Interrogating the Logic of Accumulation in the Sugar Sector in Southern Africa

Alex Dubb

(Institute of Poverty, Land and Agrarian Studies, University of the Western Cape)

Over the last 20 years sugar production in southern Africa has been characterised by both the geographic dispersal and the heightened concentration of (formerly) South African sugar capital. This paper argues that key variations in the contours of corporate accumulation in the region can be explained through dynamics generated by two sets of interacting variables: (i) the changing productivity of sugar manufacturing and sugar cane cultivation, and the interaction between them, and (ii) shifting terms of pricing and exchange, as governed by mercantile politics. An arithmetic model for the analysis of data is applied in the case of Illovo Sugar. It shows that high profits in Malawi are due to both favourable mercantile and productivity features; that Mozambican profits come exclusively from mercantilism; that Tanzania, Swaziland and especially Zambia owe their relative profitability to particularly high levels of productivity, and that South Africa, Illovo's country of origin, receives low profits in both mercantile and productivity terms. These differences are rooted in value relations, which are core to understanding accumulation in sugar. The paper argues that, although the logic of sugar is somewhat unique, the approach to the analysis of accumulation adopted here has wider application.

Introduction

The southern African sugar sector has attracted renewed attention from academics, policy-makers, non-governmental organisations and the media, and is often portrayed in starkly contrasting narratives of 'boom or bust',[1] 'development' or corporate corruption. In contemporary scholarship on the agrarian political economy of Africa, sugar is often included as a key case in contemporary debates on land (or water) 'grabbing', 'socially inclusive' business models, contract farming, biofuel production, as well as in long-running debates on the politics of land

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1 D. Miller, 'Southern African Sugar gets Massive Investment as EU Barriers Wind Down', *Wall Street Journal* (19 February 2007), p. 22; N. Bariyo, 'Africa's Sugar Ambitions Turn Sour' (20 October 2014), available at http://www.wsj.com/articles/africas-once-promising-sugar-market-struggles-1413821598, retrieved 27 October 2014.

reform, rural accumulation and national development.[2] Sugar's place in these debates has some distinctive features. Whereas other land-based and agro-industrial development schemes have tended to stall, expansion of large South African sugar companies into the wider region has witnessed substantial productive investments and boasted improved levels of employment in several countries, as well as opened opportunities for production by thousands of small-scale farmers. Key questions that arise include: what has driven this expansion, what have been its effects to date, and what is its wider significance for debates on the potential of large-scale agricultural investments to reduce rural poverty?

This article seeks to assess the dynamics of the southern African sugar sector by examining the 'logic' of capital accumulation. It does so through analysis of value relations, as understood in Marxist political economy, an approach rooted in the changing productivity of labour and its effects on profitability, and influenced by mercantile (trade) relations and their politics. However, there are a number of product-specific reasons for the drive to achieve economies of scale and increased levels of agro-industrial integration in sugar, strongly influenced by sugar cane's perishability and the need to locate cultivation in close proximity to processing plants. The paper argues that the variable levels of profitability achieved by corporate capital in the sugar sector can only be understood through analysis of both the built-in logic of capital in general and the specificities of sugar. These are shaped by both 'internal' struggles over class relations in specific settings and exposure to the 'external' exigencies of global markets, and their mediation by forms of national politics. The interaction of all these variables results in highly differentiated 'models' through which profitability is secured by sugar companies across the region.

This approach to the analysis of large-scale agricultural investment is relevant to the analysis of investment in agriculture, contract farming and agro-processing in Africa more broadly. It suggests that both 'productive' and 'mercantile' aspects are central to accumulation, albeit to different degrees, and that their configuration in relation to each other should feature strongly in attempts to understand the dynamics of investment, production and markets.

As discussed in the introduction to this special issue,[3] three converging historical conjunctures underlie the restructuring of southern African sugar over the past two decades: South Africa's post-apartheid reintegration into the region; ongoing processes of liberalisation originating in structural adjustment programmes; and new opportunities presented by biofuel production and the restructuring of the European sugar market. Simply put, South African sugar companies, sold off by the large conglomerates of which they were a part, and facing a saturated domestic market and uncertain prospects for future political support, have found lucrative investment opportunities in the wider region. Here countries have been under pressure to privatise state

2 S.M. Borras, J. Franco, S. Gomez, C. Kay, and M. Spoor, 'Land Grabbing in Latin America and the Caribbean', *Journal of Peasant Studies*, 39, 3–4 (2012), pp. 845–72; L. Buur , C. Mondlane and O. Baloi, 'Strategic Privatisation: Rehabilitating the Mozambican Sugar Industry', *Review of African Political Economy*, 38, 128 (2011), pp. 235–56; R. Hall, 'Land Grabbing in Southern Africa: The Many Faces of the Investor Rush', *Review of African Political Economy*, 38, 128 (2011), pp. 193–214; J. Jackson and A. Cheater, 'Contract Farming in Zimbabwe: Case Studies of Sugar, Tea and Cotton' in P. Little and M. Watts (eds), *Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa* (Madison, University of Wisconsin Press, 1994); G. Porter and K. Phillips-Howard 'Comparing Contracts: An Evaluation of Contract Schemes in Africa', *World Development*, 25, 2 (1997), pp. 227–38; E. Sulle, 'A Hybrid Business Model: The Case of Sugarcane Growers in Tanzania', in L. Cotula and R. Leonard (eds), *Alternatives to Land Acquisitions: Agricultural Investment and Collaborative Business Models* (London, International Institute for Environment and Development, 2010); P. Woodhouse, 'New Investment, Old Challenges. Land Deals and the Water Constraint in African Agriculture', *Journal of Peasant Studies*, 39, 3 (2012), pp. 777–94.
3 A. Dubb, I. Scoones and P. Woodhouse, 'The Political Economy of Sugar in Southern Africa, Introduction', *Journal of Southern African Studies*, 43, 3 (2017), pp. 447–70, this issue.

assets and induce foreign direct investment, alongside emerging opportunities to export sugar and ethanol to the EU under preferential terms.[4]

A comparison of reported operating profits from Illovo's and Tongaat Hulett's sugar operations (see Table 3 of Dubb *et al.*[5]) suggests considerable variability in how 'Big Sugar'[6] has fared in the region in this period of corporate restructuring. Using the case of Illovo, this paper is structured around two key questions: (i) what causes these discrepancies between profit and production, and (ii) how can this diversity be explained?

These questions concern empirical patterns of differentiation of southern Africa's sugar capitals, but facilitate examination of the underlying processes that structure value relations, i.e. the 'logic' underlying capitalist accumulation in the sugar sector. Influenced by Gibbon and Ponte's contention that accumulation in African agriculture is increasingly premised on economies of scale and/or oligopoly rents,[7] the paper argues that differential patterns of accumulation in southern African sugar can be understood by examining the interactions between two distinct sets of components:

i.   *differential levels of productivity* among southern African sugar producers, who combine capital-intensive miller-processing with labour and water-intensive sugar cane cultivation, on both company estates and farms operated by 'outgrower' suppliers;

ii. *uneven terms of exchange and pricing*, in the context of the persistence of a mercantile politics of tariff protection, domestic price-setting, and cheap labour regimes, long characteristic of sugar producing countries everywhere.[8]

The next section provides an overview of each of these sets of components and their particular features. The relative influence of each of these components on corporate profitability is then examined by application of a simple counterfactual arithmetic model to data on Illovo's regional operations.

There are two key reasons for the focus on Illovo. First, Illovo's restructuring has featured centrally in the wider reconfiguration of southern African sugar production.[9] Second, Illovo offers unusually detailed data in its recently published 'Good Corporate Citizenship' (GCC)

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4   B. Richardson, 'Big Sugar in Southern Africa: Rural Development and the Perverted Potential of Sugar/Ethanol Exports', *Journal of Peasant Studies*, 37, 4 (2010), pp. 917–38; D. Lincoln, 'The Historical Geography of the Southern African Development Community's Sugar Protocol', *Illes i Imperis*, 9, 2006, pp. 117–30; A. Dubb, 'The Rise and Decline of Small-Scale Sugarcane Production in South Africa: A Historical Perspective', *Journal of Agrarian Change*, forthcoming.

5   Dubb, Scoones and Woodhouse, 'The Political Economy of Sugar in Southern Africa – Introduction', this issue.

6   Here 'Big Sugar' denotes the actors which stand to benefit from profit generated in sugar production. This most directly concerns the sugar milling companies and their corporate owners, but also entails the constellation of other profit-generating businesses and service-providers ancillary to sugar production, such as trading, technical assistance, and finance (which are not directly dealt with here). Actors that supply only or primarily their own labour are not included as constitutive of 'Big Sugar' interest in profit-making, even though they are necessary to it, and even though they may benefit from employment or supply opportunities.

7   P. Gibbon and S. Ponte, *Trading Down: Africa, Value Chains, and the Global Economy* (Philadelphia, Temple University Press, 2005).

8   S. Mintz, *Sweetness and Power: The Place of Sugar in Modern History* (London, Penguin Books, 1986); G. Hollander, 'Re-Naturalizing Sugar: Narratives of Place, Production and Consumption', *Social & Cultural Geography*, 4, 1 (2003), pp. 59–74.

9   Dubb, Scoones and Woodhouse, 'The Political Economy of Sugar in Southern Africa – Introduction', this issue.

reports.[10] Similar data are not available for Tongaat Hulett and TSB.[11] While gross production data are available from the South African Sugar Technologists' Association (SASTA), this is not true of disaggregated data on production, marketing, trade and prices for different firms in different countries, despite the highly concentrated and regulated character of southern Africa's sugar industries. This presents a unique opportunity for the analysis of profitability using three different data sources: (i) Illovo's GCC reports; (ii) World Bank pricing data; and (iii) production information published by SASTA. Detailed data are available only for 2012/13, which precludes direct interrogation of variation over time.

The Peculiar Logic of Sugar Production in Southern Africa

Hierarchies of Field, Factory and Labour

The fulcrum of accumulation in sugar production in general is the close relationship between sugar cane cultivation and sugar manufacturing. Two characteristics structure this relationship:

- *perishability*: sugar cane undergoes a rapid degradation in sucrose content once harvested. Swift transport is needed to minimise the time between cutting and processing and loss of sucrose content;
- *necessity of processing for sale*: raw sugar cane is largely (although not exclusively) regarded as a worthless stand-alone commodity.[12] Its value tends to only be realised upon sale as a sugar commodity (raw, refined, ethanol, molasses etc.).

The close relationship between cane and sugar is also hierarchical, with field almost invariably subordinated to factory. The basis of this hierarchy is, in turn, twofold: First, *structural monopsony* means sugar cane cultivators are usually able to sell only to a single (nearest) sugar miller without incurring excessive transport costs and loss of cane quality. Second, sugar mills are capital intensive, and their profitability highly contingent on maximising throughput of high quality cane. Profits for milling capital are only gained in the 'last tons' processed, a chronic hunger for the 'living labour' embodied in cane that grows with capital intensity and increased processing capacity.[13] The volume of cane grown therefore needs to be tightly adjusted to cane

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10 Corporate Citizenship, 'Illovo Sugar: Malawi Socio-Economic Impact Assessment: Internal Management Report' (London, Corporate Citizenship, April 2014), available at https://www.illovosugar.co.za/UserContent/Documents/Illovo-Malawi-Socio-economic-Impact-Assessment-12May14.pdf; Corporate Citizenship, 'Illovo Sugar: Mozambique Socio-Economic Impact Assessment: Internal Management Report' (London, Corporate Citizenship, April 2014), at https://www.illovosugar.co.za/UserContent/Documents/Illovo-Mozambique-Socio-economic-impact-12May14.pdf; Corporate Citizenship, 'Illovo Sugar: South Africa Socio-Economic Impact Assessment: Internal Management Report' (April 2014), at https://www.illovosugar.co.za/UserContent/Documents/Illovo-South-Africa-Socio-Economic-Impact-12May14.pdf; Corporate Citizenship, 'Illovo Sugar: Swaziland Socio-Economic Impact Assessment: Internal Management Report' (April 2014), at https://www.illovosugar.co.za/UserContent/Documents/Illovo-Swaziland-Socio-economic-Impact-Assessment-12May14.pdf; Corporate Citizenship, 'Illovo Sugar: Tanzania Socio-Economic Impact Assessment: Internal Management Report' (April 2014), at https://www.illovosugar.co.za/UserContent/Documents/Illovo-Tanzania-Socio-economic-Impact-Assessment-12May14.pdf; Corporate Citizenship, 'Illovo Sugar: Zambia Socio-Economic Impact Assessment: Internal Management Report' (April 2014), at https://www.illovosugar.co.za/UserContent/Documents/Illovo-Zambia-Socio-economic-Impact-Assessment-12May14.pdf, all retrieved 27 November 2014.
11 This more transparent approach, ironically, is likely to be the outcome of the greater scrutiny that is afforded to Illovo than to its competitors, as both a multinational company and the subject of tax-related scandals. See M. Lewis, *Sweet Nothings: The Human Cost of a British Sugar Giant Avoiding Taxes in Southern Africa* (Somerset, ActionAid, 2013).
12 H. Binswanger and M. Rosenzweig, 'Behavioural and Material Determinants of Production Relations in Agriculture', *Journal of Development Studies*, 22, 3, 1986, pp. 503–39; Mintz, *Sweetness and Power*, 1986.
13 See Marx's critique of 'Senior's last hour' in K. Marx, *Capital: Volume 1* (London, New Left Review, 1976). For a recent discussion, see J. Moore, 'Transcending the Metabolic Rift: A Theory of Crises in the Capitalist World Ecology', *Journal of Peasant Studies*, 38, 1 (2011), pp. 1–46.

processing capacity. The subordination of field production to downstream processing is not unique to sugar.[14] However, the necessity of rapid transport ensures that in sugar production these imperatives are found in an extreme form.

The value basis of southern African sugar cane production, upon which the profitability of sugar manufacture depends, is also distinguished by its:

- *labour intensity*: in sugar cane, as in other agricultural subsectors, widespread land dispossession of the indigenous population was a precursor to both improved access to land and the fostering of a 'reserve army' of 'cheap' African labour.[15] In contrast to advancing mechanical innovations and increased capital intensity in sugar milling, transport and loading elsewhere in the world, southern African sugar cane production has remained largely unmechanised;[16]
- *input and water intensity*: improvements in productivity have been premised on both input improvements (seed cane varieties, chemical fertilisers, pesticides etc.) and increasing water intensity, achieved through opening up production in areas of relatively high-rainfall areas or through the development of (often state-subsidised) irrigation infrastructure.[17]

The appropriation of value from 'cheap' African field labour is intensified in proportion to its enhanced productivity using water resources, as a form of 'biophysical' rent or 'ground rent' in areas of high rainfall, or through subsidised capitalisation from state investment in irrigation infrastructure.[18] This distinguishes southern African sugar production systems from more land-extensive and mechanised systems, such as those in Australia and Brazil. Indeed, sugar continues to vie for preferential access to water in contemporary state-led programmes of irrigation expansion in the region.[19] This combination of 'cheap' labour, water and land in cane production and capital-intensive milling operations has been central to southern Africa becoming among the 'lowest-cost' sugar production regions in the world.[20] Table 1 suggests that these variables are also key differentiating factors amongst Illovo's different operations across southern Africa.

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14 Indeed, there is a general similarity to 'industrial-throughput' systems in grain-livestock production. See T. Weis, 'The Meat of the Global Food Crisis', *Journal of Peasant Studies*, 40, 1 (2013), pp. 65–85; T. Weis, 'The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture', *Journal of Agrarian Change*, 10, 3 (2010), pp. 315–41.

15 J.F. Head, 'State, Capital, and Migrant Labour in Zambezia, Mozambique: A Study of the Labour Force of Sena Sugar Estates Limited' (PhD thesis, University of Durham, 1980); P. Richardson, 'The Natal Sugar Industry, 1849–1905: An Interpretative Essay', *The Journal of African History,* 23, 4 (1982), pp. 515–27; W. Beinart, 'Transkeian Migrant Workers and Youth Labour on the Natal Sugar Estates, 1918–1940' (unpublished paper, University of the Witwatersrand, 1990); A.S. Mlambo and E.S. Pangeti, *The Political Economy of the Sugar Industry in Zimbabwe 1920–90* (Harare, University of Zimbabwe Publications, 1996); Lincoln, 'The Historical Geography of the Southern African Development Community's Sugar Protocol'.

16 F.J. Van Biljon, *Commission of Inquiry into the Sugar Industry* (Pretoria, Government Printer, 1970); A.D. Minaar, *Ushukela: A History of the Growth and Development of the Sugar Industry in Zululand, 1905 to Present* (Cape Town, HSRC Press, 1992); see B. O'Laughlin, 'Consuming Bodies: Health and Work in the Cane Fields in Xinavane, Mozambique', *Journal of Southern African Studies*, 43, 3 (2017), pp. 625–41, this issue.

17 A.D. Beck, 'The Kilombero Valley of South-Central Tanganyika', *East African Geographic Review*, 2 (1964), pp. 37–43; Netherlands Development Corporation (NDC), *Sector Aid and Structural Adjustment: The Case of Sugar in Tanzania,* NDC evaluation report (Amsterdam, NDC, 1992); Minaar, *Ushukela*; Mlambo and Pangeti, *The Political Economy of the Sugar Industry in Zimbabwe*; G. Tyler, *All-Africa Review of Experiences with Commercial Agriculture: The Fall and Rise of the Colonial Development Corporation* (2007), available at http://siteresources.worldbank.org/INTAFRICA/Resources/257994-1215457178567/CCAA_Colonial.pdf, retrieved 29 May 2014.

18 Moore, 'Transcending the Metabolic Rift'; B. Fine and A. Saad-Filho, *Marx's Capital* (London, Pluto Press, 2004).

19 See B. Chinsinga, 'The Green Belt Initiative, Politics and Sugar Production in Malawi', *Journal of Southern African Studies*, 43, 3 (2017), pp. 501–15, this issue, and E. Sulle, 'Social Differentiation and the Politics of Land: Sugar Cane Outgrowing in Kilombero, Tanzania', *Journal of Southern African Studies*, also in this issue, 43, 3 (2017), pp. 517–33.

20 Although referring to a dated survey from between 2006/07 to 2009/10, southern African countries all crowd the top end of 'cheapest' producers encompassing over 100 countries. The first 11, in order, included Malawi, Brazil, Swaziland, South Africa, Zambia, Thailand, Australia, Tanzania, UK, Zimbabwe and Mozambique (Illovo Sugar, 'Integrated Report 2010', from http://www.illovosugar.co.za/Investors/Integrated-Annual-Reports/2010, retrieved 10 January 2014).

Table 1. Key productive characteristics across Illovo's countries of operation

	Malawi (2 mills)	Mozambique (1 mill)	South Africa (4 mills)	Swaziland (1 mill)	Tanzania (2 mills)	Zambia (1 mill)
Cane						
Total cane (tonnes)*	2,460,735	719,860	5,119,944	2,165,058	1,309,145	3,246,082
Average ERC%[a]	12.2%	11.7%	11.7%	10.7%	9.9%	12.4%
Irrigation water (m^3) tonne/estate cane	183	74	0	133	94	105
Total hectare*	24,567	9,300	n.d.[c]	23,600	24,162	28,000
Tonnes per hectare**	102	80	n.d.[c]	92	60	116
Total employment*	7,954	4,798	23,431	6,411	10,993	6,369
Tonne cane/ worker**	412	154	228	419	294	545
Sugar						
Total sugar (tonnes)	299,494	84,546	598,700	232,723	129,737	403,867
Mill capacity Tonnes cane per hour	501.69	297.48	1,051.70	398.92	252.6	642.07
Tonnes sugar per hour	61.06	36.07	122.86	42.88	25.05	79.88
Time efficiency[b]	87.60%	80.40%	78%	82.40%	81%	84.20%
Total employment	7,032	1,684	2,879	1,467	1,036	3,035
Tonne sugar/ worker	42.59	50.21	207.95	158.64	125.23	133.07

[a]'ERC%' here refers to 'Estimated Recoverable Content', a simple ratio of the amount of sugar produced per tonne of cane crushed. This stands as an approximate measure of the quality of cane received by the mill, but effectively fails to disentangle factory performance, a notorious difficulty. This simplified expression is not to be confused with the typical definition for ERC% as 'Estimated Recoverable Crystal', which attempts to measure a factory's recovery of sucrose crystals from a given cane supply. This is similarly distinct from precise payment formulas employed by different mills and countries, with South Africa in particular utilising a formula to recognise manufacture of other by-products, such as molasses. For a more complete review of the different formulas involved, see S.D. Peacock, and P.M. Schorn, 'Crystal Recovery Efficiency as an Overall Measure of Sugar Mill Performance', *Proceedings of the Annual Congress of the South African Sugar Technologists' Association*, 76, (2002) pp. 544–60.

[b]'Time efficiency' here refers to what is usually termed 'Overall Time Efficiency (OTE)', and attempts to capture the amount of time a mill operates out of the time it could in principle operate. As an effective measure of capacity utilisation, OTE effectively equates to the ratio of total throughput to total capacity, and can hence also be influenced by cane quality. Generally, time efficiency is reduced by stoppages due to lack of cane throughput ('No-cane stops'), breakdowns and industrial action, but also include stoppages due to foreign matter (largely sand, rocks and metal), scheduled maintenance stops and others: E.P.G. Jenkins, 'Factors Affecting the Length of the Sugar Milling Season in South Africa' (MSc thesis, University of KwaZulu-Natal, 2013); Smith *et al*. 'Review of the Milling Season', 2013.

[c]n.d.: no data available.

*Includes estate and outgrowers.

**Weighted by estate and outgrower production.

Sources: G.T. Smith, S.B. Davis, S. Madho, and A. Chary, 'Eighty-Eighth Annual Review of the Milling Season in Southern Africa', *Proceedings of the South African Sugar Technologists' Association*, 86 (2013), pp. 24–54; Corporate Citizenship reports, 'Illovo Sugar: Socio-Economic Impact Assessment' for Malawi, Mozambique, South Africa, Swaziland, Tanzania and Zambia (see note 10).

Outgrowers

The substantial numbers of 'outgrower' farmers supplying sugar mills with cane stand out as one of southern African sugar's most distinguishing features. However, as observed above, a miller's monopsonic position in the value chain precludes market mechanisms from directly mediating its relations with outgrowers. Sugar cane outgrowers are thus an important social fraction within a (nominally) technically and economically unified process of sugar production.

It is difficult to generalise about the role of outgrowers in capital accumulation. Forms of outgrower production are highly varied, encompassing individual and collective arrangements, under private and customary property regimes, with variable levels of capitalisation, and operating at different scales. Most obviously, outgrower production helps extend the supply of cane. However, less obviously, a number of dynamic relations through which outgrowers facilitate accumulation in sugar can be identified. First, as emphasised in critiques of contract farming in general, outgrowers can be used to directly absorb:

- *the risk or cost of failure in cane production*: typically, a mill will only purchase the sucrose of the cane itself (though it may also provide some capital services to farmers, for a fee). If there is a production failure, the mill is unaffected, provided there is sufficient supply in aggregate;
- *the risk or cost of failure in sugar marketing*: this typically includes not paying farmers, or reducing their payments for sucrose not ultimately sold, or scaling down other services (such as extension support, credit provision, sourcing labour, or capital services in ploughing and transport);
- *necessary costs of circulation*: although the transport of cane is necessary for both mill and grower, growers often shoulder the full costs, including the cost of sucrose lost as the result of delays.

Framing the question in terms of 'risk' raises further questions as to how the costs of failures are absorbed in practice.[21] Critiques tend to focus on how outgrowers effectively intensify the exploitation of labour in cane production – by fragmenting workers over multiple enterprises and by socially embedding production within local structures of authority and reciprocity that are also highly unequal in relation to gender. Outgrower production can consequently be used as a vehicle to evade minimum wages and avoid the difficulties of sourcing and disciplining labour on company estates.[22] Longer working hours, lower wages and poor conditions may, however, simply serve to compensate for lower-than-average levels of productivity (in field or factory), and may be captured by either farmers or millers.[23] It is equally plausible to presume the increased exploitation of labour power by other means, such as increasing scale and/or intensifying capital and resource use, particularly by larger-scale outgrowers.

This raises questions regarding the terms of exchange between outgrowers and millers, which tend to be determined either in direct negotiations between a particular mill and its supplier-growers, or within a national-corporatist representational structure encompassing all mills and growers nationally. These terms of exchange encompass not only crucial issues of cane/sucrose pricing (in southern Africa, regulated largely by fixed revenue-sharing formulae), but also the costs of production via capital services provided by the mills, such as ploughing and transportation. Rather than dispersing the costs of production, the terms of outgrower supply may instead tend towards integration with the production systems on company estates. Outgrowers are hence differentiated not only in terms of scale, labour and capital intensity, but also in the content of their relationship to millers, which may resemble that between lessor and lessee.[24]

Second, outgrowers can also play an important *indirect* role in fostering accumulation in sugar, by:

- *rendering the absorption of land and water resources into estate production and/or establishing mills in the first place, more politically palatable*;[25]

21 D. Glover and K. Kusterer, *Small Farmers, Big Business: Contract Farming and Rural Development* (London, Macmillan Press, 1990).
22 J. Wilson, 'The Political Economy of Contract Farming', *Review of Radical Political Economy,* 18, 4 (1986), pp. 47–70; P. Little and M. Watts (eds), *Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa* (Madison, University of Wisconsin Press, 1994).
23 G. Starosta, 'Global Commodity Chains and the Marxian Law of Value', *Antipode*, 42, 2 (2010), pp. 433–65.
24 Dubb, 'The Rise and Decline of Small-Scale Sugarcane Production in South Africa'; R. Smalley, E. Sulle and L. Malale (2014), 'The Role of the State and Foreign Capital in Agricultural Commercialisation: The Case of Sugarcane Outgrowers in Kilombero District, Tanzania', *Future Agricultures Consortium Working Paper* no. 106 (2014), available at http://www.plaas.org.za/sites/default/files/publications-pdf/FAC_Working_Paper_106. pdf, retrieved 5 November 2014; I. Wallerstein and T. Hopkins, 'Commodity Chains: Construct and Research', in G. Gereffi and M. Korzeniewicz (eds) *Commodity Chains and Global Capitalism* (Westport, Greenwood Press, 1994).
25 G. Tyler, *All-Africa Review of Experiences with Commercial Agriculture*; Mlambo and Pangeti, *The Political Economy of the Sugar Industry in Zimbabwe*; Minaar, *Ushukela*.

- *attracting investment of development aid or preferential finance and/or access to preferential markets*;[26]
- *encouraging the political promotion of favourable mercantile arrangements for sugar pricing and tariff protection often in connection to different models of land reform.*[27]

As shown in Table 2, differentiated outgrower segments contribute a substantial, but highly variable, proportion of Illovo's cane supply in different countries. Again, South Africa and Malawi represent perhaps the most extreme cases, with mills in the former supplied almost entirely by large-scale outgrowers, and mills in the latter receiving a small supplement of cane from a large number of small-scale (< 5 ha) growers. Tanzania's mills receive the highest proportion of their supplies from small growers. However, with the notable exception of Mozambique (showing low levels of productivity across the board) and Zambia (whose mainly large outgrowers garner similar per-hectare yields) outgrower production is marked by far lower levels of productivity relative to estate production, both in per-hectare and per-worker terms.

Markets, Mercantilism and Regulatory Restructuring

The idiosyncrasies of southern African sugar production are matched by peculiarities in its marketing regimes. In the *longue durée*, the unusual structure of the world market for sugar is, of course, closely tied to the historical development of tropical commodity production within imperial circuits of trade.[28] But sugar has retained its unusually mercantile[29] character: as a commodity that has largely evaded wholesale liberalisation and deregulation, it is subject to a complex politics of domestic and regional market segmentation. These politics feature as a central point of struggle both within and between countries over the absolute extent of sugar's surplus, and its distribution. Four features have emerged as particularly significant:

- *rents*: received prices for different sugar commodities (raw, refined, cane, molasses, ethanol, electricity co-generation etc.) are governed by direct price-setting or tariff protection. These shape whether or not rents are established in the domestic market, and of what magnitude the rents are. One key issue is whether or not to increase sugar's 'pie' at the expense of consumers (including downstream manufacturers). The prospects for state creation and appropriation of surplus have been key to sugar's historical and contemporary development in southern Africa;
- *'residual' world market*: because of the widespread protection and subsidy of domestic sugar industries, and the fact that the vast bulk of sugar is traded within bilateral arrangements, the world sugar market is often characterised as a 'residual market'. Here, prices do not

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26 B. Pound and A. Phiri, 'Longitudinal Impact Assessment Study of Sugar Producers in Malawi', report commissioned by the Fairtrade Foundation (Chatham Maritime, University of Greenwich and Natural Resources Institute, 2010), available at http://www.nri.org/images/images/nri-news/2012/ft_sugar_malawi_main_report_july2012.pdf, retrieved 10 July 2014; P. Richardson-Ngwenya and B. Richardson, 'Aid for Trade and African Agriculture: The Bittersweet Case of Swazi Sugar', *Review of African Political Economy*, 41, 140 (2014), pp. 201–15; Dubb, 'The Rise and Decline of Small-Scale Sugarcane Production in South Africa'.

27 See the following articles, all in this issue: Chinsinga, 'The Green Belt Initiative'; P. James and P. Woodhouse, 'Crisis and Differentiation among Small-Scale Sugar Cane Growers in Nkomazi, South Africa', *Journal of Southern African Studies*, 43, 3 (2017), pp. 535–49; C.R. Matenga, 'Outgrowers and Livelihoods: The Case of Magobbo Smallholder Block Farming in Mazabuka District in Zambia', *Journal of Southern African Studies*, 43, 3 (2017), pp. 551–66; A. Terry and M. Ogg, 'Restructuring the Swazi Sugar Industry: The Changing Role and Political Significance of Smallholders', *Journal of Southern African Studies*, 43, 3 (2017), pp. 585–603; I. Scoones, B. Mavedzenge and F. Murimbarimba, 'Sugar, People and Politics in Zimbabwe's Lowveld', *Journal of Southern African Studies*, 43, 3 (2017), pp. 567–84; Sulle, 'Social Differentiation and the Politics of Land'.

28 S. Mintz, *Sweetness and Power*; H. Friedmann and P. McMichael, 'Agriculture and the State System', *Sociologia Ruralis*, 29 (1989), pp. 93–117.

29 Here 'mercantile' is used to mean purposely shifting terms of trade that were erstwhile anonymously determined by 'market' forces.

Table 2. Key characteristics of outgrower producers in Illovo's countries of operation

	Malawi		Mozambique		South Africa		Swaziland		Tanzania		Zambia	
	N	%	N	%	N	%	N	%	N	%	N	%
Production												
Total (tonnes cane)	2,460,735	100	719,860	100	5,119,944	100	2,165,058	100	1,309,145	100	3,246,082	100
Estate	2,102,002	85	532,560	74	358,396	7	862,058	40	726,145	55	1,942,435	60
Outgrower	358,733	15	187,300	26	4,761,548	93	1,303,000	60	583,000	45	1,303,647	40
Outgrowers												
Total (N, % of output)	2,047	100	371	99	5,707	100	±3,031	100	8,000	100	270	100
'Small' N	1,888	90	337	17	5,071	5	±3,000	32	6,320	70	254	16
Ha per grower	2.5		<20		3–5		3		<5		6–7.5	
'Medium' N	159	10	29	37	58	3	14	3	1,667	19	–	–
Ha per grower	?		20–120		?		<50		5–50		–	
'Large' N	–	–	5	45	578	92	16	65	13	11	16	84
Ha per grower	–		120		50+		50+		50+		50+	
Area												
Total hectares	24,567	100	9,300	100			23,600	100	24,162	100	28,000	100
Estate	19,567	80	6,000	65	?	?	8,600	36	9,562	40	17,025	61
Outgrower	5,000	20	3,300	35	?	?	15,000	64	14,600	60	10,975	39
Land Productivity												
Mean tonnes/hectare**	102		80		?		92		60		116	
Estate	107		89		?		100		76		114	
Outgrower	72		57		?		87		40		119	
Employment												
Total	7,954	100	4,798	100	23,431	100	6,411	100	10,993	100	6,369	100
Estate*	4,520	57	3,173	66	780	3	1,290	20	1,509	14	2,979	47
Outgrower	3,434	43	1,625	34	22,651	97	5,121	80	9,484	86	3,390	53
Labour Productivity												
Mean tonnes/worker**	412		154		228		419		294		545	
Estate*	465		168		459		668		481		652	
Outgrower	104		115		210		254		61		385	

*Estate employment here was defined as 'seasonal agricultural workers'; **Weighted by estate and outgrower production. *Sources*: Corporate Citizenship reports, 'Illovo Sugar: Socio-Economic Impact Assessment' for Malawi, Mozambique, South Africa, Swaziland, Tanzania and Zambia (see note 10); Smith *et al.* 'Review of the Milling Season', 2013.

reflect the cost of production, and are highly sensitive to variations in supply and demand from key exporters (mainly Brazil, but also Thailand) and consumers (such as Russia and East Asia) and countries which have at different times stood as both key importers and exporters (mainly the EU and India);

• *'overproduction'*: the low-priced 'residual' world market impels market protection, but also acts as a final limit to rent-based, domestic 'super-surpluses'. Expanding production beyond domestic confines carries the danger of a particular sort of 'overproduction' in which insufficient world prices are paid for large proportions of production.[30] Relative exposure to international markets tends to be governed by way of compulsory single-channel export mechanisms managed either by state or industry agencies. These mechanisms act not only to maintain domestic prices by exporting 'surplus' supply, but, in ensuring that all producers 'share' the risk of export exposure (often proportionate to each producers respective contribution to national production), also act as a means to effectively define each producer's share of the domestic market. This also has a direct bearing on the impact of growth in production on the composition of a domestic industry, and may lead to pressures to 'rationalise' or 'shake out' less efficient producers;

• *preferential market access*: managing the risks of 'overproduction' has been heavily mediated by a politics of access to protected markets, particularly those in the USA and the EU. Together with sugar's high level of protection, this directly implicates sugar in the broader politics of international trade.

Mercantile politics continues to play a prominent role in the development of the sugar industry in southern Africa.[31] Restructuring of sugar markets from the mid-2000s has underpinned southern Africa's emergent regional sugar regime, with reform of the EU's sugar protocol perhaps most influential.[32] Optimism was further bolstered by a gradual rise in world sugar prices and speculation surrounding the potential for sugar cane to act as a 'flex crop'[33] for bioethanol production, particularly given the EU's further commitment to source biofuels as part of the 2008 Climate Change Package.[34] These developments spurred a wave of capital expansion throughout the region, and coincided with the purchase of Illovo by British capital and construction of a European refinery to handle the anticipated increase of sugar imports.

Yet the depression of the EU sugar price (see Figure 1), together with the recent announcement that the EU will seek to dispense with quota limitations on domestic supply, has dampened this optimism.[35] Likewise, while even in the context of the recent rapid deflation of oil prices world

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30 The inverted commas denote that here 'overproduction' idiosyncratically refers to crises emanating primarily from mercantile conditions, rather than problems in production.

31 Dubb, Scoones and Woodhouse, 'The Political Economy of Sugar in Southern Africa – Introduction', in this issue.

32 B. Richardson, *Refined Power in a Global Regime* (London, Palgrave Macmillan, 2009).

33 'Flex crops' concern agro-commodities fungible over multiple markets and/or particular commodities that can be produced from different feed-stock commodities. 'Flexing', as a sort of agro-industrial arbitrage, is meant to mitigate risk through market/supply diversification, but has also been linked to speculative volatility. 'Flexing' in sugar production strictly goes back at least to European development of sugar beet as a substitute for sugarcane in the mid-18th–19th centuries, but more recently has concerned the potential for sugarcane to straddle energy and food markets. It is notable that sugar cane for energy in southern Africa has strongly featured in recent academic inquiry into 'flex crops' and their association with large-scale land acquisitions or 'land grabs', including the infamous case of ProCana in Mozambique in S.M. Borras, D. Fig and S.M. Suárez, 'The Politics of Agrofuels and Mega-Land and Water Deals: Insights from the ProCana Case, Mozambique', *Review of African Political Economy*, 38, 128 (2011), pp. 215–34. For a recent critical approach to 'flexing' and its application, see the 'Flex Crops and Commodities Special Forum' in *Journal of Peasant Studies* 43, 1 (2016), including a focus on sugar cane in B. McKay, S. Sauer, B. Richardson and R. Herre, 'The Political Economy of Sugarcane Flexing: Initial Insights from Brazil, Southern Africa and Cambodia', *Journal of Peasant Studies*, 43, 1 (2016), pp. 195–223.

34 Borras, *et al*. 'Land Grabbing in Latin America and the Caribbean'; Richardson, 'Big Sugar'.

35 *Agritrade*, 'ACP Sugar Exports to the EU: Sugar Quota Abolition and the Future of Raw Cane Sugar Co-Refining by EU Beet Refiners' (Wageningen, Technical Centre for Agricultural and Rural Cooperation [ACP–EU], 2014). Available at http://agritrade.cta.int/Agriculture/Commodities/Sugar/ACP-sugar-exports-to-the-EU-Sugar-quota-abolition-and-the-future-of-raw-cane-sugar-co-refining-by-EU-beet-refiners, retrieved in November 2014.
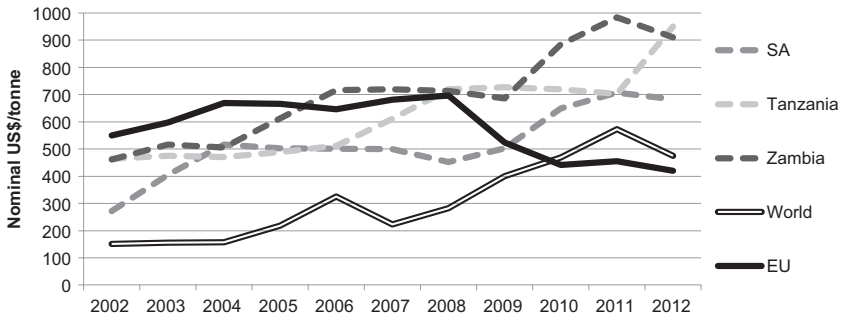
Figure 1. Nominal EU, world, and select domestic sugar prices (2002–2012). *Source:* B. Chisanga *et al.* 'Competition in the Regional Sugar Sector' (World Bank, Global Economic Monitor [GEM] Commodities, 2014), available at http://data.worldbank.org/data-catalog/commodity-price-data, retrieved 12 September 2014.
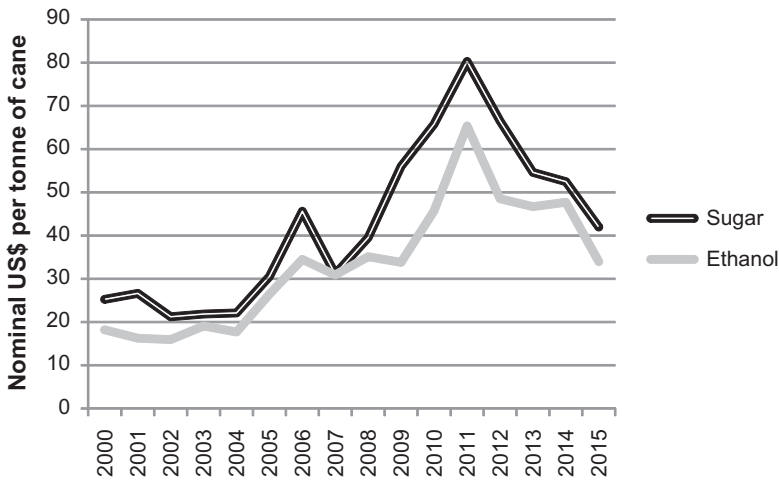

Figure 2. Nominal sugar and ethanol prices per tonne of cane (2000–2015). *Sources:* World Bank, 'GEM Commodities'; OECD, 'Biofuel Agricultural Outlook', (2014), available at http://stats.oecd.org/viewhtml. aspx?QueryId=58648&vh=0000&vf=0&l&il=&lang=en, retrieved 23 September 2014; OECD, 'OECD-FAO Agricultural Outlook 2016-2025', available at http://stats.oecd.org/#, retrieved 19 July 2016; World Bank, 'Commodity Markets Outlook: Resource Development in an Era of Cheap Commodities' (April 2016), available at http://pubdocs.worldbank.org/en/677121461693540498/CMO-April-2016-Full-Report.pdf, retrieved 19 July 2016. Note: Ethanol and sugar yields are in practice highly variable because of contingent variables present in both field and factory. These price trends are based on a relatively optimistic assumption of 0.014 tonnes of sugar and 74.5 litres of ethanol per tonne of cane, as applied by G. Yamba, G. Brown, F.X. Johnson, L. Jolly and J. Woods, 'Bioenergy for Sustainable Development and Global Competitiveness: The Case of Sugarcane in Southern Africa', *Special Report* (Cane Resources Network for Southern Africa, March 2008), p. 41.

ethanol prices have remained consistently below those of oil (Figure 3), they have similarly remained below even the declining world price of sugar (Figure 2), raising serious doubts about the prospects of bioethanol production as a stand-alone alternative to sugar.[36] The declining

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36 The biofuel 'rush' was, however, marked by the conspicuous absence of Illovo and Tongaat Hulett, barring Illovo's failed plan to erect a bio-ethanol facility in Mali and ongoing construction of a Tanzanian ethanol distillery (not as yet for fuel), and Tongaat Hulett's plans to refurbish its existing Zimbabwean ethanol facilities for fuel-grade ethanol. The emergence of new actors in the biofuel sector was marked by failure, such as in the now infamous case of the ProCana initiative in Mozambique: See Borras, Fig and Suárez 'The Politics of Agrofuels and Mega-Land and Water Deals'. The tendency for biofuel production to require subsidy is not confined to sugar: see P. Woodhouse, 'Beyond Industrial Agriculture? Some Questions about Farm Size, Productivity and Sustainability', *Journal of Agrarian Change*, 10, 3 (2010) pp. 437–53.
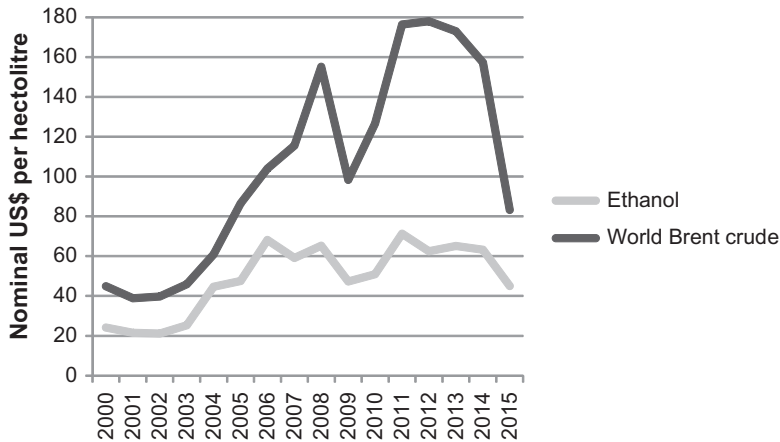
Figure 3. Nominal Brent crude and ethanol prices per hectolitre (2000–2015). *Sources:* World Bank, 'GEM Commodities'; OECD, 'Biofuel Agricultural Outlook'; OECD, 'OECD-FAO Agricultural Outlook 2016–2025'; World Bank, 'Commodity Markets Outlook: Resource Development in an Era of Cheap Commodities'.
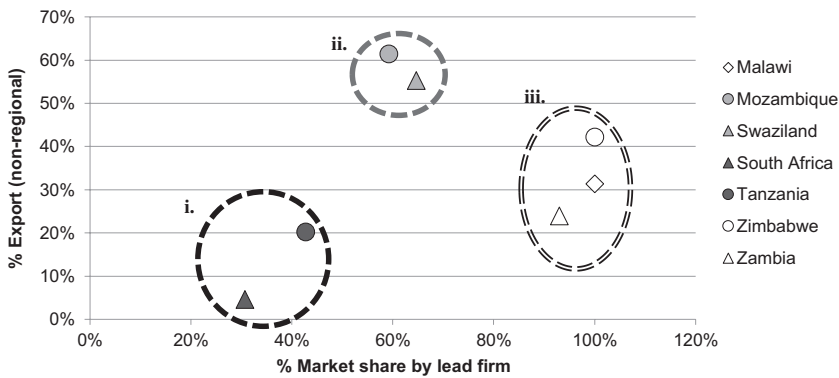

Figure 4. Proportions of export production and production by lead firms in southern Africa in 2012/13. *Sources:* Illovo Sugar, 'Illovo Sugar (Malawi) Limited: Annual Report 2013' (Malawi, Illovo, 2013), available at https://www.illovosugar.co.za/FileHandler.ashx?nsfguid=6103b577-bdb3-433d-9da5-0432449bf43b; Illovo Sugar, 'Zambia Sugar Plc Annual Report' (2013), available at https://www.illovosugar.co.za/About-Us/Zambia/Zambia-Sugar-Plc; A. Zacarias and D. Esterhuizen, 'Mozambique: Sugar Annual Report', *Global Agricultural Information Network Report* (USDA Foreign Agricultural Service, 2013); D. Esterhuizen, 'Zimbabwe Sugar Annual: Drought Drives Sugar Production Down Marginally', *Global Agricultural Information Network Report* (USDA Foreign Agricultural Service, 2013a); D. Esterhuizen, 'Republic of South Africa Sugar Annual: The Report Covers Supply and Demand Trends For Sugar in South Africa', *Global Agricultural Information Network Report* (USDA Foreign Agricultural Service, 2013b); Sugar Board of Tanzania, 'Imports and Exports' (2014), available at http://www.sbt.go.tz/index.php/data; Swaziland Sugar Association, 'Markets' (2014), available at http://www.ssa.co.sz/index.php/sales-marketing/markets; South African Sugar Association (2014); all above web-based reports retrieved 7 November 2014.

profitability of exports to the European market has seen a renewed emphasis on domestic mercantile politics for both sugar, and indeed ethanol, production. Considerable effort is now being expended on protecting domestic markets from the threat of legal (South Africa)
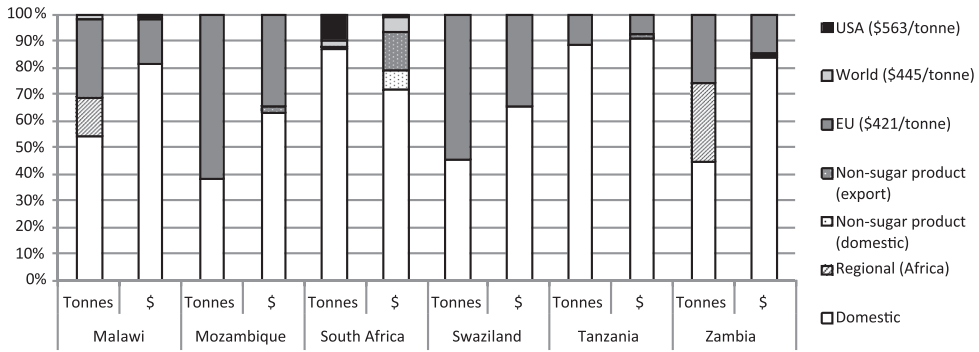
Figure 5. Comparison of distribution of sales by weight and by value in different markets for each of Illovo's operations in 2012/13. *Sources:* Illovo, Malawi, 2013; Illovo, Mozambique, 2013; Illovo, South Africa, 2013; Illovo, Swaziland. 2013; Illovo, Tanzania, 2013; Illovo, Zambia, 2013; World Bank, GEM.

and illegal (Tanzania) imports raising the domestic price of sugar and developing (or more accurately, subsidising) 'alternative' markets such as ethanol to absorb 'surplus' production.[37]

These mercantile dynamics have found uneven expression in different national settings. This can be partially glimpsed through differential degrees of concentration, that is, the relative dominance within a country of a single corporate sugar producer, and the relative share of production destined for (non-regional) export, acting to some degree as a proxy for vulnerability to shifts in world and international markets. As illustrated in Figure 4, this reveals a striking distinction between three types of national production structure:

i. industries composed of a number of firms oriented almost completely towards the regional market (South Africa, Tanzania), and characterised by a contentious politics of import penetration in recent years;
ii. highly concentrated industries exporting more than half of production overseas (Mozambique and Swaziland), all but exclusively to formerly preferential EU markets, and thus vulnerable to recent shifts in EU sugar policy;
iii. industries with a (non-regional) export profile of below 50 per cent and dominated all but exclusively by Illovo or Tongaat Hulett (Zambia, Zimbabwe, Malawi). Notably, all these countries exhibit high profits proportional to production.

Mercantile dynamics also appear as a key source of differentiation amongst Illovo's countries of operation. The value Illovo receives for the sugar it produces in different countries is highly variable, and contingent on the types of markets accessed. Figure 5 compares the proportion of physical output absorbed by different markets to the proportion of overall revenue received in them. It suggests that relative export exposure plays the most striking role: the share of revenue accounted for by domestic and regional sales is larger than the share of production absorbed by domestic markets in all countries except South Africa.

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37 B. Chisanga, J. Gathiaka, G. Nguruse, S. Onyancha and T. Vilakazi, 'Competition in the Regional Sugar Sector: The Case of Kenya, South Africa, Tanzania and Zambia', Paper for presentation at pre-ICN conference, 22 April 2014, available at http://www.cak.go.ke/images/docs/Sugar%20sector_ACF%20Report%20(1).pdf, retrieved 21 August 2014; T. Munyaka, 'Anger Fuels Ethanol U-turn in Zim' *Mail & Guardian* (17 January 2014), available at http://mg.co.za/article/2014-01-17-00-anger-fuels-ethanol-u-turn, retrieved 7 November 2014; L. Prinsloo, 'Sugar Looks to Ethanol to Help Pick Up Speed', *Business Day* (27 April 2014), available at http://web.archive.org/web/20140822182714/http://www.bdlive.co.za/businesstimes/2014/04/27/sugar-looks-to-ethanol-to-help-pick-up-speed, original source retrieved 7 November 2014.

Table 3. Estimated sugar prices, cane, factory and wage costs across Illovo's operations in 2012/13

	Estimated domestic & regional price ($/tonne)	Average realised sugar price ($/t)	DoP %	OG realised share ($/t)	Mill realised share ($/t)	Notional capital cost ($/ TSH)	Lowest wage ($/month)	Milling season (days)	Average permanent wage ($/ month)	National minimum wage ($/ month)	National pop. living ≤$2 a day (%)
Malawi	850	718	60.0	431	287	844,686	76	237	394	27	82.0
Mozambique	1,210	745	61.2*	456	289	677,818	103	193	997	86	81.8
South Africa	674	830	66.0	548	282	1,420,049	282	256	2,669	282	31.0
Swaziland	956	664	64.0	425	239	1,111,649	194	267	1,479	93	60.4
Tanzania	761	633	57.0	361	272	1,102,636	119	268	1,473	98	87.9
Zambia	828	733	59.1	433	300	1,485,199	230	257	1,974	218	86.0

DoP = division of proceeds between outgrowers and millers; OG = Outgrower; TSH = tonnes sugar per hour. *The actual DoP percentage was not reported for Mozambique. The reported figure represents the mean of the rest of the group. *Sources*: Corporate Citizenship reports, 'Illovo Sugar: Socio-Economic Impact Assessment' for Malawi, Mozambique, South Africa, Swaziland, Tanzania and Zambia (see note 10); World Bank, GEM; Smith *et al.* 'Review of the Milling Season', 2013.

Figure 5 suggests that rents from high domestic and regional sugar prices compensate for low returns from exported sugar. This can be further illustrated by comparing Illovo's average revenue received per tonne of sugar in different countries (i.e. encompassing all markets) with an estimation of the effective domestic and regional prices they receive, in Table 3.[38] Indeed, the countries with the highest export exposure, Mozambique and Swaziland, obtained the highest local prices, even compared to the erstwhile 'monopoly' profit powerhouses of Zambia and Malawi. Meanwhile, the lowest local prices were obtained by Tanzania and South Africa, the only countries facing import competition. South Africa's local prices were both the lowest in the group and the only ones that did not exceed the average realised value. Moreover, South Africa's average realised value itself was the highest in the group, largely as a result of the unusually high proportion of revenue accounted for by non-sugar products.[39]

In addition to receiving different prices for its sugar, Illovo's operations also faced different average prices for capital and labour. Again, while precise prices are difficult to ascertain, a simple division of stated aggregate costs by number of units provides some insight into the breadth of difference. Factory and estate costs – expressed as US dollars per tonne of sugar per hour (TSH) milling capacity – were highest for Illovo's Zambian and four aggregated South African mills, despite the fact that the latter rely heavily on outgrower cane and there is little estate production. At the other extreme, Mozambique's and Malawi's costs were much lower, despite the vast extent of estate production in the latter. The reasons for these striking differences are not self-evident, and would probably include use of a range of both agricultural and industrial inputs that are not disaggregated in the data, to say nothing of shifting exchange rate differentials.

An even more extreme differential can be found with regard to average wages. Mozambique and Malawi's average wage for all permanent employees (in factory and estates), and lowest monthly wage, are particularly low, with Malawi paying less than one-fifth of the average wage rate of Zambia and South Africa. These indicators suggest that labour's weak political standing and relative deprivation under uneven conditions of social reproduction and economic development generally have played a key role in determining the 'floors' upon which Illovo's wage structure is based. For the casual, non-unionised and often migrant labourers that attract Illovo's lowest wage rates, in Mozambique, Malawi and Tanzania these are higher than the national minimum, but stand just above the US$2/day line. Perhaps unsurprisingly, these countries tend towards the lower levels of productivity summarised earlier.[40]

These concerns also connect with the terms of exchange between millers and differentiated outgrowers and the latter's ambiguous standing as both a fraction of sugar capital as well as a source of labour. Although relations between outgrowers and millers encompass a variety of dynamics that cannot be reduced to measurement by one particular indicator, examination of the terms of exchange between outgrowers and millers reveals a marked consistency in their

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38 See Appendix A for an explanation of how these processes were estimated.

39 However, these figures pre-date the increase in the dollar-based reference price of South Africa's (and hence much of the Southern African Customs Union's) sugar tariff from $358/tonne to $566/tonne and salary increases of around 9 per cent: see International Trade Administration Commission of South Africa, 'Increase in the Domestic Dollar-Based Reference Price of Sugar from US$358/ton to US$566/ton', report no. 463 (Pretoria, ITAC, 2014). Available at http://www.itac.org.za/upload/document_files/20140928125229_Report-No-463.pdf, retrieved 12 July 2015. This is likely to have underpinned Illovo's recent increase in operating profits from 8 per cent to 14 per cent in both South Africa and Swaziland.

40 It should be noted that the method used to estimate average permanent wages (see Appendix B) could not distinguish between permanent labour in plantations and factories. Consequently, the 'permanent wage' is likely to be deflated in countries with large plantations, such as Mozambique and Malawi, where permanent labour is spread over both sugar factories and cane fields. Conversely, the 'permanent wage' is likely to be inflated for countries with large outgrower segments where the cost of labour in cane is disguised within the prices paid to outgrowers, and 'permanent labour' tends to be confined to the higher-skilled factory jobs that enjoy high, if not total, levels of unionisation.

respective returns per tonne of sugar, despite variable Division of Proceeds arrangements and combinations of markets. The variability of outgrower forms, however, instead appears more directly associated with both the relative strength of labour and aggregate levels of outgrower productivity, as summarised in Table 2.

In Malawi and Mozambique, extremely low wages may have obviated any desire on the part of Illovo to outsource cane production, but at the same time, formed the foundation for the survival of relatively unproductive outgrowers. Similarly, the inverse would seem to hold for Zambia and Swaziland, where a relatively higher wage base is correlated with far more productive and capital-intensive outgrowers. While South Africa and Tanzania conform to this pattern, they form the outlier poles of outgrower returns, despite returns to sugar mills remaining stable in both. While this might be attributed to the superior bargaining power of South Africa's large-scale outgrowers against Tanzania's small-scale outgrowers,[41] it is equally likely that it is simply because the cost of South African cane is higher, due to far lower rainfall and markedly higher minimum wages.

Unpacking Profits: Production or Mercantilism?

This paper has argued thus far that the 'value logic' underpinning accumulation in sugar in southern Africa involves the interaction of two broad sets of dynamics features. The first concerns productivity, in which highly capital-intensive sugar factories are combined with water and labour-intensive forms of cane production, involving unusually large numbers of 'outgrowers'. The second is a persistent mercantile politics in which state policies are centred on the relative creation and distribution of domestic rents and trade in internationally segmented markets.

The extent and configuration of these features in relation to each other were also shown to be highly variable across Illovo's southern African operations. Does their variability explain the differential profitability of Illovo's operations? The question also has clear political implications. Understanding the relative origin of profits (or lack thereof) is important for tracing the class content of different accumulation regimes and in delineating the parameters within which different agencies must strategise in (actual and potential) struggle.

This section sets out to compare the relative influence of productivity and mercantile features in Illovo's different country operations. These relations cannot be disentangled through an examination of unified company profits, which are the outcome of underlying processes. Consequently, an analytical device is necessary to probe beneath the surface. Multiple regression modelling is often pursued to interrogate questions of the relative influence of multiple variables (here productivity and mercantilism) on another (i.e. profit), but is precluded by a lack of sufficiently disaggregated data and relatively small sample size. Hence I have used a simple arithmetic counterfactual approach, designed specifically to analyse the available data on Illovo.

Simply put, this approach proceeds by positing two hypothetical worlds, or models: first, one in which there is no variation in mercantile characteristics, and second, another in which there is no variation in productive characteristics. By 'controlling' for mercantile and productive characteristics, the models provide insight into the respective influence of each set of variables on profits and costs. A detailed account of the procedure and its limits is discussed in Appendix B.

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41 The irony here is that mainstream accounts of contract farming arrangements typically characterise processor/ retailers as absorbing the 'risk' in marketing. These results suggest the opposite is more likely.
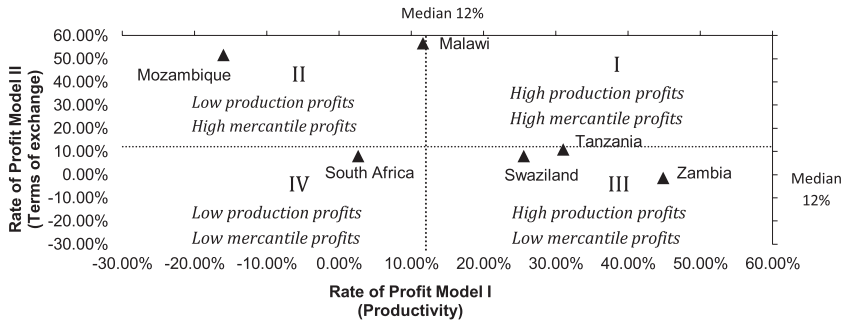
Figure 6. Differential rates of profit of Illovo's operations under Models I and II.

Results

The results of the two models are reported alongside the real values reported by Illovo in Figure C1 and Figure C2 and Table C1 in Appendix C. The results are rendered more intelligible by the use of four key analytical ratios. The meaning of each of these ratios is summarised below before applying them to an analysis of Illovo's operations in different countries in the region.

- The Rate of Profit (RoP) measures overall profitability as the ratio of profit (before taxes and interest) to the total value of capital and wages. As such, it is the most important indicator in evaluating the central question of the relative weight of different mercantile and productive features. For this reason the RoP under both models is plotted in Figure 6.
- The Profit–Wage Ratio (PWR) measures the degree to which profits exceed wages paid. As in effect representing value created but not captured by labour, it is sometimes referred to as the 'rate of exploitation'.
- The Capital–Wage Ratio (CWR), sometimes referred to as the 'Value Composition of Capital', measures the value of capital relative to that of wages, and is a measure of relative capital intensity. Where unit prices are constant (as in Model I), the CWR reflects the physical ratio of capital to labour, sometimes referred to as the 'Organic Composition of Capital'.
- The Profit–Capital Ratio (PCR) measures the profit generated relative to the value of capital deployed. It also stands as a simplified outcome of the ratio of the PWR to the CWR – rising with the former and falling with the latter – and hence *realised* capital efficiency. Where unit prices are constant (as in Model I), the PCR reflects the productive efficiency of deployed capital.[42]

Zambia

Perhaps unexpectedly for this 'monopoly' producer, productive efficiency, rather than rent, is at the core of Illovo's accumulation in Zambia. As illustrated in Figure 6, Zambia claimed the highest RoP in the group in Model I, but ran at a loss in Model II. In the former its mid-level CWR suggests that Zambia Sugar employs a significant number of workers relative to its immense capital investment, while its peak PCR and PWR, and least lost crushing time, show that they are highly productive. In Model II, however, close-to-average realised sugar prices do not cover its unusually high wage and capital rates, despite its low – and according to recent reports, reducing – export burden.[43] It hence retains a medium CWR, but critically low PWR and hence PCR.

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42 This is very similar to the algebraic reformulation of the Marxist rate of profit as $r = \dfrac{Rate\ of\ exploitation}{Organic\ Composition\ of\ Capital\ +1}$. See Fine and Saad-Filho, *Marx's Capital*, p.111.

43 K. Njombo, 'EU Reforms May Hurt Zambia Sugar', *Zambia Daily Mail* (13 October 2014), available at https://www.daily-mail.co.zm/?p=7436, retrieved 20 October 2014.

The political economy of Zambia Sugar's productivity-centred approach hence appears to cohere around a three-way compact. This involves state permission for the company's increased access to substantial productive resources, including the controversial extension of its water-intensive estates with the acquisition of Nanga Farms and highly integrated management of outgrowers and further low-tax commitments (leaving aside allegations of tax evasion).[44] These have contributed to Illovo's substantial profits without the cost to consumers of unusually high rents, but have further ensured that substantial wages and outgrower returns can be financed. In turn, these bolster the ruling party's interest in translating Zambia Sugar's economic benefits into enhanced electoral support in its opposition-held area of operation.[45]

Malawi

As was shown at the paper's start, Illovo's two lucrative Malawian mills are undoubtedly at the core of the group's profitability. Certainly, the mills are highly productive. In Model I its quintessential combination of factory efficiency with labour intensity and vast water-intensive estates saw the lowest levels of lost crushing time at minimal capital costs (C2) and low cane purchases from outgrowers (C1). Here, a mediocre RoP comes only as a consequence of the application of average wages to an exceptionally large workforce, as expressed in a low CWR undermined by a very low PWR.

Model II, however, shows dramatically the impact of releasing Malawi from this particular hypothetical constraint. While the inland monopoly producer Malawi is shown to enjoy higher-than-average domestic prices and low per-unit capital costs, it is acute and extreme labour exploitation which is shown to be at the core of Malawi's super-profits, resulting in the clustering of very high ratios for RoP, PWR and CWR.

This analysis suggests that Illovo's Malawian operation retains the character of the patrimonial relationship forged in the past between Hastings Banda's state and Tiny Rowland's Lonrho Sugar, despite reports that leverage of sugar distribution quotas by individual politicians will no longer be allowed.[46] Notably, Illovo Malawi's high profits and low interest commitments see it rank amongst the highest in proportional tax contributions and retained profits. Small-scale outgrowers' sparse contribution to supply suggest that they have limited opportunities for accumulation. Nonetheless, the benefit of even this limited income has stood as a substantial force in socially differentiating Malawi's outgrowers from their neighbours and cane labourers.[47] They exist mainly as petty beneficiaries of ongoing squeezes on land, water and labour by the triumvirate of party, state and company.[48]

Mozambique

It is perhaps unsurprising to find Illovo's least productive Mozambican operations running at an outright loss in Model I, bearing a high wage burden (W1+W2) but producing insufficient output (and revenue) relative to its very high manufacturing costs (C1+C2). But Model II demonstrates, in an even more extreme form than Malawi, the centrality of mercantile 'squeezing' to accumulation in Illovo's Mozambique operation. In addition to showing the highest domestic prices (counterbalancing a particularly large proportion of exports) and exceptionally depressed capital costs, Mozambique's pitifully low wage bill is second only to that of Malawi.

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44 Lewis, *Sweet Nothings*; see Matenga, 'Outgrowers and Livelihoods', in this issue.

45 Richardson, *Big Sugar*.

46 J. Gosnell, 'The Story of Lonrho Sugar and Rene Leclezio', *Proceedings of the South African Sugar Technologists' Association*, 79 (2005); G. Gondwe, 'Malawi: Muluzi No Longer Sugar Barron as Govt. Strips Him of Sugar Monopoly', *The Chronicle* (Lilongwe) (12 August 2005), available at http://allafrica.com/stories/200508120557. html, retrieved 6 April 2013; Corporate Citizenship, 'Illovo Sugar: Malawi'.

47 R. Herrmann and U. Grote, 'Large-Scale Agro-Industrial Investments and Rural Poverty: Evidence from Sugarcane in Malawi', *Journal of African Economies*, published online (2015); Pound and Phiri, 'Longitudinal Impact Assessment Study of Sugar Producers in Malawi'.

48 Chinsinga, 'The Green Belt Initiative', in this issue.

Buur (2011) has argued that in Mozambique, like Zambia, direct economic returns to the state were secondary to the potential electoral benefits in projects of party political consolidation.[49] It is not clear how consistently Illovo's Maragra mill in Mozambique performs in relation to its local competitors, or what particular political returns its concessions generated. Certainly, Illovo's Mozambican operations retain the highest proportion of profit, and contribute among the least in taxes. However, the fact that its profitability – despite its low productivity – is premised on combining the squeezing of labour with high consumer rents, suggests that these profits come at the greatest 'externalised' social, environmental and economic cost of the entire cohort.

Swaziland

The political economy of Swaziland's sugar production regime resembles Malawi's, with a similar history of close patrimonial relations between private company and state. Despite formally operating through a corporatist representative structure resembling the South African Sugar Association, the state is the country's largest sugar producer and is effectively controlled by the Swazi king's personal trust, Tibiyo Taka Ngwane.[50]

But Illovo's Swaziland operations are underpinned by different productive and mercantile features to those of Malawi. First, its highly capital-intensive mill and water-intensive estates exhibit the highest per-worker productivity in the cohort, but show a lower RoP in Model I than either Zambia or the less productive Tanzanian operations, due to large outgrower-cane purchases (C1) that raise its CWR and lower its PWR. Second, in Model II it shows substantial capital and wage costs, and – despite holding the second-highest domestic price in the sample – it obtains a low realised price and mass of revenue owing to its large export burden.

Where the price premiums attending substantial European market access once stood at the foundation of Swaziland sugar's profitability, this feature is now its chief liability. The bulk of Illovo's Swazi profits are absorbed by interest and taxes, but of those profits retained, nearly all are released as dividends. Although the pattern is not completely clear, in this case Illovo appears to be blending mercantile and productive responses. Illovo has undertaken considerable capital expansion while downscaling employment and services, utilised EU relief funds to promote outgrower production, and should be benefiting from raised Southern African Customs Union prices following South Africa's tariff increase.[51]

Tanzania

In many respects the opportunities for and constraints on accumulation in Illovo's Tanzanian mills parallel those of the Swaziland mill, as reflected in very similar profit, wage and capital ratios, but for different reasons. Despite lower masses of production, revenue and profit, under Model I, the Tanzanian mills claim a higher rate of profit by virtue of lower capital commitments in the purchase of outgrower cane, thus claiming a higher PCR from its paired lower CWR and comparable PWR.

Similarly, in Model II, Tanzania, like Swaziland, exhibits a far lower mass of revenue and profit as a consequence of its low realised prices – the lowest in the group. Unlike Swaziland, however, this is not a result of a high export burden. 'Low' domestic prices in Tanzania have been the subject of great controversy and scandals surrounding the illicit import of sugar and the issue of controversial import licences. In 2012/13, Illovo estimated that 17,000 tonnes of produced sugar was withheld for the past year as a consequence (representing 13 per cent of production in Model I, and 6 per cent in Model II).[52]

49 Buur *et al.*, 'Strategic Privatisation'.
50 J. Daniel, 'The Political Economy of Colonial and Post-Colonial Swaziland', *South African Labour Bulletin*, 7, 6 (1982), pp. 90–113.
51 Corporate Citizenship, 'Illovo Sugar: Swaziland'; Richardson-Ngwenya and Richardson, 'Aid for Trade and African Agriculture'; see Terry and Ogg, 'Restructuring the Swazi Sugar Industry', this issue.
52 Corporate Citizenship, 'Illovo Sugar: Tanzania'.

The contradictions faced by Tanzania's privately administered industry are an interesting counterpoint to the contradictions endured in the state-led era of modernisation and import substitution. In the past, consumer-oriented pan-territorial pricing policies were criticised for not sufficiently supporting 'producers' (invoking outgrowers), despite Tanzania's status as a net sugar importer, particularly as the cost of imported capital rose, international prices dropped and companies were exposed to intense taxation.[53] Despite the genuine reinvigoration and 'rehabilitation' of production, however, structural adjustment and privatisation do not seem to have eliminated these concerns. Taxation is higher for Illovo in Tanzania than elsewhere. Sugar prices remain 'too low' without effective protection – with outgrowers bearing the brunt of the burden – while Tanzania remains a net importer of sugar.[54]

South Africa

Expansion of sugar capital into the southern African region figured centrally in alleviating the core contradiction of South Africa's particular brand of 'overproduction' to the mid-1990s. But despite Illovo's significant disinvestment, particularly of the Pongola, Umfolozi and Gledhow mills, its South African operations still claim the largest share of the group's production and its smallest rate of profit. Model I suggests that in terms of productivity, insufficient cane supply and exceptionally high outgrower costs (C1) put the greatest brakes on profits, raising the CWR to extreme heights. This is only slightly offset by impressive mill labour productivity and hence PWR. This analysis is consistent with industry concerns regarding the impacts of years of low rainfall, with Illovo's Umzimkulu mill in particular being forced to close in 2015.[55]

Modest profits in Model I, however, turn to outright loss in Model II, suggesting that the South African operations inhabit the worst of both hypothetical worlds. Exhibiting the highest capital and wage rates in the group, higher losses are mitigated only by the exceptionally high average realised price. Importantly, the high realised price was not the result of high domestic prices, which were the lowest in the group. Rather these were the consequence of its combination of an exceptionally low sugar-export profile, together with the export of non-sugar value-added by-products. The importance of value-adding with non-sugar by-products, however, is likely to be overstated in this model, owing to its exclusion of the recent tariff and wage hikes.

Conclusion

This article has sought to interrogate the 'logic' underlying accumulation in sugar in southern Africa through an analysis of the underlying processes that structure value relations. It argues that these processes must be understood in terms of the dynamic interaction of two sets of relations that are common to commodity relations, but find unique expression in sugar.

The first is the compulsion to increase productivity inherent in capitalist value relations in general, and which have become increasingly evident in drives for economies of scale in African agro-food value-chains and agro-industrial integration.[56] The case of sugar stands as something of an extreme or 'limit case' in this regard. For many agro-commodity chains, 'primary' cultivation and 'secondary' processing are separated in space across regions, countries

53 NDC, *Sector Aid and Structural Adjustment*.

54 See Sulle, 'Social Differentiation and the Politics of Land', this issue.

55 T. Mokhema, and D. Alberts, 'Drought Likely to Hurt SA's Sugar Producers', *Business Day* (6 February 2015), available at http://www.bdlive.co.za/business/agriculture/2015/02/06/drought-likely-to-hurt-sas-sugar-producers, retrieved 1 March 2015.

56 R. Brenner, *The Economics of Global Turbulence: The Advanced Capitalist Economies from Long Boom to Long Downturn, 1945–2005* (Verso, London, 2006); Gibbon and Ponte, *Trading Down*; Weis, 'The Meat of the Global Food Crisis'.

or even continents, but the temporal constraint of cane's perishability necessitates that cultivation occur in close proximity to sugar processing. Indeed, this is one of its most attractive qualities for would-be governments as well as development planners: where there is cane in the ground, factory jobs will not be far away.

The spectacle of the centralised factory as a concentration of capital is marked, of course, by its contrast to the relative poverty of field labour (including labouring outgrowers), and the even greater poverty of those standing outside the 'world' built by Big Sugar. Accumulation involves the exploitation of 'living labour' in the fields, and is expressed in constant pressure to maximise throughput, ferocious discipline in work regimes, meagre returns to relatively low outputs, and hazards to health.[57]

The high levels of coercion involved in labour processes in southern African cane fields and sugar factories is striking, but their translation into company profit is contingent on value relations, that is, on how these labour processes relate to those found in fields and factories elsewhere. This is not simply a matter of comparing their productivity by examining physical ratios of output to input (e.g. tonnes/hectare). These stand ultimately as mere proxies for the values they represent, that is, the socially necessary labour time required to create these outputs. It is productivity in *value* production, manifesting as 'low-cost' in relation to a wider international 'social average', that has been central to accumulation dynamics in sugar in southern Africa.

This article has also shown that profitability can be attained with very different formal features and with very different social outcomes. The results of Model I, for example, reveal that a broad distinction can be made between Illovo's capital-'intensive' strategies, premised on raising output under intensive irrigation (as in Zambia) and its capital-'extensive' strategies. The latter are based on the fact that the 'free gift' of high rainfall lowers the capital commitment and cost of cane in both estate and outgrower production, in spite of the low productivity of its factory (as in Tanzania). Yet the Tanzanian operation has a very similar rate of profit to the highly capital-intensive Swazi operations, in spite of the latter foregoing substantial profits in cane to outgrowers.

These more abstract relations of value and production, however, must also be located within more concrete mercantile struggles over the amount and distribution of sugar's surplus, which figure centrally in the political economy of sugar in southern Africa. Key to these politics has been sugar's *generalised* evasion of the politics of liberalisation and deregulation, which has simultaneously enabled sugar to advance at the expense of local industry and labour (in the form of higher sugar prices) *and* cheapened sugar internationally, with oversupply of sugar on a 'residual' world market. The tides of mercantile dynamics in southern Africa are clearly in flux yet again. While the position of Illovo's countries of operation within international preferential markets remains crucial, sugar's position within domestic and regional political economies is increasingly central, and highly varied.[58]

This paper, although focused largely on only one company, Illovo, draws attention to key issues often ignored in discussions of sugar as well as broader literatures. It argues that the levels of profit achieved by corporate capital in the sugar sector are contingent on the dynamic interaction of the relations determining productivity and underpinning mercantile politics. For this reason, they are influenced by the 'internal' dynamics of class formation and exposure to the 'external' pressures of global markets, as well as by national politics. This analysis attempts to identify an underlying logic to differentiated 'outcomes' emerging from diverse 'contexts'. In particular, it attempts to lay bare struggles over – and expression of – value relations that

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57 See O'Laughlin, 'Consuming Bodies: Health and Work', this issue.
58 Dubb, Scoones and Woodhouse, 'The Political Economy of Sugar in Southern Africa – Introduction', this issue.

are neither neutral nor limitless. It is the analysis and comparison of underlying processes that is critically important.

This approach is of wider relevance to analyses of 'land grabs' and large-scale investment by corporate capital in African agriculture, which tend to focus mainly on understanding a range of context-specific factors, such as the character of land rights and livelihoods, or the nature of connections between local and national political dynamics. Others attempt to match 'outcomes' with 'ideal types' (such as outgrowers vs estate production, perhaps the issue most commonly discussed in the sugar sector). The approach used here offers further insights into forces driving accumulation and the value relations that these reflect, by setting out a way to examine the underlying stakes for capital and labour, however difficult this may be in practice, in order to grasp the essential relations of capitalism at work in sugar, and contemporary rural Africa in general.

Acknowledgements

ALEX DUBB

Institute of Poverty, Land and Agrarian Studies, University of the Western Cape, Private Bag X17, Bellville 7535, South Africa. E-mail: alexander.dubb@gmail.com

APPENDIX A: Estimation of Prices of Raw Sugar

Particular domestic and regional ex-factory raw sugar prices and disaggregated refined and speciality data are notoriously difficult to obtain. Nonetheless, available world, EU, and US raw sugar prices provide a basis for comparative analysis. The values and prices (in US$ and ZAR) employed were calculated as:

$$Average\ realised\ sugar\ price = \frac{Gross\ revenue}{Gross\ sugar\ production}$$

and:

$$Average\ domestic + regional\ price = \frac{Gross\ revenue\ -\ EUval\ -\ USval\ -\ Worldval\ -\ NonSugarVal}{Total\ production\ -\ EU\ export\ -\ US\ export\ -\ World\ export}$$

where:
EUval = realised value from European export = EU price × EU export
USval = realised value from American export = US price × US export
Worldval = realised value from world export = world price × world export
NonSugarval = realised value from reported non-sugar by-products.

APPENDIX B: The Model and its Limits

As noted above, the core purpose of this model is to establish a relationship between profits and productive and mercantile characteristics. The first step was to specify how 'profit' was to be defined. In this regard, the mass of profits was simply understood as equal to the revenue from sugar sales less capital costs (outgrower cane and manufacturing costs) and wages, salaries, and benefits. The formula is near-identical to Illovo's value-added statement from which the value data were drawn, the only distinction being that 'wages, salaries and benefits' were deducted from 'value-added' to form a cost category and 'depreciation' was added to 'manufacturing costs', leaving the mass of profit to encompass all forms of retained profit, dividends and taxation. In addition, wages were decomposed into estimated seasonal and permanent masses. Seasonal labour costs were estimated as the lowest monthly wage multiplied by the length of the milling season and number of seasonal workers. Permanent labour costs were then estimated by deducting the estimate of total seasonal labour costs from total expenditure on wages, salaries and benefits. The cumulative formula is simply expressed as:

$$P(profit) = Revenue - C1(outgrower\ cane) - C2(manufacturing\ costs)$$
$$- W1(permanent\ labour) - W2(seasonal\ labour).$$

As observed, the model is based on a counterfactual methodology. Simply put, its logic proceeds by positing two hypothetical worlds: one where there is no variation in mercantile characteristics, and another where there is no variation in productive characteristics. By 'controlling' for mercantile and productive characteristics, the model gives insight into the respective influence of each set of variables on profits and costs.

In order to construct a model that provides for mercantile and productive features to be controlled, however, required first establishing the value elements in the formula above as the outcome of both productive and mercantile features. Each value was hence redefined in terms of a direct mathematical relationship, shown below, between physical characteristics/output (in italics) and prices (in bold). As in most cases estimates of prices were themselves achieved by dividing the mass of values provided by physical units, the variable usually represents a simple mathematic tautology. There were two exceptions. First, the price of outgrower cane was estimated not by dividing the reported value of Illovo's cane payment by outgrower cane produced, but deduced in a slightly more complex manner to include both reported divisions of proceeds (DoPs) and derived percentage of Estimated Recoverable Content (ERC%). Unfortunately outgrowers' particular ERC% was not given and could not be established. Consequently, when no controls are applied, the formula does not equal the values provided by Illovo, although reported values are utilised to evaluate 'real' value compositions in the Appendix.[59] The second case concerned the calculation for seasonal labour employed to estimate the cost of permanent labour.

Hence, here each variable is defined as:

$$Revenue = \textbf{Realised price per tonne sugar} \times Total\ sugar\ produced$$

$$C_1 = \textbf{Price per tonne sugar} \times \textbf{Division of proceeds} \times ERC\% \times Total\ outgrower\ cane\ production$$

$$C_2 = \frac{\textbf{Manufacturing costs} + \textbf{Depreciation}}{\textbf{Tonnes sugar per hour}} \times Tonnes\ sugar\ per\ hour$$

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59 The actual differences between the formula's estimation of the mass of values paid to outgrowers (OG) and the actual values reported are tabulated below:

	Formula calculation of OG value ($)	Illovo's reported actual OG value ($)	% difference of formula value
Malawi	18,803,937	18,680,330.71	+1
Mozambique	10,032,267	9,751,367.60	+3
South Africa	305,002,465	226,866,154.71	+34
Swaziland	59,502,473	61,445,364.53	−3
Tanzania	20,830,971	24,084,703.12	−14
Zambia	70,265,398	57,333,342.05	+23

$$W_1 = \frac{\textbf{Gross salaries, wages \& benefits} - \textbf{W2})}{\textbf{\textit{Number of permanent workers}}} \times \textit{Number of permanent workers}$$

$$W_2 = \textit{Number of seasonal labourers} \times \textbf{Lowest monthly wage} \times \textit{Length of milling season}$$

$$\textit{Realised price per tonne sugar} = \frac{\textbf{Revenue}}{\textbf{Total sugar produced}}$$

$$\mathrm{ERC\%} = \%\textit{Estimated Recoverable Content} = \frac{\textit{Total sugar produced}}{\textit{Total cane crushed}}$$

Having established each of the values as the outcome of a mathematical relationship between both productive and mercantile features, each hypothetical could now be established by applying constant values to one set of characteristics for each variable, while letting the other characteristic set vary. To mitigate a completely arbitrary determination for the constant, I applied the simple mean of realised values to approximate a (purely) notional 'social average'.

The first, Model I, examines the impact of differential productive characteristics by controlling for differentials in 'mercantile' variables by applying equal values for these variables across all countries.[60] Hence, Model I represents a world where all pricing is perfectly constant. The inverse procedure is in turn applied in Model II, with average production figures applied across cases, positing identical factory and cane-supply areas across countries while sugar prices, wages and cane payment are left to vary.[61]

For example, to establish an average realised price per tonne of sugar, total reported revenue for each country was divided by that country's actual sugar output. In the first model seeking to control mercantile characteristics, each country's revenue was established by multiplying its actual sugar output by the group average of realised prices per tonne of sugar. In the second mercantile model, conversely, sugar prices as originally calculated for individual countries would be multiplied by the group's average sugar output.

Two additional variables were included for descriptive purposes, although having no mathematical impact on the calculation of profit. In the first case, although the costs of outgrower labour are subsumed within payments for cane, the composition of outgrower cane accounted for by labour costs is estimated to be:

$$W_3 = \textit{Number of workers estimated employed by outgrowers} \times \textbf{Lowest monthly wage}$$
$$\times \textit{Length of milling season}$$

Second, owing to the known centrality of maximising throughput to miller profitability, I applied the South African Sugar Technologists' Association estimates of lost crushing time (largely but not exclusively due to strikes and/or cane shortages) to approximate revenue losses due to insufficient throughput:

$$\textit{Lost revenue} = \left(\frac{\textit{Total sugar}}{\%\ \textit{Time efficiency}} - \textit{Total sugar} \right) \times \textbf{Price per tonne sugar}$$

It is worth emphasising again that the arithmetic employed here is not precise, and only guides the analysis of relative differentials. Its most egregious failings are threefold:

- As observed, the calculation of Estimated Recoverable Content (ERC%) in terms of total cane crushed/ sugar produced does not accommodate differences between outgrower and estate cane quality, but neither does it differentiate the sucrose extraction efficiency of milling operations, which is notoriously difficult to measure and disentangle from cane quality.[62]

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60 The specific average values applied to Model I were: Price per tonne of sugar = \$720.42; Division of proceeds = 61.213%; Manufacturing costs per 'Tonnes of Sugar per Hour' factory capacity = \$1,107,006.33; Lowest annual wage = \$167.12; and Average annual wage of permanent workers = \$17,972.33.

61 The specific average values applied to Model II were: Total sugar = 291,511; Total cane crushed = 2,503,471; ERC% = 11.64; Outgrower cane = 1,416,205; Tonnes of sugar per hour (TSH) = 61.3; Time efficiency = 82.32%; Seasonal workers = 3,132; Permanent workers = 2,099; and Workers employed by outgrowers = 7,618.

62 T.H. Fourmond, 'How to Measure and Express Sugar Mills' Efficiencies', *Proceedings of the Annual Congress of the South African Sugar Technologists' Association*, 40 (1966), pp. 149–51.

- The division of proceeds formula in Mozambique was not reported, and was assumed to be the average of the remaining countries.
- Finally, manufacturing costs (C2) are divided according to Tonnes Sugar per Hour factory capacity as a proxy for per-unit capital costs, but in reality also include estate costs.
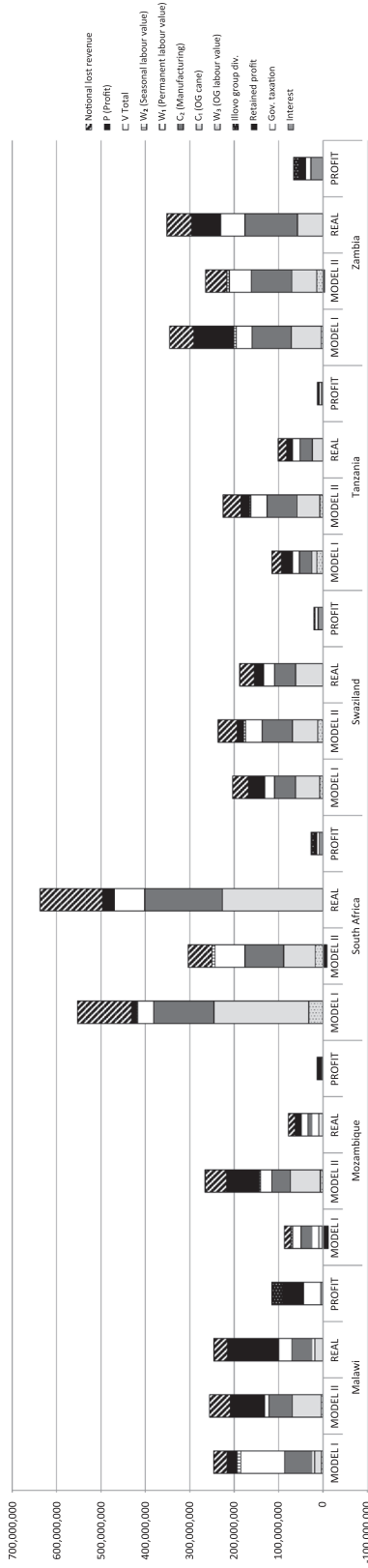
APPENDIX C: Analysis of Illovo Data

Figure C1. Mass and composition of revenue and profits across Illovo's operations by country.
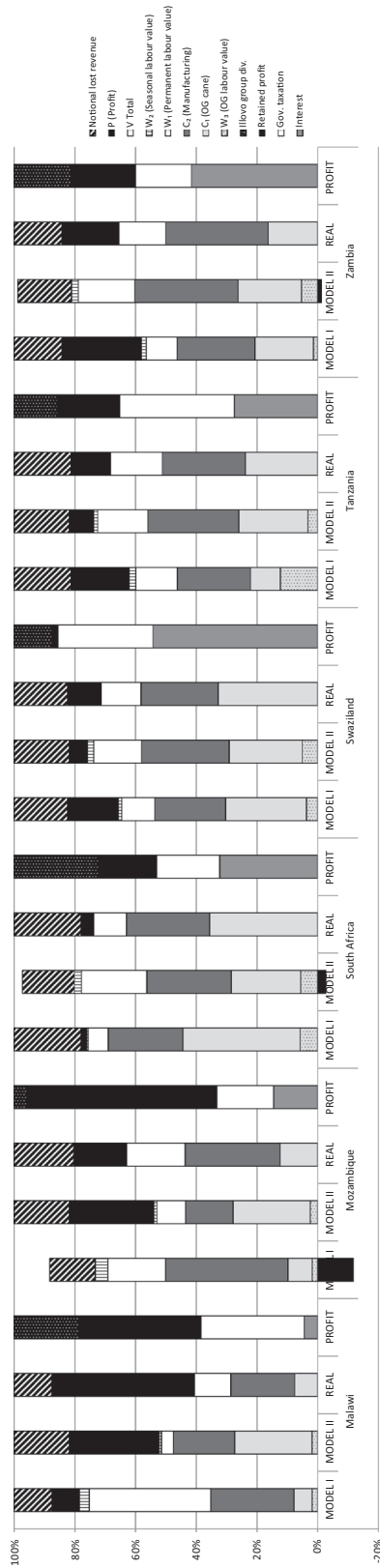
Figure C2. Proportional composition of revenue and profits across Illovo's operations by country.

Table C1. Proportional composition of revenue and profits across Illovo's operations by country

	Malawi						Mozambique						South Africa						Swaziland						Tanzania						Zambia					
	Model I		Model II		Real		Model I		Model II		Real		Model I		Model II		Real		Model I		Model II		Real		Model I		Model II		Real		Model I		Model II		Real	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
Lost Revenue	14	6	22	1.16	14	6	24	2	22	1.16	24	2.5	28	1	22	1.16	28	1	21	4	22	1.16	21	4	23	3	22	1.16	23	3	19	5	22	1.16	19	5
P	10	4	36	1	54	1	-19	6	34	2	22	5	3	5	-3	6	5	6	20	3	7	4	14	5	24	2	10	3	16	4	31	1	-2	5	22	2.5
C_1	9	6	33	4.5	9	6	16	5	34	3	15	5	57	1	37	1	46	1	37	2	36	2	40	2	27	3	32	6	29	3	25	4	33	4.5	19	4
C_2	31	3	25	5	24	6	66	1	19	6	39	2	32	2	36	3	35	3	28	6	35	4	31	5	30	4.5	37	2	34	4	30	4.5	43	1	40	1
W_3 (% OG)	24	2	7	6			18	3	9	5			13	4	20	1.5			12	5	18	3			56	1	13	4			7	6	20	1.5		
C_1+C_2	40	6	58	5	33	6	81	2	53	6	54	5	88	1	73	1	81	1	65	3	71	3	71	2	57	4	68	4	63	3	55	5	75	2	59	4
W_1	46	1	5	6			31	2	12	5			8	6	28	1			13	4	19	4			17	3	20	3			12	5	23	2		
W_2	4	5	1	5.5			7	6	1	5.5			1	1.5	3	1.33			1	1.5	3	1.33			3	4	2	4			2	3	3	1.33		
W_1+W_2	49	1	6	6	14	5.5	38	2	13	5	24	1	9	6	31	1	14	5.5	15	4	22	3.5	16	4	19	3	22	3.5	21	2	14	5	26	2	18	3
Rate of Profit	12	4	57	1	116	1	-16	6	52	2	28	3	3	5	-3	6	6	6	26	3	8	4	16	5	31	2	11	3	19	4	45	1	-1	5	29	2
Profit–Wage Ratio	21	5	639	1	391	1	-51	6	267	2	92	3	29	4	-11	6	39	6	140	2	34	4	86	4	122	3	45	3	77	5	220	1	-6	5	121	2
Capital–Wage Ratio	82	6	1026	1	238	5	217	5	416	2	228	6	988	1	236	6	585	1	449	2	324	3	447	2	293	4	314	4	301	4	391	3	290	5	324	3
Profit–Capital Ratio	26	4	62	2	164	1	-23	6	64	1	40	2	3	5	-5	6	7	6	31	3	10	3	19	5	42	2	-2	4.5	26	4	56	1	-2	4.5	37	3