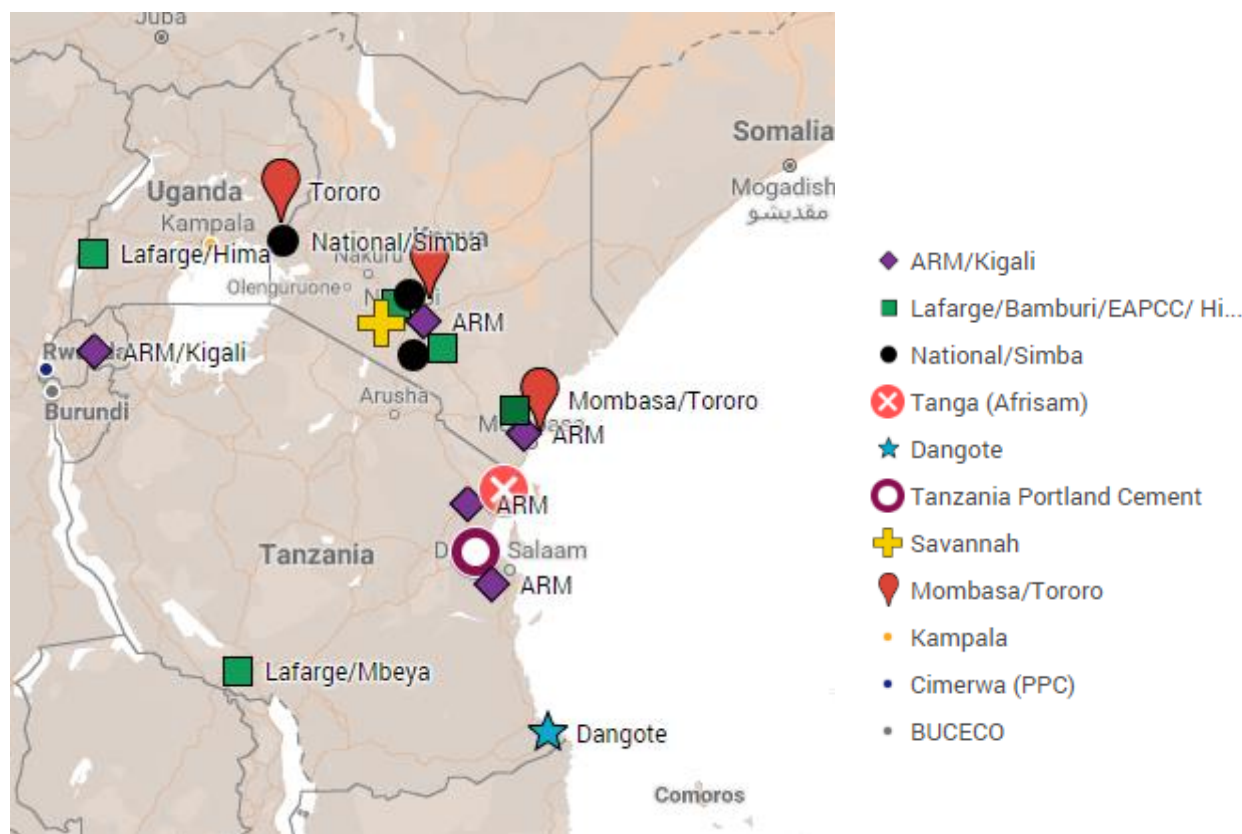
Source: Cemnet (2018), company websites and Google Maps

We examine the pricing trends in Tanzania and Kenya, as a measure of market outcomes in these countries, considering links to trade flows, investment decisions and protection.

There is a common external tariff (CET) on a number of products in the EAC, including cement, with internal duties removed in 2005.[39] The CET has three tiers of goods with different duties. Finished goods are charged a 25% duty, intermediate goods, 10% and raw materials and

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[39] There was an asymmetric adjustment with Kenya removing more quickly and Uganda and Tanzania having a phased approach. There have been extensive non-tariff measures (World Bank, 2008).

capital goods, 0% (Anyanzwa, 2018). Until 1 July 2017, clinker was treated as a finished good. With the change in 2017, its CET moved to 10% with effect from 1 July 2017. Under the sensitive list of products covered by the EAC Customs Union Protocol, cement imports into the EAC faced a 55% tariff but this was to be reduced at a rate of five percentage points per year from 2005 to a level of 35% in 2009.[40] Cement was temporarily removed from the list in 2008, to lower tariffs from 40% in that year to 25%, due to shortages relative to demand.[41] It was permanently removed from the list in 2014 and tariffs fell to 25% in that year.

Tanzania

International comparisons indicate that prices in Tanzania were relatively low and, until 2011, around $2/bag cheaper than in Kenya. Tanzania has been more open to deep sea imports, such as from Pakistan, to discipline local producers.[42] In 2007 Tanzania lifted all tariffs within the EAC and then from 2008 Tanzania suspended the CET and local prices reduced somewhat, although the difference between Kenya and Tanzania prices remained around $2/bag even while prices came down (Figure 7, and Amunkete et al., 2016). This is consistent with trade data which indicate almost all imports from the Rest of the World, from 2007 (Figure 10 below).

Examining the period from 2013 to 2017 more closely, prices remained relatively stable in nominal terms until a major reduction in the second half of 2016, after a brief spike in Q2 2016 (Figure 7). Prices in the first quarter of 2017 were around 20% lower than they had been over 2014 and 2015. In real terms, prices had been falling from Q2 2014, and were 30% lower by 2017.

Figure 7. Producer prices for cement, Tanzania

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[40] 'Reduced duty on imported cement sparks furore among EA producers' (2 March 2015), *TradeMark East Africa.* Available at: https://www.trademarkea.com/news/reduced-duty-on-imported-cement-sparks-furore-among-ea-producers/ (Accessed: 29 August 2018).
[41] Tanzania suspended the CET for cement in 2008.
[42] More than 80% of imports were from Pakistan (Amunkete et al., 2016).
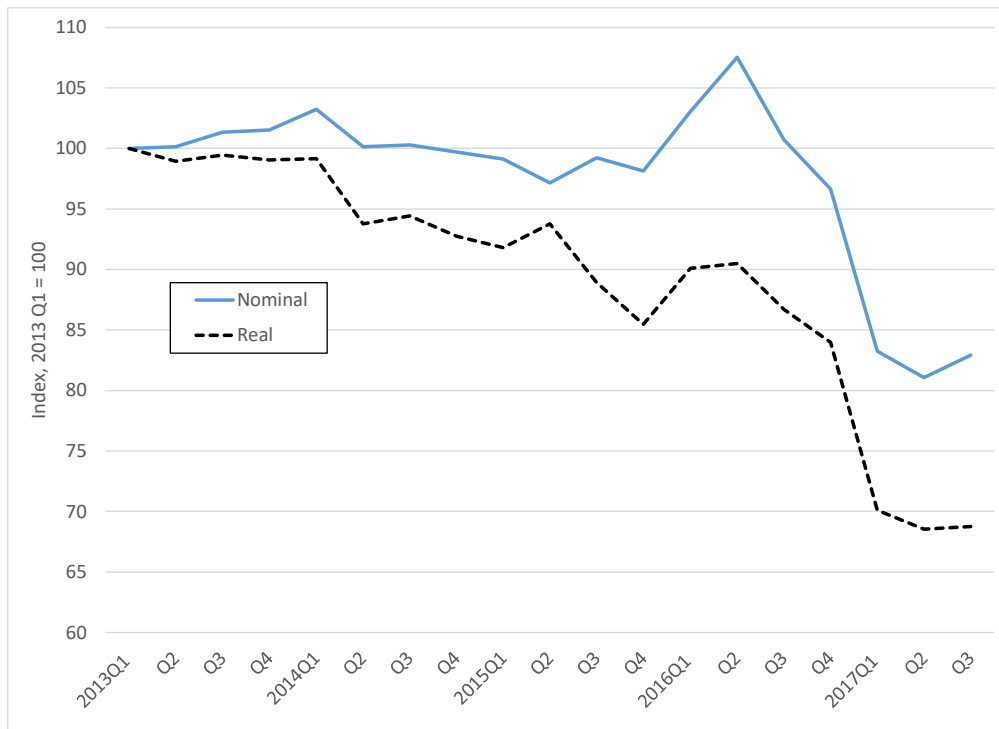
This decrease in prices has been widely attributed to increased competition as a result of Dangote's entry in particular. Indeed, there have been reports of prices dropping by even larger proportions. Heidelberg (Tanzania Portland Cement Company, with the Twiga brand) has been said to have dropped prices from US$120/t in 2014 to US$100/t in 2015 and further to US$88/t in 2016 and to US$66 by May 2017.[43] As the Tanzanian exchange rate depreciated around 35% from 2014 to 2017 the halving of prices in US$ terms is consistent with a reduction of 30% in local currency terms (compared with the nominal reduction reflected in the PPI, for average cement prices, of around 20%).

While price reductions are consistent with Dangote's entry, with production coming on stream in Tanzania at the end of 2015, other producers also invested in expanded production in larger scale and more efficient plants to manufacture clinker, partly as a response to Dangote. In 2014, TPCC (Heidelburg) commissioned a substantial increase in capacity and, in 2015, Mbeya (Lafarge) expanded clinker production at scale and ARM's clinker plant came into production, before Dangote Cement started production at the end of 2015. In 2016, Tanga Cement (Afrisam) also brought a new kiln with expanded capacity into production.

In Tanzania, up to 2012, there had been three major cement producers, as follows: Tanzania Portland Cement (TPC, part of the Heidelberg group), Tanga Cement Company (Afrisam, formerly Holcim) on the coast, and Mbeya Cement (Lafarge) in the west of the country close to the Zambia border (Amunkete et al., 2016). ARM had a grinding plant using imported clinker, until its clinker plant came on stream in 2015. Cement production capacity at the time was 3.5 million tonnes and capacity utilization was at about 87%. In other words, in terms of

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[43] Wafula, P. 'Tanzania miscalculation that cost ARM cement billions of shillings' (1 April 2017), *The Standard (Kenya)*. Available at: https://www.standardmedia.co.ke/business/article/2001258006/how-arm-aggressive-expansion-into-dar-has-left-pradeep-in-tears (Accessed: 29 August 2018).

domestic clinker production, there was a coastal duopoly and prices were disciplined by imports. Five years later, in 2017, production capacity had tripled with entry as well as expansions on the part of some of the incumbent producers (Table 5).

Problems with energy supply and pricing have constrained production, as President Magufuli banned the importation of coal in August 2016.[44] These were resolved in December 2016 after Dangote suspended cement production and agreement was reportedly reached on gas supply and pricing.[45] This is consistent with the reduction in producer prices in Q1 2017 of 14% from the previous quarter.

The Dangote plant is located in the far southern region of Tanzania in Mtwara, to enable Dangote Cement to benefit from its proximity to natural gas sources (Dangote Cement, 2017). The entry was apparently facilitated by extensive investment incentives made available by the Tanzanian government although with the change in regime, some of the incentives have been withdrawn or curtailed (Andreoni, 2017; Dangote Cement, 2017).

It is notable that, even with all the entrants, Mbeya Cement (Lafarge) is the only plant located in the south western region of Tanzania in Mbeya and has access to markets in the western part of the country, the northern regions of Zambia, Malawi and Burundi (see Figure 7). However, in Zambia and Malawi the other major producers include plants owned by Lafarge (which are not therefore competitors). The total installed capacity of over 10 million tonnes compares with demand for cement estimated at between 4.2 and 4.8 million tonnes (TPCCL, 2016; Dangote Cement, 2017). The Dangote plant alone has capacity of 3 mtpa. The capacity utilization of the cement manufacturers is low as a result.[46] Some rationalization is therefore likely to occur. ARM is perhaps the first victim of the rationalization. Aggressive pricing in 2017 and 2018 along with the coal supply issues led to ARM being put into administration in August 2018.[47]

Kenya

The Kenyan cement market has grown significantly in the last two decades, buoyed by strong growth in the economy and recently by strong government focus on infrastructure development and construction sector more generally. Total cement production has grown from less than 1.5 million tonnes per annum in 1999 to, 6.7 million tonnes in 2016, though this fell slightly to 6.2 million tonnes in 2017. Total production capacity stood at around 8.9 mtpa, implying capacity utilization of about 73%. Equally, cement consumption in Kenya has closely tracked cement production, with consumption growing very rapidly over the 2000s, rising from about 1.0 million tpa in 1999 to about 6.3 million tpa in 2016, and falling to about 5.8 million tpa in 2017 (KNBS, 2018; Perilli, 2018).

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[45] 'Government lifts lid on Dangote gas impasse' (21 December 2016), *IPP Media.* Available at: https://www.ippmedia.com/en/news/government-lifts-lid-dangote-gas-impasse (Accessed: 29 August 2018).
[46] Interview with Tanga Cement, 5 June 2018.
[47] Wafula, P. 'Banks take control of Athi River Mining over Sh15 billion debt' (19 August 2018), *Standard Digital.* Available at: https://www.standardmedia.co.ke/business/article/2001292469/lenders-pounce-on-what-is-left-off-arm-take-control-of-the-firm (Accessed: 29 August 2018).

As of 2017, there are six major players in the cement sector in Kenya, with other potential entrants rumoured to be plotting their entry.[48] Two of these have a shareholding by Lafarge, Bamburi Cement and East African Portland Cement Company (EAPCC), with a combined share of 47.7% (Figure 8). Mombasa Cement and Savannah Cement have around 15% market share each, followed by ARM and National Cement.

Figure 8. Market shares of cement manufactures in Kenya, 2017
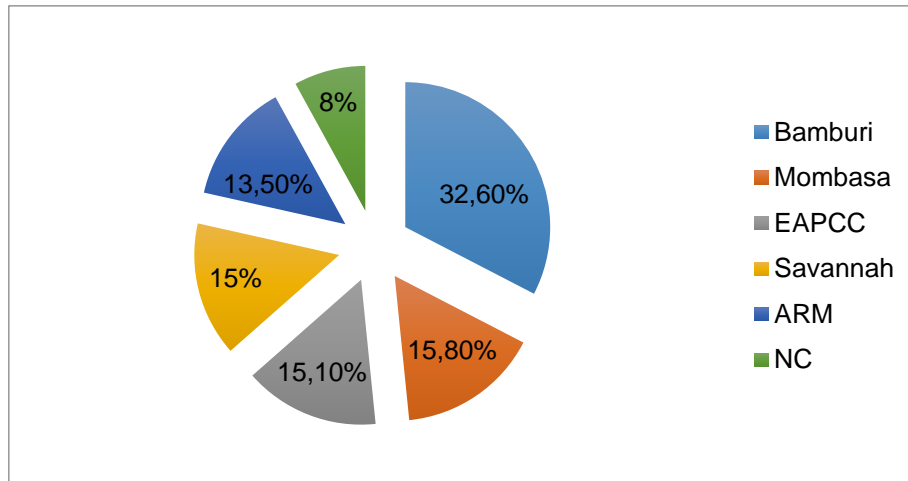
Source: Authors' own computations based on information from Construction Kenya (2017).

Bamburi Cement Limited is a subsidiary of LafargeHolcim, the largest cement producer in Kenya and, until Dangote's entry in Tanzania, also the largest in East Africa, with a capacity of 2.3 mtpa (Table 2). It is long established having begun production of cement in Kenya in 1954. Mombasa Cement, the second largest cement producer in Kenya, started operations in 2009.[49] Mombasa Cement has clinker production and cement production capacity of 1.6 million tonnes annually, and is planning to double its capacity to 3.2 million tonnes per annum.[50] EAPCC, which is associated with LafargeHolcim, is the oldest cement company in Kenya, having been established in 1933, though it did not produce cement in Kenya until 1956.[51] It has installed capacity of 1.3 mtpa, and a market share of 15.1 percent (Construction Kenya, 2017).

ARM Africa (formerly Athi River Mining) was established in 1974 as a family business and expanded to set up subsidiaries in Tanzania, Rwanda and South Africa. It has clinker production although it still relies on imports to meet its needs. Its cement production is around 1.0 mtpa.

In addition to the entry of Mombasa Cement, two smaller producers have entered, Savannah Cement, established in 2012 with local owners (Savannah Heights and Seruji Ltd), and National Cement (part of the Devki local steel group) in 2011. Neither had clinker production, although National Cement opened a new clinker plant in Kajiado County, Kenya, in February

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[48] Among the potential entrants is Dangote Cement, with large scale entry planned (3 million tonnes per annum).

[49] Mombasa Cement is a subsidiary of Tororo Cement of Uganda (the largest producer in that country).

[50] Construction Review Online (2017).

[51] Between 1933 and 1956 EAPCC operated as a trading company.

2018, with an installed capacity of 1.2 mtpa.[52] National Cement Company also has a subsidiary in Uganda trading as Simba Cement.

While Kenya has had cement production capacity in excess of demand, a number of plants have had to rely on imported clinker. Smaller companies have entered through establishing grinding plants using imported clinker and then have sought to establish clinker production exploiting limestone deposits either close to Mombasa or in the area of Athi River close to Nairobi. Estimates indicate that importing clinker (on which the CET is applied at the same level as on cement) means that cement production costs are as much as 25% higher than operating an internal clinker business.[53]

The entry and expansion of rivals in the form of National Cement, Savannah Cement and Mombasa Cement brought substantial additional capacity on stream in 2011 to 2013 and allowed for increased production. From the end of 2015, this appears consistent with lower nominal prices, and substantial declines in real prices, by more than 20% (Figure 9). These changes are also consistent with a convergence to prices in the US$4-6 range across the comparator countries (Figure 1 above).
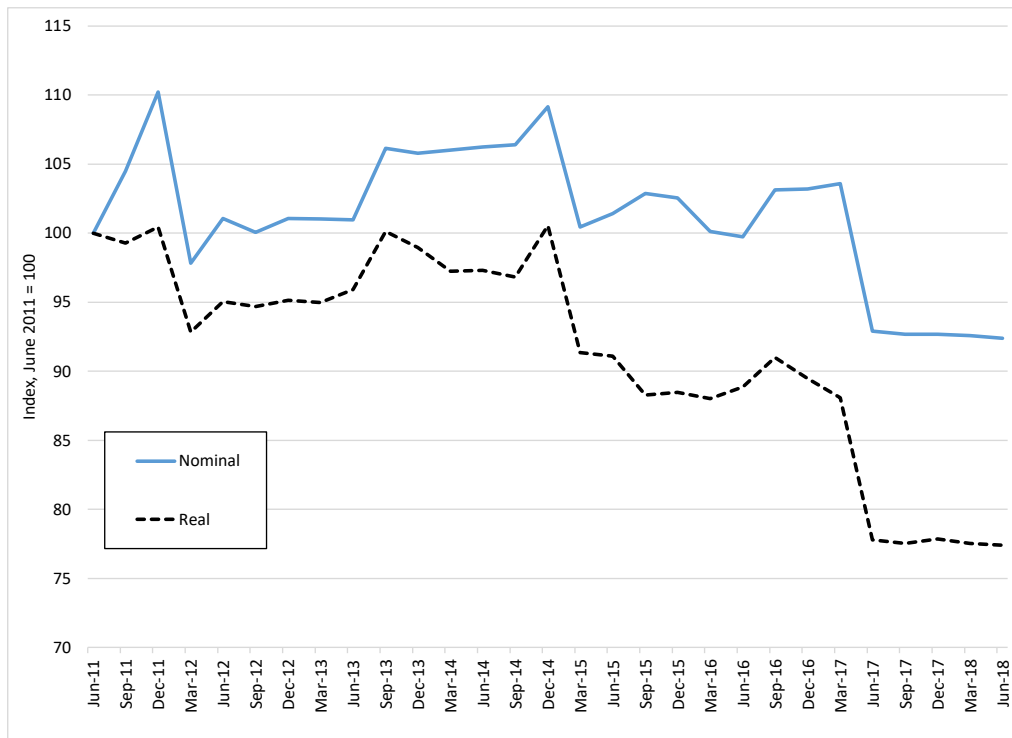
Figure 9. Producer prices for cement, Kenya

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[52] Perilli (2018).
[53] Construction Kenya (2017).

Source: Calculated from KNBS data
Note: Real cement PPI deflated by overall PPI

The Competition Authority of Kenya (CAK) began investigating the cement industry in Kenya around 2014, and ended its investigation in February 2017 without a finding and with an agreement by the producers to cease the sharing of sales volumes with the East African Cement Producers Association of which they were members. A cartel, if it existed, may have operated at a regional level across the EAC (similar to SACU) and used information exchange through the industry association.[54] Prices dropped substantially in the next quarter, to June 2017.

Uganda

Uganda has four cement manufacturers Hima Cement, Tororo Cement, Simba Cement and Kampala Cement. Tororo Cement, located in the eastern part of the country, bordering Kenya, is the largest producer. The second major supplier is Hima Cement, owned by LafargeHolcim via Bamburi, whose plant is located close to the western border of the country in Kasese. The plant in Kasese gives it access to markets in Rwanda, Burundi and the DRC. The plant exports about 70% of its cement.[55] Kampala Cement, located in the central region, began production in 2015 with a plant capacity of 1.2 mtpa. Simba Cement is a subsidiary of National Cement, from Kenya and started production in 2018.

Rwanda and Burundi

There are currently two cement manufacturers in Rwanda although a third is in the processof constructing a plant. Cimerwa is a subsidiary of PPC while Kigali Cement is owned by ARM Cement, from Kenya. In Burundi, Burundi Cement Company with an installed capacity of 0.1

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[54] Personal communication with CAK.
[55] Hima Cement website.

mtpa began production in 2011 and is the only cement producer in the country. The country imports cement form Zambia, Uganda, Tanzania and even Kenya.

The East African Community's main export markets are within the region including, Uganda, DRC, Rwanda, South Sudan and Burundi with some exports reaching Malawi. Because of the geographical location of these plants, market shares may differ when considered regionally, which also implies an import role for third-party distributors and transporters.

Regional trade, entry and pricing

The evidence is clear that pricing in Tanzania was determined by imports from outside the region and not regional competition. This is reflected in the growth of imports from the Rest of the World from 2007 when the Tanzania government made the key policy choice to suspend the EAC's common external tariff for cement (Figure 10).[56] The entry of Dangote in 2015, and the competitive response by other producers, meant sharply lower prices in 2016 and 2017 alongside lower imports. Exports from Tanzania have been much smaller than imports and have mainly been to Malawi, Rwanda and Burundi.

Figure 10: Tanzania cement trade, from main sources and destinations
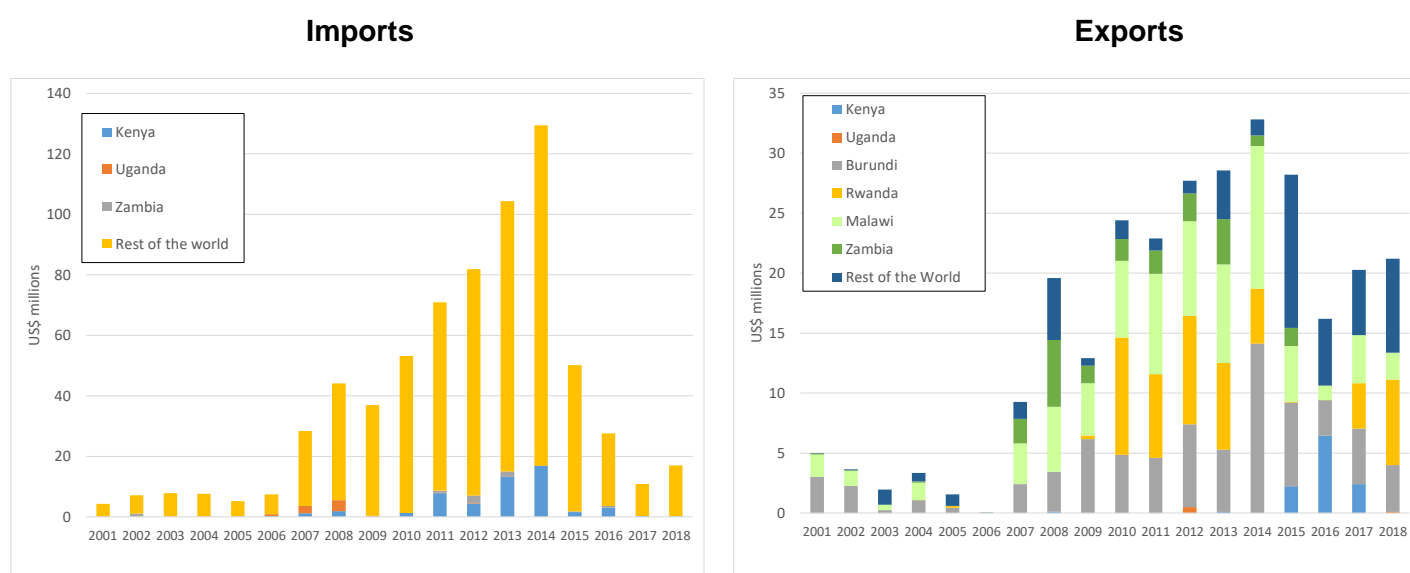
Source: ComTrade data
Note: Product HS code: 2523

Local and regional competition has also played little role in Kenya until 2015, while there have been substantial imports almost entirely from outside the region and with the common external tariff being charged, on clinker as well as blended cement imports (Figure 11). Kenya exported to Uganda, consistent with the link between Bamburi and Hima cement, and small amounts to Tanzania, in line with the expansion of ARM's operations, even while prices in Tanzania were lower than in Kenya. Uganda relies on imports of cement and of clinker, including from Kenya with the two lead producers being integrated with Kenyan businesses. This is significant as the producers appear to plan supplies to Uganda integrated with Kenya operations, in addition

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[56] There are no other imports from the region than reflected in Figure 10.

to being able to meet demand in Rwanda. The East African Cement Producers Association (EACPA) also operates across the EAC as a whole.

The regional footprint of the international companies means they are integrated across the region while there is little evidence of competition between them, including through intra-regional trade. The key impacts have come from entry by fringe producers and actions by the competition authority to address information exchange through the EACPA.

Figure 11: Kenya cement trade, from main sources and destinations

Source: ComTrade data
Note: Product HS code: 2523

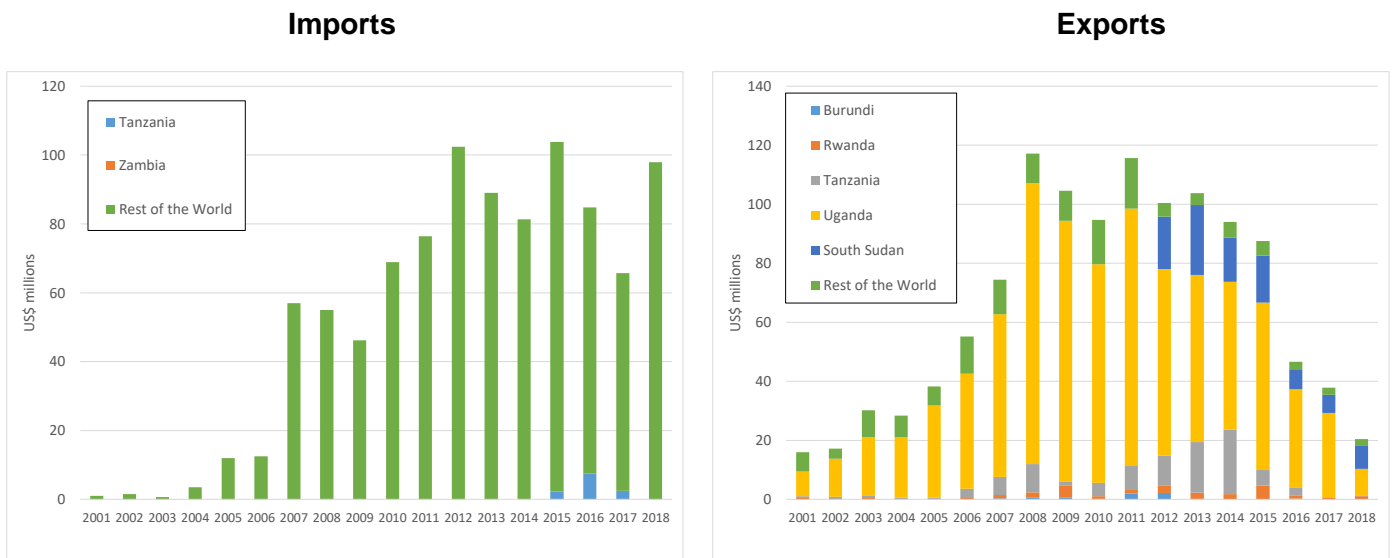## 6   Statistical analysis of mark-ups from lack of competition

Cartels generally raise prices above competitive levels and overcharges are an ex post estimation of the difference (mark-up) between the observed cartel (or anti-competitive) price and some counterfactual 'competitive' price that would have likely prevailed absent the arrangement. These estimates provide an indication of the harm caused by anti-competitive conduct. Oxera Consulting (2009) provides a helpful description of the main techniques based on a range of different studies, grouping these into three main categories: comparator-based, financial-analysis-based, and market-structure-based. In this paper however, as in Hüschelrath et al, 2013; Govinda et al. (2016) and Theron and van Niekerk (2017), we adopt the comparator based approach to overcharge estimation.

In this section, we set out the assessment of the impact of entry and competition in Zambia and Kenya for which we have data on cement prices along with proxies for variable costs and demand. In Zambia we focus on the impact of Dangote's entry, while in Kenya we take the entry of National Cement and Savannah Cement as disrupting the close oligopolistic arrangements. We apply the *during and after* technique to analyse the impact of the entry episodes in these two markets. Although there were investigations of cartel conduct in both Zambia and Kenya, no conclusive evidence was adduced in either country regarding the existence of a cartel in the cement market. As such, we are comparing the level of prices

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under a more competitive market after entry of Dangote in Zambia and Savannah and National Cement in Kenya, against prices which prevailed in the market before the entry. In other words, we are assessing the impact of the entry episode on prices, which is equivalent to assessing the impact of the ending of a cartel.

In the case of hard-core cartels, it is generally agreed that there may be a transition period to competition following the busting/collapse of the cartel. Two main arguments are often advanced. First, tacit collusion may be easier to sustain following the break-up of explicit collusion as firms may have developed certain understandings about each other's behaviours and about the market more generally (Brander and Ross, 2006). Second, existence of long term contracts may mean that prices may remain elevated for some time following the break-up of the cartel. For these reasons, the price will not instantaneously adjust to the competitive level, but would instead gradually adjust. We could apply the same logic in the two case studies considered below. That is, that the prices adjusted slowly to the new (competitive) equilibrium following the period of dominance by Lafarge in Zambia, and by the incumbent firms in Kenya. However, given that the "cartels" in the present study are broken from within (i.e., through entry and intensification of competition), it is more plausible, we believe, to assume instantaneous adjustment, as gradual adjustment may mean the incumbent firms would cede too much market share to the entrants.

Estimating the "cartel" overcharge

As with previous studies, the assessment uses a multivariate econometric model to explain variability in the average (real) cement price as a function of the independent (demand and cost shifter) variables for a given time period, t. The general overcharge equation is as follows (taking log-log form):

$$P_t^c = \beta_0 + \sum_i \beta_i C_{it} + \sum_i \eta_i D_{it} + \delta D_{cart} + \gamma_t t + \varepsilon_t, \qquad (1)$$

where P_t^c denotes the price of cement at time t, C_i represents different proxies for variable costs of cement production, D_i are the demand drivers, while D_{cart} is a dummy variable which takes value 1 during the "cartel" period and 0 otherwise, t is a time trend variable and ε the error term.

In sections 7.1 and 7.2 below we explain the C_i and D_i variables used in the two studies. Since demand for cement is a derived demand, the main demand drivers are the levels of economic activity (including construction) and income.[57] The primary cost drivers are energy, raw materials such as limestone, gypsum, iron ore, and labour, etc. Cement production is energy intensive and involves inputs of electricity, coal and liquid fuels in production and in

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[57] As pointed out by Hüschelrath et al. (2013), due to its poor storage properties, production of cement is largely done on demand, making quantities produced a good proxy for the quantity demanded of cement.

transportation. According to Lafarge, electricity is one of the largest cost drivers for cement production, contributing over 30 percent to production costs.[58,59]

6.1 Zambia

Although Dangote Cement announced its intention to enter the Zambian market in 2010, it only produced its first bag of cement in Zambia in May 2015, as discussed above. Prior to the entry of Dangote, Lafarge was the dominant cement manufacturer in Zambia. Because of the dominance of Lafarge during this period, the assumption implicit in our assessment is that the outcomes in Zambia were not reflective of competition prior to the entry of Dangote (the 'during' period), and that they are after its entry. This is consistent with the facts of the market as uncovered in the CCPC investigation regarding the lack of competition and high prices in the Zambian cement market prior to entry, discussed above (CCPC, 2017).

There are constraints in terms of the available data for the assessment as set out in more detail below – for example, the reference price data is the retail price of cement (which includes margins of retailers and wholesalers in the market) whereas ideally producer prices should be used – these producer prices or an index thereof are currently not collected by the statistical authority in Zambia.

Data and variables

As per equation (1) above, the cement price is estimated as a function of the independent (demand and cost shifter) variables for a given month, *t*. Specifically, the price is modelled as a function of fuel costs as a proxy for various variable costs in cement production, function of cement production as a proxy for demand for cement, and a dummy variable, which represents the "cartel" and "competition" periods. Fuel/energy costs are measured using the Zambia fuels index, which measures costs of various household, water, electricity, gas and other fuels. This index is compiled as a composite of the costs of different fuels, although it is worth noting that not all the components measured necessarily relate to cement production.[60]

We consider the period from January 2010 (after ZPC's entry in 2009) to December 2017 (2018 omitted partly due to non-availability of copper exports data) – for a total of 96 time observations. This period allows for an assessment of the impact of entry for a 32 month period from May 2015 to December 2017, which we consider to be sufficient in terms of the number of observations to assess the sustained impact of entry given the use of monthly data in the model. The data are deflated to account for inflation using the general CPI for Zambia, provided by the Zambia Central Statistical Office. Natural logs of all variables are taken to allow for interpretation of the estimated coefficients as percentage changes (elasticities) and

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[58] Lafarge gives the breakdown as follows: energy 31%, raw materials and consumables 28%, production, labour and maintenance costs 30% and depreciation 11%. Source: http://www.lafarge.com/04022008-Activities-Details_cement_business-en.pdf. Accessed on 10 September 2018.

[59] Trademark East Africa (2015) puts the cost share of electricity at about 40 per cent in Kenya.

[60] However, the index has a strong positive correlation with the diesel prices (+0.8) and so, as a sensitivity check, we also ran the model with a variable for the diesel price as a proxy for energy and transportation costs instead (not shown in the output below) – the results are not significantly different from those using the fuels index.

to control for the effect of large values or outliers. To measure the overcharge, a dummy variable is constructed which takes the value of 1 prior to entry in May 2015 ("cartel" period), and 0 for the period of competition after entry from May 2015 onwards, consistent with the approach in the studies reviewed above.

Table 4. Data description

Variable	Description	Source
Retail cement price (real)	National average cement prices for 50kg bag deflated using general CPI (2009=100)	Zambia CSO
Fuels index	Housing, water, electricity, gas and other fuels price index for Zambia (2009=100) deflated using general CPI	Zambia CSO
Cement production		
Copper exports	Monthly copper exports from Zambia	Bank of Zambia annual reports 2010 to 2017
Entry	Dummy variable taking the value 1 before entry of Dangote in May 2015, and 0 after entry	Constructed
Diesel price	Monthly price of one litre of diesel fuel in Kwacha deflated using general CPI (2009=100)	Zambia CSO

Estimation results

We begin by running a simple OLS regression of log cement price on log cement production, log fuels, Trend variable and cartel dummy. However, due to possible endogeneity concerns arising from the use of cement production as a proxy for demand for cement, we instrument for cement production using copper exports (2SLS). We argue that copper exports are an appropriate instrument for the following reasons. First, cement (for which demand is derived from the demand for concrete) is an important input into mining activity generally, and that Zambia's primary source of foreign exchange is copper exports (World Bank, 2011). Second, given the overwhelming dependence of the Zambian economy on copper mining and exports, household incomes (and thus demand for housing and construction services and infrastructure investments are also shaped to a large extent by the level of copper exports. The results are presented in Table 5 below.

Table 5. Zambia market overcharge estimation results (OLS & 2SLS)

Variable	OLS	2SLS
Dependent: Log real cement price		
Log fuels index	0.827*	
Log cement production	-0.188**	
Log copper exports		

Cartel dummy	0.336***	
Trend	-0.004	
Constant	1.830	
No. of observations	96	
R-squared	0.78	
Adjusted R-squared	0.77	

Note: Statistical significance at the 10%, 5% and 1% level is denoted as *, **, ***, respectively

The results of this simple model show that the variable of interest, the dummy for competition, is statistically significant at the 1% level. Noting how this variable is defined above, it can be interpreted as the estimate of overcharge: overcharges in the period prior to entry were 39.93 percent.[61]

Cement production, a proxy for the demand for cement, has a negative and significant coefficient, which is contrary to prior expectations. The fuel index has a coefficient of 0.827 and is statistically significant at the 10 per cent level. The Trend variable (negative coefficient) and the constant are both insignificant at the 10 percent level.

However, given that T is sufficiently large (T=96), we ran the ADF test to see if log cement price is stationary. The null hypothesis of "unit root" cannot be rejected, with a test statistic of -1.634 against the 10% critical value of -3,154; and a p-value of 0.7790. As a result, the results obtained in Table 6 above cannot be relied upon, as they are likely to be spurious. We proceed to difference the series. It turns out that differencing the series once is sufficient to render the series stationary. We then proceed to regress the variables in first differences. The results are given in Table 6 below.

Table 6. Zambia market overcharge estimation results – first differences (OLS)

Variable	OLS	2SLS
Dependent: Log real cement price		
Log cement production	-0.0018	
Log fuels index	0.0447	0.0437
Cartel dummy	0.0298***	0.0300**
Trend	0.0004**	0.0004*
Log copper exports		0.0037
Constant	-0.0424***	-0.0428**
No. of observations	95	95
R-squared	0.1095	0.1091
Adjusted R-squared	0.0699	

Note: Statistical significance at the 10%, 5% and 1% level is denoted as *, **, ***, respectively.

The results of the OLS and 2SLS regressios suggest that the cartel and Trend are important drivers of the cement price in Zambia during the period 2010 – 2018 as they are both statistically significant. The cartel coefficient of 0.0298 for OLS and 0.03 for 2SLS suggests a 3 percent price effect from the "cartel". In other words, overcharges in the period prior to entry

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[61] Overcharge percentage calculated as (exp(coefficient) − 1)*100.

(the non-competitive market period) were 3 percent. The overcharge is surprisingly low for such a concentrated market (at least prior to 2015). The Trend coefficient, with magnitude 0.0004, points to a positive but economically negligible effect of time on the price of cement in Zambia.

Cement production (a proxy for demand) and fuels index (a proxy for cost drivers) were not important determinants of cement prices in Zambia between 2010 and 2018. The coefficients of these factors are statistically insignificant. The findings on cement production and fuel costs are rather counterintuitive.[62] The coefficient for copper exports is positive (0.0037) and statistically insignificant. Again, the non-significance of demand and cost factors is counterintuitive and suggests issues with the data used in this study.

6.2 Kenya

Prior to 2015, the Kenyan cement market was largely uncompetitive, and exhibited high concentration and stable market shares among the incumbent firms. This motivated an investigation of cartel conduct by the Competition Authority of Kenya. However, there was no finding made of explicit collusion among the incumbent firms. While cement prices appear to have peaked in 2008/2009, unfortunately we are not able to compute the overcharge for the period before 2011 due to data constraints. We can only investigate overcharges for the period June 2011 to June 2018 for which we have quarterly data sourced from the Kenya National Bureau of Statistics (KNBS).[63]

Data and variables

As per equation (1) above, p_t^c is the real cement producer price index in Kenya at time t, which serves as a proxy for the actual prices charged. Among the cost factors are the costs of limestone and gypsum (key inputs in the production of cement), proxied here by the real producer price index for mining and quarrying.[64,65] Another key input in the production of cement in Kenya is electricity. Electricity on average makes up about 40 per cent of the direct cost of cement manufacturing in Kenya (Trademark East Africa, 2015). Oil is also an important input in the production of cement, especially the heavy equipment used to mine, ferry and crush limestone. The data used is the Murban Abu Dhabi National Oil Corporation (ADNOC) Crude Oil Prices (free on board) as published by the Kenya National Bureau of Statistics (Leading Economic Indicators). Oil enters with a lag of three quarters.[66]

On the demand side, we consider cement production as the primary determinant of the price of cement. We are however cognisant of possible endogeneity issues associated with using cement production in the determination of the price of cement. To address this concern, we run a 2SLS regression in addition to the Ordinary Least Squares (OLS). In particular, we

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[62] We carried out the test for endogeneity of cement production and we cannot reject the null hypothesis of exogeneity of cement production (Durbin Chi2(1)=0.0005 with p-value = 0.98; Wu-Hausman F(1,90) = 0.0004 with p-value = 0.98). Hence, OLS suffices for this study.

[63] KNBS only started compiling quarterly producer price indices (PPI) in June 2011.

[64] We could not find price data on limestone and gypsum in the Kenyan market.

[65] Most of the cement producers mine their own limestone, from which the other commodity inputs are derived. Hence the use of mining and quarrying PPI is deemed appropriate.

[66] Since the data relates to crude oil prices, lagging the effect of crude oil prices on cement prices is reasonable, as the crude has to first be shipped to Kenya, and then undergo processing, before being ready for consumption.

instrument for demand (in equation (1) above) using the following variables: *value of building plans approved* by the Nairobi City Council (now Nairobi County); construction cost index (CCI); and the construction GDP. Given that cement cost is a small fraction of the cost of building construction, and thus not a major driver of the CCI and the construction GDP, we believe these instruments are valid. We also include a time trend variable to capture changes in cement prices over time.

Lastly, we introduce a dummy variable to capture changes in the competitive environment in the cement market in Kenya. As indicated above, competition in the sector was rather lethargic up until about 2015 when competition appeared to intensify, and potential entrants begun construction of new plants.[67] At the same time, many of the incumbent firms also began expanding their production capacity, which also served to increase capacity (and supply). This also coincides with price wars in Tanzania following the entry of Dangote in that market. Further, Tanzania began exporting to Kenya in 2015. The "cartel" dummy takes value 1 from Q2 2011 to Q4 2014 (cartel period) and value "0" from Q1 2015 to Q2 2018.[68] The dummy variable, D^{cart} measures the price impact of the "cartel".

As shown above, virtually all the data used in the Kenyan overcharge case study is sourced from the Kenya National Bureau of Statistics (KNBS), except for the US CPI, used to deflate the oil price.

Table 7. Data description

Variable	Source	Description
Cement price index	KNBS	Ex-works producer price index of cement (June 2011 =100)
Mining and quarrying price index	KNBS	Producer price index for mining and quarrying activities in Kenya (June 2011 =100)
Electricity price index	KNBS	Producer price index for electricity in Kenya (June 2011 =100)
Building plans approved	KNBS	Value of building plans approved by the Nairobi City Council (now Nairobi County), real Kenya Shilling. Base year June 2011.
Cement production	KNBS	Amount of cement produced per quarter in Kenya, in tonnes.
Construction cost index (CCI)	KNBS	Index measuring the evolution of the costs of construction, including all raw materials and labour.
Construction GDP	KNBS	Quarterly GDP for construction sector (2009 KSh million)
Price of oil	KNBS	Murban Abu Dhabi National Oil Corporation (ADNOC) Crude Oil Prices as published by the Kenya National Bureau of Statistics (fob).
US CPI (2010 =100)	Federal Reserve Bank of ST. Loius	United States of America consumer price index.

Table 8. Kenya market overcharge estimation results

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[67] Savannah and National Cement started operations in 2012 and 2013 respectively but these were just grinding businesses relying on imported clinker. Also, Savannah had incentives in EPZ and so was not meant to sell locally at first. ARM also expanded capacity in 2015 in Tanzania and used this clinker for its Kenya operations.
[68] We use the term *cartel* here rather loosely to denote weak competition.

Variable	OLS	2SLS
Dependent: Log real cement price		
Cartel period	0.1104***	0.1037***
Limestone & Gypsum	0.3514**	0.4329**
Electricity	-0.3117***	-0.2518***
Production	0.4431***	0.3608**
Oil price_L3	0.0286	0.0250
Trend	-0.0079***	-0.0081***
Constant	-2.0433**	-1.5154
No. of observations	26	26
R-squared	0.9487	0.9463

Notes: *** indicates significance at 1% level; ** indicates significance at 5% level and * indicates significance at 10% level.

As the natural log of all variables was taken, we are able to interpret the coefficients here as elasticities. The coefficient for mining and quarrying, proxing for the costs of limestone and gypsum, is 0.3514, and is significant at the 5 percent level. Rather surprisingly, the electricity price is highly significant, but carries the wrong sign, which is rather counterintuitive.t[69] Demand, as proxied by cement production, has a positive and statistically significant effect on the price of cement. A one percent increase in demand results in a 0.4431 percent increase in the price of cement. Oil (lagged 3 periods) is found not to be significant, with a coefficient of 0.0286. The trend variable is negative and statistically significant at the one percent level, suggesting that cement prices in Kenya were trending downwards over the study period. The magnitude of the impact is rather small however, with prices falling by 0.0079 percent per quarter.

Of greater interest for this study is the coefficient of the cartel dummy. The coefficient of the cartel dummy is 0.1104 for the OLS estimation. The price overcharge (i.e., difference between the cartel period and non-cartel period) is thus given by exp(0.1104)-1 = 11.67 percent. To put this in perspective, let's consider the price per tonne of cement as at June 2017 which, according to KNBS (2018), averaged KES 12,952. This means the "cartel" price would have been higher by 11.67 percent (i.e., the cartel price per tonne of cement would have been KES 14463, an overcharge of KES 1511 (about US$ 15) per tonne) had the "cartel" persisted. According KNBS (2018), the total cement consumption in Kenya for the year 2017 was 5,790,189 tonnes. Thus, the resultant saving by Kenyan consumers in 2017 alone due to the collapse of the "cartel" was KES 8,751,861,409 million (US$ 87.5 million). These are evidently substantial savings emanating from more vigorous competition.

Given the concerns about possible endogeneity of cement production in the estimation of the price of cement, we instrumented for production using building plans approved, CCI and construction GDP. Results from the 2SLS estimation closely mirror the ones from OLS. In particular, the magnitudes and direction for most control variables are reasonably close to those found under OLS. We therefore will not focus on these here. We instead focus here on the coefficient for the cartel dummy. The cartel coefficient, at 0.1037, is slightly smaller under

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[69] Govinda et al. (2016) and Hüschelrath et al. (2013) also found negative coefficients for electricity price for the South African and Germany cement cartels respectively.

2SLS. The overcharge is therefore estimated at 10.93 percent. That is, prices were 10.93 percent higher during the cartel period relative to the post cartel period. Doing the same computations as above, the overcharge per tonne of cement under 2SLS estimation would have been KES 1415 (US$ 14) in 2017, had the non-competitive environment persisted. Thus, using 2SLS method, we can conclude that competition has enabled Kenyan consumers to save about US$ 82 million in cement costs in 2017 alone.[70]

7   Conclusion

Regional economic integration is a big agenda for Africa. African leaders have signed many protocols aimed at boosting economic integration, the latest of which is the African Continental Free Trade Area, aimed at bringing together the various regional economic blocks to boost intra-Africa trade, and thus economic development. The ultimate goal is to enhance movement of goods and services between African countries, strengthening competition across borders for the benefit of consumers, and improving the competitiveness of industries. While these efforts are noble, research has pointed to weak competition and concentrated markets. Along with other factors, incumbents in key sectors appear to have succeeded in thwarting integration efforts by limiting the flow of goods across borders. This includes through lobbying for tariff and nontariff barriers, notwithstanding the existence of regional integration agreements.

The cement industry illustrates the importance of understanding firm strategies in an oligopolistic context, including with multi-market contacts and common ownership. As with many other industrial products, scale economies in cement production coupled with relatively low demand mean that the industry is concentrated across the region, and prone to collusion and/or tacit coordination. This is the case around the world, as evidenced in the number of cement cartels which have been uncovered, including in SACU (Appendix B).

The main producers have operations across the region and thus plan capacity expansions and sales regionally. This is best illustrated perhaps by LafargeHolcim which has cement plants in seven of the countries examined here. Its decisions at group level directly impact on trade and investment across the region.

The evidence on pricing indicates that it has been at supra-competitive levels in the countries examined, until entry by new firms brought sharp reductions in later years. The trade data indicate low intra-regional trade, notwithstanding the moves to free trade under the RECs, reinforcing the indications of regional coordination along similar lines to the conduct uncovered in the SACU cartel. Imports from outside the continent have constrained pricing in Zambia, Tanzania and Kenya, even while local producers had capacity to supply the regional market. It is striking that this is the case even in inland markets and not just at the coast where deep sea imports are relatively cost competitive. The commonly observed fact that African countries

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[70] Given the concerns about endogeneity expressed earlier, we tested for endogeneity of production using the Hausman-Wu test but could not reject the null hypothesis that "production" is exogenous (Robust score Chi2 (1) = 0.5091, with p = 0.4755; Robust regression F(1,18) = 0.3510, with p = 0.5609). This suggests that OLS is consistent, and thus the results from the OLS estimation are valid. Indeed, the results from OLS are pretty similar to the results from 2SLS. We also carried out the Sargan test for overidentifying restrictions and we could not reject the null hypothesis of valid instruments (Chi2 (2) = 0.5299, with p=0.7672). The instruments however appear to be weak (partial r-sq = 0.2743 and F(3,17) = 1.7450).

continue to trade relatively little with each other and more with the rest of the world appears to be partly the result of low levels of competition within RECs in Africa.

Given the presence of the same firms across the region, it is likely that such anti-competitive conduct has extended outside SACU and partly explain the low levels of cross-border trade, especially given that in many cases cement plants are located close to borders. This inference is reinforced by positive changes to increase competition through new entry, as well as the actions of competition authorities. In particular, entry has come from new producers and not the tight knit group of insiders which have dominated the markets in southern and East Africa until recently. Dangote is the most significant entrant, in four countries at scale (Ethiopia, South Africa, Tanzania and Zambia). However, there are other smaller entrants as well, within and across countries, such as Mamba Cement in South Africa and Kenya's National Cement. Entry requires access to limestone, infrastructure and energy which means that governments need to actively support entrants.

Competition authorities have taken important steps to address possible coordination and anti-competitive conduct. The Competition Authority of Kenya ended the information sharing by the East African Cement Producers Association in 2017 after several years of investigation. This information being exchanged would have allowed the monitoring of market division arrangements although were not found to be a contravention in its own right. The CCPC of Zambia investigated excessive pricing on the part of Lafarge over much the same period, finding that the pricing had been supra-competitive, which was consistent with the lower prices realised on the entry of Dangote. The competition action demonstrated the case for entry. Further, there is growing interest in the regional coordination of competition enforcement, including collaboration among competition authorities as well as development of regional competition authorities such as the COMESA and ECOWAS competition authorities. This is critically important if arrangements which operate across countries are to be detected and enforced against.

In tandem with entry and capacity expansion in the cement sector in East and Southern Africa, there has also been a reduction in tariffs and non-tariff barriers which means that increased competition in one country can lead to lower prices also in a neighbour through exports, such as in the case of Malawi discussed above. The overall picture from the trade analysis is, however, that while the companies are integrated, the markets are not with entry within national markets and rivalry from imports from outside the region having the most important impacts on pricing.

Our assessment has identified substantial reductions in real prices following entry and more effective competition in national markets. For example, real prices declined by more than 20% in Kenya between 2014 and 2018, and by more than 40% in Zambia between 2014 and 2016. The mark-ups estimated from the econometric assessments for Zambia and Kenya are significant. Specifically, price overcharge in Zambia is estimated to be 40% from 2010 to May 2015, and the overcharge in Kenya is estimated to be between 10.9% and 11.7%, relative to the prices obtaining in the post 2015 period. We note the limitations in terms of the available data for the econometric analysis for both countries, however, and this points to an area for further inquiry with, and intervention by, statistical authorities and regional economic communities, to the extent that good quality data enables the assessment of the impacts of integration and competition.

In conclusion, we note two other aspects of competition and regional integration which we briefly highlight, as follows.

Barriers to entry are an important consideration for increased competition. In addition to exogenous barriers such as the sunk costs and technical requirements of entry, the incumbent firms and governments can also erect barriers. Cement production at scale and as an efficient producer depends on being able to access key inputs (limestone and energy), and to be able to reach customers. Various rights and permits are necessary for mining, environmental issues, water and land use. Government can play an important role in each of these. Incumbents can secure long term rights to block entry and can lobby governments. Deliberate efforts are therefore required on the part of governments to open up the sectors through streamlining the necessary processes for permits and licences, and dealing decisively with exclusive arrangements.[71]

Entry and more intense competition have effects beyond simply more competitive prices to consumers. These include investments in more efficient production technologies. Sephaku Cement, for instance, estimates their savings due to the use of Vertical Roller Mills at between 30-40% and additional savings on coal of about 20-25% due to their use of a five-stage precalciner. Other entrants have also invested in the more efficient vertical mills. Indeed, the incumbent firms have also increasingly been investing in more efficient production lines to remain competitive. Competition through regional entry at scale therefore improves efficiencies and lowers carbon emissions.

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[71] In Zambia Dangote Cement benefitted from substantial government support including with land and mining rights. By comparison, in Tanzania although Dangote had received assurance from the government on a number of incentives including for a coal power plant, and to natural gas at a discounted price, there were obstacles and delays in practice. In South Africa, Sephaku struggled to acquire a mining licence as well as environmental clearances, yet Mamba Cement received significant support from the same government in setting up of their plant.

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Annex A: Studies on cement cartels in South Africa and Germany

	Govinda et al. (2016) SACU cartel	Theron and van Niekerk (2017) SACU cartel	Hüschelrath et al. (2013) – German cartel
Overcharge estimate (%)	Between 7.5% (OLS) and 9.7% (2SLS)	Between 8.68% and 17.90%	Between 20.7% (before-after, OLS) and 26.5% (DiD)
Period considered	During cartel and after intervention (based on date of CCSA intervention – November 2009) January 2008 to December 2012	May 1993 to September 2015 Illegal cartel from January 1999 Consider four different transition period dummies	January 1995 to December 2009 (before and after); 1991 to 2004 (DiD)
Methodology	Temporal (during and after), OLS and 2-Stage Least Squares (2SLS)	Temporal (during and after)	Temporal and spatial (country comparators), OLS and DiD
Dependent variable	National cement price index based on actual ex-works cement prices from producers for 42.5N, bulk sales	National cement price index (PPI)	National cement price index
Independent variables	-Cartel period dummy Price indices for: -Coal (PPI) -Limestone & shale (PPI) -Iron ore monthly index -Energy (incl. electricity PPI) -Oil Brent crude -Oil Price indices (instrumented by dummy for global financial crisis July 2008 to May 2009) -Construction GDP index	-Index of value of building plans passed (demand) -Four dummy variables for different cartel end hypotheses -Spike dummy for commodity price boom period Price indices for: -Limestone & lime -Coal -Gypsum -Oil Brent crude	-Cartel period dummy -Time trend variable -Cement production index Price indices for: -Lime -Electricity -Lignite Also instrumental variables for cement production

As noted earlier, there has not been any studies of "cartel" overcharge outside of South Africa,

Annex B: Cement cartels around the world

Year	Country	Firms involved	Type of conduct
2005	Germany	Heidelberg, Schwenk, Dysckerhoff, Lafarge, Holcim (formerly Alsen), Ready Mix	Price fixing, market allocation
2005	Argentina	Loma Negra, Minetti, Cemento San Martin, Petroquímica Rivadavia, Cement Avellaneda	Price fixing and market allocation through industry Association
2005	Taiwan	Taiwan Cement Corp, Tung Woo Corp (Cemex), Asia Cement Corp, Lucky Cement Co and Universal Cement Corp	Price fixing
2006	Turkey	Çimsa Çimento and Oyak Adana Çimento	Price fixing and market allocation
2007	France		

2008	India	Ultratech , Jaypee, Penna Cements, India Cements, Bharathi Cements, Dalmia (Bharat) Cements, Bhavya Cements, Zuari Cements, Ramco Cements, KCP Cements and My Home Cements	Price fixing Market allocation
2009	Poland	Lafarge, Gorazdze Cement, Cemex Polska, Dyckerhoff Polska, Cementownia Warta, Cementia Odra, Grupa Ozarow	Price fixing Market allocation
2009	Pakistan	Lucky Cement Ltd., Maple Leaf Cement Factory Ltd. and Flying Cement Co. Ltd	Price fixing Limiting supply
2010	South Africa	Lafarge, AfriSam (formerly Holcim) Pretoria Portland Cement (PPC) and Natal Portland Cement	Price fixing and Market allocation through industry Association
2014	Brazil	Votorantim Cimentos SA, Camargo Correa SA's Intercement Brasil, Itabira Agro Industrial SA, Cia de Cimentos Itambé SA, Holcim Ltd and Cimpor Cimentos de Portugal SGPS SA	Price fixing

Adapted from Govinda et al. (2016)