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VENT FOR SURPLUS OR PRODUCTIVITY BREAKTHROUGH? THE GHANAIAN COCOA TAKE-OFF, c.1890-1936

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VENT FOR SURPLUS OR PRODUCTIVITY BREAKTHROUGH? THE GHANAIAN COCOA TAKE-OFF, c.1890-1936[1]

Abstract: *Through a case-study of cocoa-farming in Ghana, this paper takes up the long-running but recently neglected debate about the 'cash crop revolution' in tropical Africa during the early colonial period. It focuses on the supply side, using quantitative evidence as far as possible, to test the much criticised but never superseded 'vent-for-surplus' interpretation of the export expansion as a substitution of labour for leisure. The paper argues that while the model captured certain features of the case, such as the application of labour to underused land, its defining claim about labour is without empirical foundation. Rather, the evidence points to a reallocation of resources from existing market activities towards the adoption of an exotic crop, entailing a shift towards a new, qualitatively different and more profitable kind of production function. This innovation is best understood in the context of the long-term search of African producers for ways of realising the economic potential of their resource of relatively abundant land, while ameliorating the constraints which the environment put upon its use.*

Ghana exported no cocoa beans in 1892, yet nineteen years later overtook Brazil (whose crop was itself a national record) as the world's largest exporter of the commodity (Clarence-Smith 2000: 238-9). That was at the level of 40,000 tonnes a year; Ghanaian output reached 200,000 in 1923, and passed 300,000 in 1936. Ghanaian farmers' investment in what for them was an exotic crop, and which required several years' gestation between planting and coming into bearing, epitomised the most dynamic aspect of a geographically widespread and very varied phenomenon. This was the 'cash crop revolution' of the late nineteenth and early twentieth centuries in the so-called 'peasant' colonies of tropical Africa – those colonies in which Africans retained control of the vast majority of cultivable land, rather than seeing much of it appropriated for use by European settlers or companies.

As a general phenomenon the 'revolution' had three parts. The first, exemplified in the forest zone of southern Ghana, was indeed the massive expansion of export agriculture, largely at African initiative, in areas with favourable land quality and location. In coastal regions of West Africa producers, many of them small, had already begun to supply European markets with agricultural produce (palm oil, groundnuts) several decades before colonial rule, during and after the abolition of the Atlantic slave trade (Hopkins 1973: 125-35; Law 1995). But the size and geographical range of Africans' entry as producers into intercontinental agricultural markets was multiplied between colonization and the 1930s depression. The second part, qualifying the term 'revolution', was the much slower and more fitful growth of agricultural exports from less naturally favoured areas (for instance, cotton from the interior of French West Africa), often prodded by the colonial administrations. The third part was the complement of the first, and a partial response to the limits of the second: the emergence, sooner or later, of a migrant-labour system which channelled workers into the main export-

[1] Earlier versions of this paper were presented in 2012 at the 'Trade, Poverty and Growth in History' conference in Madrid (May), the World Economic History Congress in Stellenbosch (July), and the 'New Frontiers in African Economic History' Workshop in Geneva (September). I am grateful to the participants for helpful comments. I am especially grateful to Alexander Moradi for an excellent set of detailed written comments. Any mistakes are mine.

crop growing areas from the drier and/or more remote parts of the same or neighbouring colonies.

Both the causes and effects of these related but varied transformations in early colonial Africa were the subject of much research and controversy during the pioneering decades of research in African economic history, from the late 1950s to the mid-1980s. But contributions since then have been sporadic. They have also tended, rightly, to give the institutional dimension of export agriculture more systematic attention than it had previously received (Firmin-Sellers 1996; Austin 2005). As a result, the 'vent-for-surplus' approach, which interprets the export crop 'revolution' as a mere substitution of labour for leisure, remains afloat, much criticised but un-replaced, and periodically re-affirmed (Teal 2002). It is time to resume the unfinished business of analysing the resource requirements of the export expansion, how they were met, and the significance of this episode for the study of African development in the long term (Austin, forthcoming).

A basic complexity of the debate is that the opportunity costs of export agriculture varied greatly according to the nature and location of the specific agricultural environment. The vent-for-surplus approach may apply where, as with palm oil in parts of southeast Nigeria, export growth occurred in local circumstances of unusually dense population, a crop that was already produced for domestic use, and which did not have particularly heavy labour requirements – at least in production, as opposed to processing and marketing (Martin 1988: 32-4, 47, 53-4, 138-9). But the approach does not work for those savanna cases where growing more cotton entailed a decrease in food production. This point was well made by Tosh who, however, suggested that the vent-for-surplus framework might fit forest crops such as cocoa (Tosh 1980). Elsewhere I propose a framework intended to accommodate and explain the variety of experience (Austin, forthcoming). The present paper offers an empirical re-examination of a forest-zone case at the most 'positive' end of this spectrum of experience within the African 'cash crop revolution'.

Section 1 describes the vent-for-surplus model in its two main forms, and outlines the debate about its application to Ghana. Section 2 undertakes the preliminary task of estimating the size of the land and labour inputs involved in the cocoa take-off. This will involve, in part, the use of a district case-study to examine the issue more sharply than is possible purely at the aggregate level. The results are analysed in Section 3, which tries first to compare the scale of inputs to the resources available, to assess whether the land and labour requirements were sufficiently modest to make a vent-for-surplus interpretation plausible. It goes on to examine the evidence on the issue of reallocation of resources into cocoa farming from prior economic activities, which in turn allows us to consider whether the cocoa 'take-off' should be regarded, not as a 'vent-for-surplus', but rather as a productivity breakthrough. The Conclusion considers whether, and if so, in what sense, the cocoa take-off constituted more than 'growth without development', and relates the Ghanaian case to recent arguments about the dynamics of long-term economic development in Sub-Saharan Africa.

1. Ghanaian Cocoa and the Vent-for-Surplus Model(s)

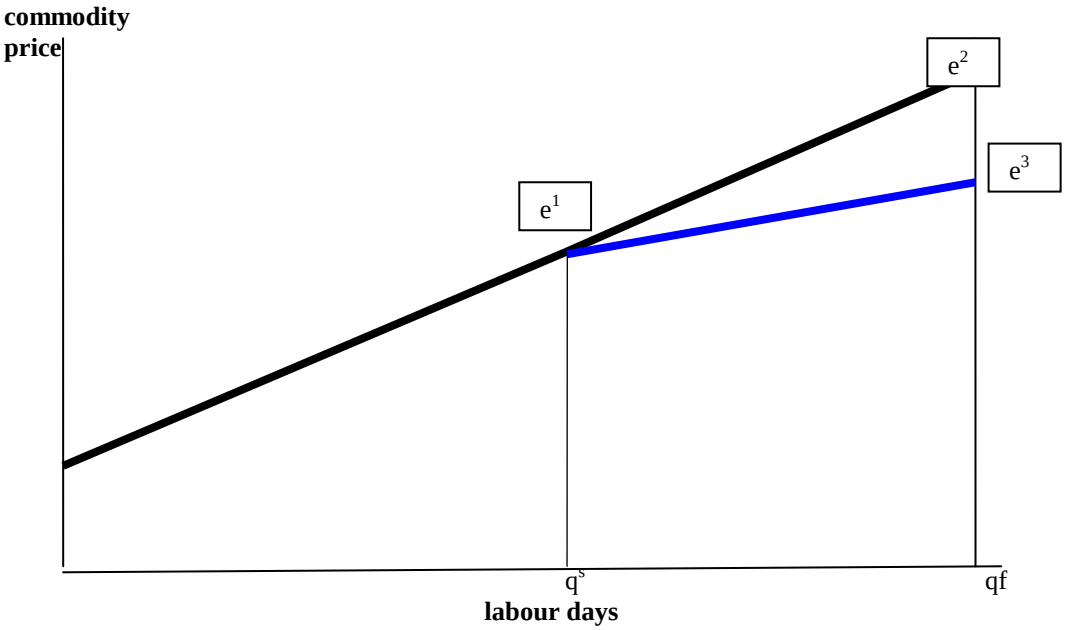
The Ghanaian cocoa take-off embodied the most dynamic aspects of the growth of agricultural exports from colonial Africa: speed, and the propelling role of indigenous entrepreneurship (Hill 1963/1997; Austin 2005). Presumably because of the former, it is the case that received the most detailed application of the vent-for-surplus approach, in the book by Szereszewski (1965), and the relevance of the model to the case has been maintained more recently by Teal (1984, 2002). Szereszewski's study is particularly significant in the

comparative literature, not only because of its relative detail, but also because it was the first formulation of a neo-classical version of the vent-for-surplus model, which had been originally formulated in classical terms by Myint (1958, 1964/1973).

All vent-for-surplus models share the defining characteristic that they depict the growth of export output as made possible by the application of previously idle labour to previously unused land. Thus they explicitly rejected the Heckscher-Ohlin comparative costs framework, within which a country entering international trade can produce exports 'only by drawing labour away from domestic production' (Myint 1958: 323). Given land abundance, output is assumed to be a function of labour inputs alone – fixed capital being formed by 'simple transformation' of 'tool-aided labour', in Szereszewski's phrase (Szereszewski 1965: 22, cf. 51, 75, 137). Population is assumed to be static.

Figure 1 depicts the model, distinguishing the Myint and Szereszewski forms. The diagram focuses on labour inputs (on the horizontal axis), because both versions of the model agree about prior land abundance, and – as we shall see – that assumption is broadly upheld by the evidence. Labour inputs are defined as man days because that is the unit used in the primary sources. The incentive to apply labour to export production (shown on the vertical axis) is defined as the producer price of the highest-value export commodity available. This is partly because in this period most farmowners applied their own plus family and dependent labour (which in the northern part of what became the cocoa belt, the former kingdom of Ashanti, at first often included pawns, slaves or the children of slaves) rather than hiring wage labour. And when they did eventually hire labour, their capacity to do so was essentially a function of the producer price (Austin 2005). The labour supply schedule begins with the producer price of the most profitable commodity somewhat above zero, because it is assumed that this price has to reach a certain level before it becomes worthwhile for producers to apply labour additional to that required for their own-account production.

Figure 1. The Process of Labour Mobilization in Vent-for-Surplus Growth



In Myint's version 'vent-for-surplus' growth is without opportunity cost. He posited a prior equilibrium (e^1) in which there is an absolute deficiency of effective demand, such that it is not profitable to make full use of the available factors of production. The equilibrium is

then broken by the offer of new kinds of imported goods, at relatively low prices, which make it worthwhile for producers to expand their output, by adding exports to their undiminished production for domestic consumption. Szereszewski's model starts from the same equilibrium, but is differently motivated: the reason land and labour are only partly employed is because producers chose to balance the advantages of income with those of risk avoidance and leisure. What ends the equilibrium is not necessarily new goods, but rather the offer of higher returns to labour through the adoption of cocoa production. As Szereszewski posits a positive preference for leisure, the cocoa take-off has an opportunity cost, but it is in reduced leisure time rather than income. The price (barter terms of trade) effect is represented in the diagram by the shift from the status quo ante (e^1, with labour supply at q^s) towards a new equilibrium, where resources are fully utilized (e^2). Myint's new wants effect is depicted as a shift in the labour supply schedule, so that more inputs will be offered at each producer price level, implying that full 'employment' (q^f) is reached even at a lower price level (e^3).

Reservations about the application of the vent-for-surplus approach to the Ghanaian cocoa take-off were entered by Ingham, and by Hogendorn and Goldberg. Ingham's own quantitative analysis did not lead her to present a refutation of Szereszewski's model. But she pointed out that the research of Hill and others on the Akwapim and Krobo farmers who were responsible for the original take-off of cocoa farming in the 1890s, in the Akim Abuakwa district of the Eastern Province of the Gold Coast Colony (see the map),[2] had shown that they were deeply engaged in commodity production and trade before they took up cocoa farming. This was inconsistent with the 'vent-for-surplus' claim that the labour put into cocoa came from a reserve of leisure (Ingham 1979, 1981). In a review essay, Hogendorn and Goldberg enlarged on that point. They also noted the lack of evidence for Myint's notion of an export-supply response to the availability of new goods for import: the import menu contained little new, and the pioneer farmers showed little interest in immediate consumption anyway, preferring to reinvest in acquisition of farmland when not building houses in their home towns. Accordingly, Hogendorn and Goldberg rejected vent-for-surplus for the original pioneers. But they maintained that it might apply to the economy as a whole (Hogendorn and Goldberg 1982).

For Myint, 'vent-for-surplus' complemented the other, much more famous, model of growth based on the mobilization of previously surplus resources. Whereas the Lewis model did not apply to land-abundant economies like Ghana, 'vent-for-surplus' could fill the gap. (Myint 1958, 1964/1973). The basic aim of all versions of the vent-for-surplus model was to explain how countries like Ghana could very rapidly increase their export production without apparently reducing their existing economic activities, nor benefitting (as yet) from massive immigration. A corollary of this, however, was that the kind of economic growth that it depicted was unimpressive in developmental terms. In the major vent-for-surplus study for Nigeria, Helleiner wrote that 'Beyond offering peasant farmers a vent for their potential surplus production the foreigner did next to nothing to alter the technological backwardness of the economy' (Helleiner 1966: 12). Szereszewski averred that 'Spurts of growth of this type *can* result in basic structural transformations', but admitted that 'In this case the process of structural change lost its momentum after 1911, and after 50 years Ghana's economy retains a close affinity with [the] 1911 Gold Coast, albeit at a level of roughly double per capita income' (Szereszewski 1965: 112).

The state of the debate on Ghana is thus inconclusive. Empirically, it has also been narrow in its scope, both in time and space. As Table 1 shows, the expansion of cocoa output

[2] It was drawn by Mina Moshkeri, cartographer of the London School of Economics.

or, implicitly, even of tree-planting, did not end in 1911. It had a long way to go. The upward trend in output ended only in the calendar year 1936, at 311,100 tonnes, or more precisely in the crop year 1936/7, at 304,800 tonnes (respectively: Kay 1972: 336-7; Bateman 1974: 315).[3] It took several years for a newly-planted cocoa seed to develop into a bearing tree, and several years more before it reached peak production. Thus the crop of 1936 reflected only plantings completed by c.1930. The 1936/7 crop was not equalled or surpassed until 1959/60, the latter reflecting the effect of a second great (though much shorter) planting boom which had begun in the early 1950s. So we can define the Ghanaian cocoa take-off as complete by the end of the 1936/7 crop year in terms of output, and probably by the end of the 1930 planting season in terms of fixed capital investment (in cocoa trees). Accordingly, our re-examination of the vent-for-surplus issue will cover the whole take-off, while giving due attention to the early, pioneering years.

Table 1. Yearly Contribution of Cocoa to Gold Coast Exports by Value, 1889-1936 (4-year averages)

Period	Volume of Cocoa Exports (000 tonnes)	Value of Cocoa Exports (£000, f.o.b.)	Total Exports* (£000, f.o.b.)	Cocoa Share of Total (%)
1889-1892	Negligible	Negligible	591.50	negligible
1893-1896	0.06	0.83	810.50	00.99
1897-1900	1.12	14.05	962.00	01.46
1901-1904	2.74	106.00	804.75	13.17
1905-1908	9.25	394.75	1944.75	20.30
1909-1912	30.74	1219.25	3019.00	40.39
1913-1916	63.45	3047.00	5101.00	59.73
1917-1920	114.58	5819.50	8012.00	72.63
1921-1924	179.10	6105.50	7857.25	77.71
1925-1928	221.00	10089.75	12365.75	81.59
1929-1932	226.63	6919.50	9381.00	73.77
1933-1936	261.60	5469.00	9260.50	59.06

Sources: for 1889-1899, Hill 1963/1997: 176-7; 1900-1936, Kay 1972: 334-7.

[3] It is better to use crop-year data (October-September), because variations between one calendar year and the next may in part reflect slight variations in the timing of harvesting and marketing within the same season, slightly obscuring the underlying trend. Unfortunately, crop-year data are available only for the last few years of the period examined in this paper, so I rely here on the calendar-year figures.

*Kay's table apparently excludes any very minor exports.

By the same token, it is necessary to consider the whole geographical area embraced by the spread of cocoa planting, rather than concentrating on Akim Abuakwa alone, or even on the whole Eastern Province of the Gold Coast Colony, the cradle of the cocoa industry. In 1936/7 the province achieved a record crop. But by then it accounted for just less than 43 per cent of the 'Ghana' total. Cocoa growing had extended westwards through the Central Province and entered Western Province. It had also spread into the smaller space of the forest zone of British Mandated Togoland. In 1936/7 this former German territory supplied over 20,000 tonnes, 6.75 per cent of the total. Above all, Ashanti (including what is now Brong-Ahafo) was steadily catching up Eastern Province, and now had a 30 per cent share (Bateman 1974: 315).[4]

2. Estimating Land and Labour Inputs

The purpose of this section is to estimate the inputs involved in the cocoa take-off. It must be stated at the outset that, as noted by Szereszewski, capital formation in cocoa farming was very largely a function of labour inputs (Szereszewski 1965: 137). The provision of mechanized transport, whether by the government, European and African firms, or the initiative of the farmers themselves, was critical to turning a local expansion into a boom that extended rapidly across much of the forest zone (Jedwab and Moradi 2012; Austin 2007:100-103; Hill 1963/1997: 243-7). But at farm level, the only equipment required was an axe, a cutlass, and seed(ling)s. The basic method for estimating actual inputs was pioneered by Szereszewski (1965: 137-8) and followed by Ingham (1979, 1981). It involves estimating backwards, from the volume of cocoa exported (produced) in successive years, to the area of bearing cocoa trees required to generate such an output, and thence to the quantity of labour days required to produce it.

I hope to improve on the earlier calculations in four ways. The first is by using a district case-study to sharpen the analysis of inputs during the take-off. One advantage of doing this is that at district level it is occasionally possible to make the estimation of inputs and the assessment of factor availability more bounded in time and, thereby, more precise than by working only at aggregate level. The other advantage is that the Ghanaian cocoa take-off did not occur all at once everywhere. Rather, it took the form of a series of local planting booms, followed by rapid growth of output, as the cocoa frontier was extended. A district study, therefore, may enable us to assess the intensity of the pressure on land and labour during the actual period in which cocoa cultivation became the main source of income of the locality concerned. Second, I use a range of contemporary estimates of yields that were missed by earlier authors but which are available in colonial publications or in the archives. The assumption one uses about yields per unit of land affects the inferred volumes of inputs required to produce the recorded crop in a given year. Third, the same kind of sources also provides case-studies of the quantity and timing of labour inputs on cocoa farms. Fourth, the sources suggest a need to qualify certain assumptions made in the estimation, thus providing the careful reader with necessary notes of caution.

[4] In this paper 'Ashanti' refers to the geographical unit, 'Asante' to its indigenous population. The British colony of Ashanti comprised what are now the Ashanti and Brong-Ahafo regions of Ghana. Colonial Ashanti itself comprised the forest core of the eighteenth-nineteenth century kingdom of Ashanti (Asante).

From output to area of bearing cocoa to labour inputs: data and assumptions

The assumption that all output was exported is subject to two qualifications. One is that it makes no allowance for beans that were planted as seeds. This may well explain why the very first recorded export of cocoa beans from the Gold Coast, 121 pounds (55 kg) in 1884 (Great Britain 1890: Schedule A), was not repeated until 1891, when there was a shipment of 80 pounds (36 kg). The latter was itself followed by a blank year (Hill 1963/1997: 177), before cocoa exports became regular. For the very first cocoa farmers, both in the Eastern Province of the Gold Coast Colony and later in Ashanti, the initial market was other farmers wanting to experiment with the new crop (Hill 1963/1997: 172-3, 175; Austin 1984: 250-1). But seed soon became a negligible proportion of total output. The other qualification to the equation of output with exports is that beans were not marketed if the current price was not high enough to justify the effort, which at least meant exceeding the cost of transport to the port. This was a problem on the periphery of the cocoa belt, at least in years of particularly low prices, when it extended into western Ashanti (now Brong-Ahafo).[5] We get around this problem for 1936, at least, because it was a peak year. That fact makes it reasonable to assume that it was one year in which not only was the harvest good, but virtually all output was marketed. Thus the 1936 export figure is the best evidence of the combined capacity of the cocoa trees bearing in that year.

Amansie (or Bekwai) district makes a useful case-study. As one of the two earliest districts of Ashanti to plant cocoa, it provides insight into the spread of cocoa cultivation from its cradle in the Eastern Province of the Gold Coast Colony. Even more pertinent for present purposes, its production history is relatively well defined, which makes it easier to estimate the inputs involved. Though the first cocoa farm in Amansie was apparently planted within months of the British occupation of the Ashanti (or Asante) kingdom in January 1896, exports began on a scale noticeable to the British administration in 1907. This is consistent with oral testimonies from various parts of Amansie, collected in 1980, that cocoa-planting began in their particular localities in the aftermath of the 1900 Kumasi revolt (Austin 1984: 225-6). This implies the 1901 planting season, at the onset of the main rains, probably in March.[6] The earliest crop-year for which we can make a reasonable estimate of cocoa output from Amansie district (based on nearly complete data, as we will see) is 1921/2, which was apparently a peak year: following rapid growth of productive capacity as trees planted in the 1900s and early 1910s matured, the high level of exports in 1921/2 was followed by a fall in 1922-23.[7] We can assume that the output of crop year 1921/2 in Amansie must have been almost entirely the product of cocoa planted during 1901-14. Conversely, we may assume realistically that all the cocoa planted during the 1914 planting season would have been bearing in 1921/2. This double assumption enables us to estimate inputs into cocoa planting by the end of 1914. The next three paragraphs, respectively, present my estimate of district cocoa output in 1921/2, the reasons for taking the total crop-year's output as representing the full productive capacity of the area at that time, and the reasons for treating it as entirely the product of trees planted during 1901-14.

We have a figure of 'about 10,000 tons' for the quantity of cocoa beans 'sent from

[5] Ghana national archives, Kumasi, file entitled 'Reports on Cocoa & Foodstuffs by Agricultural Department' (D2168), especially 'Quarterly Report on Instructional Work in Ashanti – April to June 1921', section on Western Province of Ashanti.

[6] From his survey in Akokoaso, Beckett noted that farmers planted both cocoa and food crops at the beginning of the rains, in order to give the young plants the full benefit of the rest of the rains (Beckett 1944: 78).

[7] See next note.

Bekwai', site of the only railway station in the district, during the main crop season of 1921/2.[8] The main crop season consisted primarily of October to January, while the much smaller 'minor crop' was harvested mainly from late July to early September (the exact timing varying with location and from year to year). We need to make an estimate of the minor crop in order to arrive at an approximation of the tonnage for the c1921/2 crop year as a whole. The first data we have on the relative size of major and minor crops in Amansie is for 1932-6. In these years the minor crop averaged just over 7.6 per cent of the major (Austin 1984: 386). Let us therefore add a slightly conservative 700 tons to give a crop year total of 10,700 tons, i.e. 10,871 tonnes.

But did the quantity marketed reflect the whole productive capacity of the district's cocoa trees? The local government commissioner described the season as 'good as to quantity and quality' though 'prices were low'.[9] The data for prices at the coast confirm that 1921 and 1922 prices were much lower than during the brief post-war boom of 1919 and especially 1920. But they were higher than in 1917 and 1918 and Gold Coast exports continued to climb, with 133,200 and 159,300 in 1921 and 1922 respectively – the highest after the remarkable 1919 level of 176,200 (Kay 1972: 336, 338).[10] Precisely because most of Amansie district had relatively good access to the railway, it is unlikely that many beans remained un-marketed in 1921-2.

How secure is my working assumption that the beans borne in 1921/2 came entirely from trees planted during 1901-1914 (the 1901/2-1914/15 crop years)? It disregards the pre-revolt plantings, but they were evidently tiny (probably just a few acres) compared to what followed. Otherwise, the assumption would be entirely safe if we could accept the figure, conventional since at least 1945 and accepted by Szeresewski because it was 'the current agro-technical view' at the time he was writing, that Amelonado cocoa trees in Ghana take 7 years to begin to bear 'a reasonable yield' (Szeresewski 1965: 137).[11] But there is authoritative evidence that the earlier cocoa farms tended to begin producing well inside 7 years. The agricultural statistician W. H. Beckett wrote in 1941 that 'About 25-30 years ago, when cocoa was planted out on experimental stations, cropping began at about 5 years old', and this 'was no doubt true then of the average native farm' (Beckett 1944: 70).[12] A. W. Cardinall, the Gold Coast Census Officer, wrote a remarkably comprehensive 'review of conditions in the Gold Coast in 1931', to complement the 1931 census. He reported that cocoa 'trees usually bear fruit in their fourth or fifth year, when a considerable yield may be expected' (Cardinall n.d.: 86). War-time cocoa prices did not fall significantly until 1917, and a large expansion of cocoa acreage was reported for Ashanti as a whole in 1915. But this was not specifically for Amansie (and it was not noted in the local commissioners' semi-official travelling diaries of the period) (Austin 1984: 390). Again, had planting continued unabated

[8] Ghana national archives, Kumasi, file entitled 'Handing & Taking Over', 1923-4 (District Administration Office file 634 in the old call lists): 'Handing Over Notes Bekwai Station' by Donald C. Mudie, Assistant District Commissioner of Bekwai, n.d. This is consistent with the figure of 9,321 tons during calendar 1922 supplied by the Department of Agriculture (Gold Coast, *Agricultural Reports for the Year 1921*, Accra 1922). After 'about 10,000 tons' for the main crop in 1921/2, railings fell to 9,372 tons for the whole crop year 1922/3 (Gold Coast, *Report on the Agriculture Department for the period January, 1922 – March, 1923*, Accra 1923). Copies of the relevant pages of both reports were kindly supplied by Alexander Moradi and Remi Jedwab.

[9] 'Handing & Taking Over', 1923-4.

[10] The average cocoa price in 1919 was nearly double that of 1918 (Kay 1972: 338). So the tonnage for 1919 may have included beans that were ready in the closing months of the previous year but which farmers delayed bringing to market in the hope of a price rise.

[11] Ingham opted for six years (Ingham 1979:24, 1981: 19).

[12] Despite the date of publication, Beckett states in the preface that his monograph was 'written in 1941'.

during 1915-16 one would have expected Amanise output to have risen sooner after 1921/2 than it actually did. So the working assumption is surely an exaggeration, but probably not by much. It should be noted that disregarding wartime planting gives the calculation a slight bias in favour of the vent-for-surplus approach, because it entails underestimating the area under cultivation, and therefore the labour involved.

To derive an estimate of the area under bearing cocoa trees from figures for output, we need to know the yield per hectare. Szereszewski used the ratio of seven 60-pound loads (190.4 kg) per acre (Szereszewski 1965: 137). This was the average annual yield of 'all bearing farms' from a survey of small farms in a Central Province village, Akokoaso, carried out by Beckett over three crop years, 1932/3 to 1934/5 (Beckett 1944: 70). There are alternative figures, also from well informed sources, at about the same time. Cardinall, for 1931, stated that the average yield per acre – apparently for the country as a whole – 'has been estimated' at 9 loads (244.8 kg) (Cardinall n.d.: 90). Referring to Ashanti, the head of the Ashanti Division of the Agricultural Department gave the 'average yield per acre on Native owned farms' as 10 loads (272 kg).[13] Rather than select a single ratio to obtain a figure for the area under bearing cocoa trees, below I use a range comprising the lowest and highest 'averages', plus the median 'average': Cardinall's 9 loads.

The final step is to work from the area under bearing cocoa farms to the labour inputs involved in the formation of these capital assets, over the years from the original clearing of forest to the appearance of the first pods. For our purpose, Cardinall's figure of 170 man days has no rivals (Cardinall n.d.; 86). Though Cardinall did not define a 'man day', we can get a sense of what it meant at the time from the work of his colleague Beckett. From work diaries kept for each farm during his survey at Akokoaso, Beckett concluded that the number of hours that husbands spent on their cocoa farms was 7 hours, excluding an hour walking to and from the farm and half an hour for a light meal (Beckett 1944: 85).

The Process of Capital Formation: Inputs of Land and Labour

Let us now use the data discussed above to estimate the inputs involved in the process of capital formation through the planting of cocoa trees. We will start in our case-study, Amansie in south Ashanti, before moving to the aggregate level.

For Amansie, as explained above, the aim is to estimate the factor inputs in the creation of the stock of cocoa trees that produced the 1921-2 crop in the case-study district. To reiterate: I assume that this stock was entirely planted by the end of the 1914 planting season (and, where relevant, that they were planted during 1901-14), and that all the farms created by then came into bearing by 1921/2. Table 2 provides an overview.

Table 2. Labour Inputs in Cocoa Planting in Amansie, to 1914

Assumed Mean Yield Per Acre (loads)*	Acreage	Man-days
Min. (7 loads)	57,067	9,701,390
Median (9 loads)	45,808	7,787,426
Max. (10 loads)	39,940	6,789,800

*1 'load' = 60 lb = 27.2 kg. Some rounding in the table. Sources: see text above.

[13] Ghana national archives, Kumasi, ARG 1/12/1/33, 'Cacao', 1932-3: J. C. Muir to Assistant Chief Commissioner of Ashanti, Kumasi 28 January 1933.

An advantage of using the case-study is that it enables us to refine these calculations to provide a sense of the growth of the land and labour requirements as the cocoa take-off gathered momentum. The requirements varied over the years before bearing began, and then during the transition from 'young bearing' to 'full bearing'. This matters because it is clear that the rate of planting in Amansie, as in many other areas during their respective cocoa 'take-offs', was not constant. Each case has, no doubt, a mixture of features that were distinctive or common, respectively, compared to at least some other areas. In Amansie, as elsewhere in what is now Ashanti Region, there is evidence that the rate of planting tended to gather pace over the fourteen years, 1901/2-1914/15, during which we assume that the cocoa trees that bore the 1921/2 crop were planted, following the defeat of the Kumasi revolt in early 1900.[14] This acceleration was probably for a combination of reasons, shared with the neighbouring districts of Adanse (Obuasi) and Kumasi. The most important was probably the opening of the railway to the coast in 1903, improving the cocoa/imports terms of trade for local farmers. There was also the increasing availability of planting material and the demonstration effect of the first adopters. Finally, there were more farmers, with the gradual return of part of the population from the political exile into which many had gone during or after the Ashanti civil war of 1884-8. The returns began after the British imposed their rule in 1896, and continued after the failure of the revolt four years later, confirmed that the colonial order was stable for the foreseeable future. So let us assume that the average annual rate of planting in the second half of the fourteen years was double that of the first (Table 3).

Table 3. Amansie: Estimated Mean Acreage Planted Each Year, 1901-14

Assumed acreage planted by end 1914	Mean acreage planted annually, 1901-14	Mean acreage planted annually, 1901-7*	Mean acreage planted annually, 1908-14**
Max: 57,067	4,076	2,717	5,435
Median: 45,808	3,272	2,181	4,362
Min: 39,940	2,853	1,902	3,804

*Assuming 1/3rd of total was planted then. **Assuming 2/3rds of total was planted then.
Source: see text.

Reverting to aggregate level, Table 4 uses the assumptions as above to estimate the area under bearing cocoa trees in the country as a whole at certain key dates. It shows the area was still tiny in 1901, before dramatically increasing. Admittedly, the proportion of cocoa output used for new planting, rather than being exported, was definitely higher in 1901 than later, as already noted. But even allowing for that would not change the adjective 'tiny'. Equally important, the table includes the two peak years, 1919 and 1936, which provide the surest guide to productive capacity.

[14] The acceleration for Ashanti as a whole is evident in retrospect from the shape of the upward curve of cocoa exports (Austin 2005: 48). For contemporary evidence specifically on southern Ashanti, including Amansie, see Austin 1984: 226-7.

Table 4. Estimated Area under Bearing Cocoa Trees in Ghana, 1901-36 (selected years; square km)

Year	Exports (000 tonnes)	Area: Minimum Estimate	Area: Median Estimate	Area: Maximum Estimate
1901	1.0	14.87	16.52	21.24
1914	52.9	786.58	873.98	1,123.69
1919	176.2	2,619.96	2,911.07	3,742.80
(1921)	135.3	(2,011.81)	(2,235.34)	(2,874.15)
1936	311.1	4,625.82	5,139.80	6,608.32

Note: In part this table corrects Austin 2007: 109.
Sources: Export volumes from Kay 1972: 336-7 (who spells the unit as 'tons' but implies it is metric, p.340).
Note: It is assumed that all output was exported. Minimum area: assuming 10 loads (load = 60 lb = 27.216 kg) per acre, 272.16 kg/acre = 67.253 tonnes/sq km. Maximum area: assuming 7 loads per acre = 47.077 tonnes/sq km.

As for Amansie, we can move from the area under bearing trees to the labour inputs required to bring them to bearing by using Cardinall's figure of 170 man days per acre (Table 5).

Table 5. Labour and Cocoa Planting in Ghana: Inputs into the Formation of the Net Fixed Capital Stock (Cocoa Trees) Bearing or Immature as of 1913 and 1936

Year	1913 (based on 1919 crop)	1936 (based on 1936 crop)
Productive capacity (1919 crop)	176,200 tonnes	311,100 tonnes
Median Assumed Mean Yield Per Acre	9 loads (60.528 tonnes/sq km)	9 loads (60.528 tonnes/sq km)
Area of Bearing Trees	2,911.1 square km	5,139.8 square km
Man-days (420.087/hectare)	122,291,527	215,914,683

The above figure for man-days invested in creating the stock of cocoa trees that bore the 1936 crop, the culmination of the cocoa take-off, is the first offered, as far as I am aware. The 1913 figure can be compared with the earlier work of Szereszewski and Ingham. Disappointingly, the former did not make explicit the labour input figure that was an integral part of his calculations of capital formation in the economy (see Szereszewski 1965: 137-8 and *passim*). Ingham's estimation, but for an error of calculation, would have been 74,590,000 man-days in the establishment of cocoa farms by 1911.[15] Allowing for the growth of output between 1911 and 1919, this is a relatively higher estimate of labour requirements than mine, because she assumes Beckett's ratio of yield per acre rather than the higher 'median' figure used here, which implies lower labour inputs per (eventual) unit of output. Thus the yield ratio used here is more favourable to the 'vent-for-surplus' case. Again, my estimate of the labour inputs required to create the productive capacity of 1936 understates the total labour invested in creating cocoa farms that came into bearing not later than 1936, because it omits farms that had gone out of production by 1936, as a result of old age or disease – farms which, at their peak, had probably contributed several thousands tons a year. Even my figure, however, poses difficulties for a 'vent-for-surplus' interpretation, as we will see.

[15] She interpreted Beckett's figure for yield per acre, 420 pounds, as '1.8 tons' [rather than 0.1875 tons]. Hence she gave the total labour inputs as 7,459,000 (see Ingham 1979: 24; Ingham 1981:19)

3. Reallocation and Productivity

Having estimated the scale of the factor inputs involved in the cocoa take-off, we need to consider them in relation to the evidence on the availability of land, capital, and – critically – labour. We begin by asking whether there was sufficient 'surplus productive capacity' (Myint 1958: 321) to have enabled the expansion to have been achieved without a reallocation of already-employed resources or the addition of new ones, through an inflow of foreign labour and/or capital. An affirmative answer is a necessary condition for the application of the model(s). It would not be sufficient, however. 'Vent-for-surplus' requires not only the existence of 'surplus land' and 'surplus labour', but that the two are 'combined' in the process of export expansion (Myint 1958: 323). In principle, even in the presence of surplus resources, the actual expansion might have been achieved by reallocation of labour and land from existing uses. So we must also examine the evidence on non-cocoa output, whether for the market or for consumption within the household, to see if it declined (or if its productivity increased, releasing labour and land).

Inputs and available resources

Can the 'vent-for-surplus' interpretation be falsified on the grounds of inflows of capital and labour? The short answer is no, at least until the later part of the cocoa expansion. While the government invested in railways and roads, using tax revenue plus bonds raised in London but repaid from Gold Coast revenues, foreign investment in cocoa farms was confined to a tiny number of plantations, which may never have numbered ten at any one time, and failed commercially in competition with African farmers (Austin 1996b). As noted above, capital formation in Ghanaian cocoa farming was 'simply the capitalisation of current local labour', in Szereszewski's phrase (Szereszewski 1965: 75). The issue of immigration is slightly more complicated. Within what was becoming the 'cocoa belt', returning Asante exiles participated in the extension of cocoa cultivation in Ashanti, as in the Amansie case. But they were not immigrants. Migrant labour became a major factor only in the 1910s, and especially the 1920s, as men from the northern savannas came to participate in production of the new crop. In the interwar period, this seasonal migration from northern Ghana and, even more so, from neighbouring French colonies to work in the cocoa farms of southern Ghana reached several tens of thousands per year. In the year ending 31 March 1938 (more or less, the crop year), 101,891 'immigrant labourers' crossed the ferries southwards into Ashanti from the Northern Territories.[16] This number of workers could have provided all the man-days estimated above for cocoa-farm labour in 1936[17] – except that they included men who would work in the mines (at least a third of the total),[18] in towns, and as cocoa carriers, while a very high proportion of the cocoa labourers went home for part of the year.[19] Despite the qualifications, the conjunction of this scale of immigrant labour with the fact that family labour continued strongly on cocoa farms (Austin 2005: 304-14, 525-7) makes one wonder whether my estimate of labour inputs on cocoa farms is too low – which would weaken the vent-for-surplus claim.

'Vent-for-surplus' works best regarding land, though there is a double sting in the tail.

[16] Gold Coast 1938: 58.
[17] Drawn to my attention by Alexander Moradi.
[18] The number of Africans employed in mining was 35,350 in 1936, 37,786 in 1937, and 39,122 in 1938 (Kay 1972: 416). Most of them would have been annual migrants.
[19] See, generally, Van Hear 1982.

A majority of the forest zone of Ghana comprises forest ochrosols, highly favourable for cocoa growing. In 1922 an official report estimated the total area suitable for cocoa as 62,000 square kilometres (Great Britain 1922: 47). On that basis, applying the median estimates of yield used in Table 6 above, the peak crops of 1919 and 1936 suggest that the proportion of potential cocoa land that was already under bearing cocoa trees was fractionally under 5 per cent in 1919 and fractionally under 8.8 per cent in 1936.[20] Even allowing for land under immature or (by 1936) old cocoa trees, this suggests that, not only was the cocoa take-off facilitated by a land surplus, it was far from exhausting it. That was indeed confirmed, again at aggregate level, by the further planting booms in the 1950s and around the end of the twentieth century (though the latter involved some re-planting of old cocoa farms, and the use of higher-yielding varieties).

Further, during the cocoa-planting boom the net demand on land was limited by the farmers' practice of planting tall foodcrops, specifically plantain and cocoyam, among the young cocoa plants to provide shade. However, this brings us to the first sting in the tail. Once a cocoa farm matures to the point where the trees form a shade canopy, it is no longer possible to grow food crops on the same land. Bearing cocoa farms therefore occupy land additional to that involved in the food crop-fallow cycle. At macro level this was not yet a problem, even in 1936. If we deduct our median estimate of the area under bearing cocoa in 1936 (5,442 square km) from the estimated area of southern Ghana (including the parts not suitable for cocoa), we are left with 126,078 square kilometres: some of it hard or impossible to farm, but most of it suitable for food crops. Dividing this by the 1931 population of the region, according to the census results, implies a density of 19.1 people per square kilometre of land not under bearing cocoa. There is no doubt among scholars that the 1931 census was a considerable understatement, but the 19:1 ratio presumably applied at some time earlier in the cocoa take-off. On the other hand, if we apply to the 1948 census results to the 1936 area under cocoa, taking the census figures as adjusted upwards by Kay 'to bring the total population in line with the revealed rate of growth between 1931 and 1960', the ratio rises to 30.2 people per square kilometre (Kay 1972: 310).

This would mean (as it definitely did by 1948, and surely before) that the combined effect of population growth and bearing cocoa trees had taken southern Ghana close to the lower bound of Allan's 'critical population density' of 33-50 people per kilometre: the maximum population supportable from the area with the prevailing technology (Allan 1965: 228). This macro picture conceals micro pressure points. Already in 1919, the chief of Adanse in southern Ashanti banned the making of new farms 'Because the cocoa farmers has maken the cocoa farm in all land . . . . our children can't get field to make farms for food to support theirself the time will come' [*sic*] (quoted in Austin 2005: 327). The colonial administration forced the chief to withdraw the ban. But they did not object twenty years later, when the Ashanti Confederacy Council of Chiefs introduced such a ban across the whole of Ashanti. The measure proved ineffective and excessive, and was abandoned in 1946. But that the chiefs, dependent on cocoa income as they were, should impose a ban at all is strong evidence of the concern about food security – a concern which is supported by evidence of pressure on land in the oldest cocoa-growing districts within Ashanti (Austin 2005: 311-12, 326-32, 527, 529-30). None of this weakens the proposition that the runway for the cocoa take-off was provided by a relative abundance of land. But it suggests that the land dimension of later cocoa-planting booms is unlikely to have been purely a 'vent-for-surplus' story.

[20] Here I correct a miscalculation I made in Austin 2007: 109-10.

The other sting in the tail from the impact of cocoa growing on land is Ruf's finding that, in the history of cocoa growing worldwide, the most profitable cocoa cultures have always been those able to plant on land newly cleared from forest (Ruf 1995a, 1995b). Cocoa trees deplete soil fertility to the extent that re-planting on the same land is much more expensive: the difference in cost being what Ruf defines as 'forest rent' (Ruf 1995b: 6-7). So, while the proponents of 'vent-for-surplus' are right that, in a sense, the cocoa trees were planted on 'surplus' land, the surplus was really of soil fertility, and the costs were long-term, including between generations (Austin 2005: 348-9).

With capital formation being the capitalization of labour, and land relatively abundant, any bottleneck on the growth of cocoa farming would be in the supply of labour. Can the evidence on use of labour, not only in creating bearing farms (as discussed in Section 2) but also on bearing farms themselves, be reconciled with the notion of a prior leisure reserve? We return to the case-study, but now focussing not on cumulative capital formation but rather on the growth of annual labour inputs. Between them, Cardinall and Beckett provided figures for labour inputs according to the life-stage of a young cocoa farm (Table 6).

Table 6. Mean Labour Inputs (Man-days) per Acre per Year in Ghana, Early 1930s

Age of Farms	Description	Where	Man-days	Source
First year of life	Non-bearing	Ashanti	115	Cardinall n.d.: 86
Years 2-5	Non-bearing	Ashanti	14	Cardinall n.d.: 86
Years 6-10	Young Bearing	Akokoaso	13.3	Beckett 1944: 71-2, 87
Over 10 Years	Full Bearing	Akokoaso	29.8	Beckett 1944: 71-2, 87

Taking the median assumption about the acreage planted by 1914, that it totalled 45,808 acres, and retaining the other assumption that the rate of planting in the second half of this period was twice what it was in the first, we reach the estimates set out in Table 7.

Table 7. Estimated Annual Labour Inputs (Man-days) on Amansie Cocoa Farms, 1901-14 (Selected Years)

Crop Year	1901/2	1908/9	1914/15
Farms in 1st Year	250,815	501,630	501,630
Farms in Years 2-5	0	122,136	244,272
Farms in Years 6-10	0	87,022	203,051
Farms over 10 Years	0	0	259,975
Total	250,815	710,788	1,208,928

Relating these figures to the size of the population is complicated by the acknowledged incompleteness of the early colonial censuses, handicapped as they were by a widespread fear that the returns would be used for taxation, and a lack of administrative resources. It was widely accepted at the time, and still more so in the light of later censuses, that the 1901, 1911 and 1921 censuses were all serious understatements (Austin 2012). The least bad guesstimate I can make is to use the 1921 return as a proxy for the population of 1914.[21] This means 41,654 people, as against a very improbably low figure of 26,331 from the 1911 census.[22] The larger estimate allows for the return en masse of the subjects of

[21] A more drastic effort to offset the undercounting in early colonial censuses is Manning 2010.

[22] These figures are based on disaggregating the census results in order to distinguish 'Amansie' from larger

several Amansie chiefs from exile in the Gold Coast Colony during the 1900s.[23] Thus the labour force in 1911 was greater than in 1901, whether or not there was natural demographic increase, which there probably was, though a slow one (Austin 2005: 57-60; Austin 2012).

There was a pronounced gender division of labour on cocoa farms in this period.[24] Women retained from the nineteenth century their prime responsibility for the growing and preparation of food; the sole distinctive contribution that men made to food growing was the admittedly laborious task of clearing the land for planting at the end of the dry season. This division enabled men to concentrate on extra-subsistence, cash-earning activities. Cocoa fitted perfectly into the latter category, and men claimed responsibility for making the vast majority of the cocoa farms planted during the 'take-off', through to the 1930s and indeed beyond. This led eventually to disputes, with wives often claiming shares of cocoa farms, especially on divorce or widowhood, on the grounds that they had helped create them. The issue reflected an ambiguity arising from the fact that food crop and cocoa farming overlapped on immature cocoa farms. The task of planting plantain and cocoyam to shade the young cocoa plants was the work of women, while men concentrated – after land clearance – on planting and weeding the cocoa plants, albeit doubtless with some female help. Where women were among the early cocoa farmowners, they tended to be 'elderly and unattached', as T. E. Kyei recalled from his childhood in Ashanti-Akim district in the 1910s (Kyei 2001: 25). In other words, it was women freed from the obligation to help men who were able to participate as principals in the cocoa farming business. For the purpose of estimating labour inputs in the early years of Ashanti cocoa-farming, it is a reasonable simplification to assume that the *equivalent* of the male population, aged 16-45, was available for cocoa farm work: whether by reallocation from existing extra-subsistence activities, or – if one existed – by the sacrifice of a leisure reserve. Conversely, a labour force equivalent to the female population in the same age group was not free for cocoa farming, except for tasks which they would have performed anyway (cultivating plantain and cocoyam). This is one of the assumptions on which Table 8 is constructed.

Table 8. Amansie: Estimated Annual Cocoa Labour (Man-days) in Relation to Population, 1901-14 (Selected Years)

Assumptions:
1.Total acreage planted by end 1914 = 45,808 (median estimate).
2.Twice as much land newly planted with cocoa during 1908-14 as during 1901-7.
3.Population during the period of planting = 41,654 (see text).
4.Available workforce for cocoa-specific activities equivalent to male population aged 16-45.
5. Latter comprised 20 per cent of the population (see text), i.e. 8,331.

Crop year	1901/2	1908/9	1914/15
Cocoa farm labour during the crop year	250,815	710,788	1,208,928
Cocoa farm labour per male worker	30.1	85.3	145.1

On this estimate, cocoa required the majority of men's working time by 1914. In one

units. This is possible in principle by assigning the inhabitants of different chieftaincies ('divisions') according to the location of the division concerned (Austin 1984: 551-3).

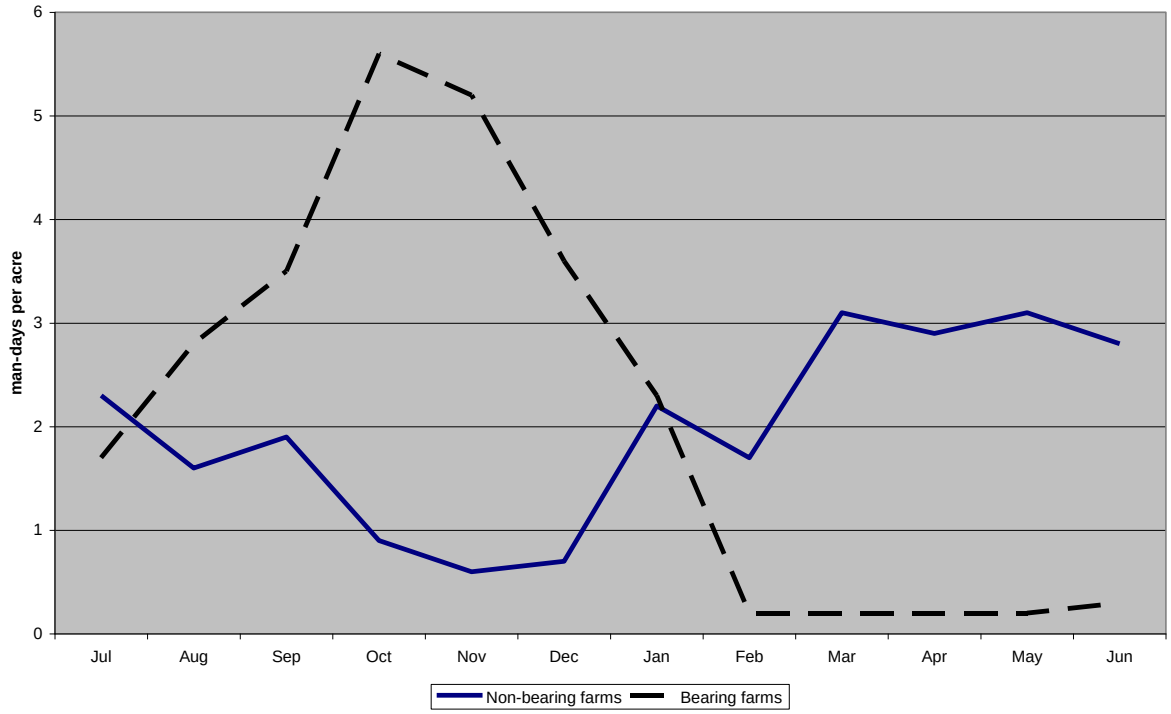
[23] Which is one of the reasons why the official census claim that the population fell between 1901 and 1911 is not credible. The figure for 1901 was anyway a pure estimate, not a count.

[24] This paragraph is based on Austin 2005: 107-10, 304-10, 374-8, 482-3, 525-6, 536-7.

respect the figure may be inflated: given that much of the land that they would anyway have cleared for food crops was now provided by new cocoa farms. In another respect, however, the figures understate men's commitment of labour to cocoa farming. For the population in 1901/2 would have been well below the 1921 census figure, because of the exiles.

Could the supply of labour for cocoa have come from a seasonal labour reserve, in the form of seasonal underemployment? Had one existed, it could not have been sufficient, because by 1914 cocoa farms demanded attention in virtually every month. As Beckett logged in his Akokoaso study (Figure 2), immature cocoa farms mainly need attention in the wet seasons (planting and weeding), whereas bearing farms reward effort in the dry months (harvesting the beans and preparing them for market).

Figure 2. Seasonality of Labour: Monthly Inputs in Akokoaso Survey, 1932-4 (Beckett 1944: 81)



The scale of the labour required, in the period before migrant labour came to be employed on cocoa farms, implies that, for the vent-for-surplus models to be sustained, they need to be supported with direct evidence of the existence of what Szereszewski called 'a large reserve of leisure' before the adoption of cocoa-farming (Szereszewski 1965: 21). Yet, ironically, despite all the references to 'leisure preference' and the supposedly consequent leisure 'reserve' in Szereszewski's pioneering book, he offered no real evidence for the existence of the latter (and indeed, of the former). He gave just two references on the matter. One, to Bauer's *West African Trade*, turns out to be concerned solely with 'unemployment' (or what we would now call 'underemployment'), after the Second World War, and uses Nigerian examples at that (Bauer 1954: 19). The other reference is to the 1889 colonial *Report on Economic Agriculture on the Gold Coast*. This provides a concise expression of a vent-for-surplus view, but it assumes, not demonstrates, the existence of leisure (Great Britain 1890: 31). Evidence is the more necessary in view of the contemporary European stereotype of the 'lazy African'. The insidiousness of that image, even when contradicted by observation, is

captured in an 1897 dispatch from H. M. Hull, a British commissioner, who in the very same sentence managed to describe Akims as 'not energetic', preferring 'doing nothing to work' *and* 'keen as petty traders and of course collect large quantities of the Kola nut'.[25]

Elsewhere I have offered a detailed account of the economic activities of Asantes in the precolonial nineteenth century, building in part upon Wilks' estimates of the labour requirements of subsistence food-farming in the forest zone (Wilks 1993: 51-63). Contrary to the assumption of a leisure reserve, I concluded that the Asantes' combination of subsistence and extra-subsistence economic activities afforded them little time for leisure. Women's work calendar was particularly incessant, men's somewhat more intermittent. But even men appear to have been fully engaged, even in the agricultural slack season: notably in artisanal gold mining, kola nut production, weaving, carpentry, hunting, fishing (in Lake Bosumtwi), and snail collection – all these activities feeding local and/or regional trades (Austin 2005: 46-8, 107-10, 468-9; 482-3; in more detail for Amansie, Austin 1984: 106-46). It is true that one cannot prove a negative: that able-bodied person enjoyed leisure (defined, say, as less than the hours per day reported later by Beckett for Akokoaso). But with detailed descriptions of multiple and energetic commercial activity, the onus is to demonstrate leisure, rather than the lack of it.

There is a further point. In nineteenth-century, precolonial (pre-1896) Ashanti, most of the opportunities for extra-subsistence economic activity – i.e. to make money (*sika*, the same word as for gold, the only legal currency within the kingdom being gold dust – occurred during the middle of the dry season, when the demands of food farming were absent (Austin 2005). From 25 observations in the nineteenth-century, most of them in its final third, the 'effort-price' of slaves ranged between 30 and 196 days of gold mining: depending partly on the kind of slave, and mainly on the supply of captives in local markets (Austin 2005: 128-134, 162-5). Acquiring trade goods, and slaves, provided the means by which a man could marry (Austin 1996a), and perhaps go on to greater social success. The latter was measured, above all, by the number of dependents a man acquired, from free wives to pawns to slaves (Wilks 1979/1993; McCaskie 1983). In this sense, among others, Asante was a 'kingdom of gold' (McLoed 1981), though the production of other commodities, such as kola nuts, was effective towards the same ends (e.g. Austin 2005: 163). In Amansie, to take the most pertinent example, it is likely that every household head had the opportunity to apply his and his dependents' labour to gold digging during the part of the dry season when other activities did not preclude it. There was every incentive to do this to the maximum possible, and people cared so much about it that when in 1883 an Asantehene (king) imposed what were considered to be excessively heavy taxes on gold-winning, he was deposed by a popular revolt (Austin 1996a). This was not a society for which leisure preference is well documented.

This general picture appears equally true of forest societies south of Ashanti, with palm oil and palm kernels rather than kola nuts. It applies most obviously to the Krobos and Akwapims, the pioneers of cocoa cultivation, who were already deeply involved in production for export (palm oil and palm kernels, and latterly rubber) before they adopted cocoa (Hill 1963/1997: 161-6; Johnson 1964). Conversely, it might be thought less true of the Akims, who sold the land bought by Krobos for oil palm cultivation and then by both Akwapims and Krobos for cocoa farming. The Akims themselves did not take as much advantage of the potential of their lands for export agriculture; or rather, they did so by sale

[25] National Archives of the United Kingdom, Kew: CO96/293, Hull to Colonial Secretary, Cape Coast 14 May 1897, enclosed in GCC 212 of 27 May 1897.

rather than through their own labour and ownership (Hill 1963: 20, 214-5). But this may have been because they preferred to specialize outside farming, by concentrating on kola nut collection and gold mining, exploiting other natural resources within their territory. That they were not lacking in commitment to take advantage of market opportunities is attested to by their enthusiastic participation in the wild rubber boom. This entailed seasonal migration to the forests of the Western Province of the Gold Coast, especially the Sefwi district. Hull, in the passage quoted above, observed:

> It is a quite ordinary occurrence to find Akim towns where all the able-bodied men are absent in this pursuit [tapping wild rubber]. Arrived at the site selected, they hire a stretch of land for usually about 5 months. When their time is up they take their produce to the Coast, sell it, buy [trade] goods and return to sell these and get more rubber.[26]

If Akim men preferred 'doing nothing to work', it was probably because they were exhausted (remembering, not least, that they had to accomplish their seasonal mobility on foot)! In this context, the 'leisure preference' attributed to southern Ghanaians by Szereszewski acquires a very different connotation from what he had in mind.

Lastly in this sub-section, what does the role of slave labour in late precolonial economies tell us about labour availability? The authors of the 'vent-for-surplus' wrote as if the labour force on the eve of the 'cash-crop revolution' consisted entirely of farmers and free family members.[27] Szereszewski on cocoa in Ghana was no exception. He referred to slaves as a commodity 'traditional' within African society, which became an export; he did not consider what happened to slavery within Ghana after the closing of the Atlantic export market (Szereszewski 1965: 5, 7). Subsequent research has made it impossible to ignore the economic significance of slavery within late precolonial societies. Because of source constraints, economic historians of Ghana have been reluctant to venture an estimate of the proportion of slaves in precolonial societies on the eve of colonial occupation (e.g. Austin 2005: 126, 487). But there is no reason to think that it was any less than in French West Africa, where early colonial surveys have led careful scholars to estimate it at about 30 per cent.[28] For Ashanti, the evidence suggests strongly that the incidence of slave-holding rose greatly during the nearly 90 years between the British withdrawal from the Atlantic slave trade in 1807 and the colonial occupation (Austin 2005: 114-27, 483-8). There was also a lively export and re-export trade in slaves from Ashanti south to the societies that later became the Gold Coast Colony (Austin 2005: 47, 122, 468). The growth in the use of slaves during most of the nineteenth century was facilitated by the fall in the price of slaves within West Africa that followed the British abolition law. It appears to have been motivated by demand for labour to supply commodity production within Ashanti, as within West Africa as a whole, during the period of 'legitimate commerce' between 1807 and the European Scramble for Africa: production aimed both at overseas and regional markets (Austin 2005: 122-9, 486-8; Austin, forthcoming). The widespread purchase of slaves for labour would hardly be a worthwhile investment if there was a large leisure reserve. The 'vent-for-surplus'

[26] CO96/293, Hull to Colonial Secretary, Cape Coast 14 May 1897.

[27] Perhaps partly because they paid little attention to institutional matters, such as the organization of labour, but also because they shared in a collective amnesia, in the early years after Independence, about the fact that slavery had ever existed within African societies (Austin 2009: 8-9).

[28] Klein arrives at over 30 per cent for 1904, well into the colonial period (Klein 1998: 252-6). Searing argues that this is too high because of slave runaways after the conquest. But for two parts of Senegal in 1880 he concludes that between a quarter and a third of the population in Kajor would have been slaves, rather less in Bawol (Searing 2002: 166-72, 184-88, 191-3).

thesis is based precisely on the assumption that demand for labour to produce commodities could be met from a reserve of leisure. This assumption is contradicted by the growth of slave labour in the decades preceding colonization and, in the case of Ghana, the adoption of cocoa cultivation.

Re-Allocation of Resources?

Having seen earlier that the supply of labour was the critical constraint on the expansion of output, and having argued against the contention that the scale of labour inputs into the cocoa take-off can be accounted for by the mobilization of a leisure reserve, let us now ask specifically whether pre-existing economic activities declined, thereby making labour available for cocoa production.

We can begin by rejecting any hypothesis of a decline in labour inputs for food farming within the forest zone during the expansion of cocoa output, to 1936-7. As noted already, the use of foodcrops to shade young cocoa plants made these two forms of agriculture complementary until the rate of cocoa planting dwindled and the existing cocoa plants matured into cocoa trees, whose shade canopies denied space for food crops. Meanwhile, food was imported into the cocoa zone on an increasing scale, though some of the evidence is unspecific. Kay's index of the volume of 'food, drinks and tobacco' imported annually into the Gold Coast rose from an average of 14.6 in 1900-1904 to 25.8 in 1932-6 (calculated from Kay 1972: 360-1). Even the food element of this, however, included consumption by European officials and by Africans outside the cocoa belt. Clearer evidence of the import of food grains into the cocoa economy dates from the 1920s, when it was reported that rice was being grown in Ejura district, in the savanna just north of Ashanti, for sale in the latter (Austin 2005: 54-5, 471). The customers surely included traders and porters in Kumasi and other towns, but perhaps also cocoa farmers. But none of these import trades seem as yet to have been on a significant scale per capita. To the extent that they reflected demand from the cocoa economy, this can sufficiently be accounted for by a combination of European and Levantine traders drawn into the cocoa-buying centres, 'luxury' purchases by farming households whose purchasing power had begun to be enhanced by cocoa income and, last but probably most important in the case of rice, by the inflow of migrant labourers from the savanna, working initially in cocoa marketing but later also on cocoa farms, especially after the First World War. Thus the vent-for-surplus assumption of undiminished food-crop production during the growth of export agriculture can be sustained.

In contrast, the rise of cocoa production was closely associated with the decline of the other African-owned lines of export production. At aggregate level there was not necessarily an immediate trade-off. Output of gold from artisanal mines in Akim was already in decline before cocoa production was introduced from Akwapim (Addo-Fening 1976). Despite a fresh discovery of gold deposits by indigenous miners in Wassa, outside the future cocoa belt, exports of gold from African mines (as distinct from the growing output from European mining companies) fell from 23,244 ounces in 1886 to 986 ounces in 1900 (Dumett 1998: 266-8).[29] More important, given that it was Akwapims and Krobos who were the first cocoa farmers, they could switch their energies from palm oil to cocoa planting without thereby causing an immediate fall in palm oil exports. This was partly because palm trees could continue to be harvested even though new planting had apparently stopped. It was also partly

[29] Export figures for 'trade gold' could not distinguish between newly-mined metal and gold released from hoarding and domestic circulation (Dumett 1997: 267). If anything one might have expected a net release of gold dust from internal use into the export market, following the colonial occupation of Asante – which ended the reign of gold dust as the official currency of Asante.

because coastal areas with soils less favourable to cocoa farming (oxysols rather than ochrosols), in the southwest, continued to specialize in palm oil and palm kernels for some time, and never became major cocoa producers. Kola nut exports were even more resilient, partly because their main market was in northern Nigeria, so the fluctuations in kola prices were only loosely correlated with those of the commodities sold to Europe and North America (Austin 2005: 48-9). Exports were redirected from the overland caravan route to the rail-and-sea route to Nigeria and even Brazil, annual exports surpassing 7,000 tons in 1919 and 1920, and 9,000 tons in 1924-6 (Abaka 2005: 86-9).

The figures suggest that as the cocoa take-off gathered pace other exports were increasingly displaced. Table 9 summarizes for the biggest exports.

Table 9. Annual Average Volume of Cocoa and the Next Largest Export Crops from the Gold Coast, 1889-1936 (4-year averages, 000 tonnes)

Period	Cocoa	Palm Oil	Palm Kernels	Rubber
1889-1892	Neg.	12.15	13.28	1.15
1893-1896	0.06	13.04	14.66	1.61
1897-1900	1.12	10.64	11.68	2.26
1901-1904	2.74	12.25	13.50	1.05
1905-1908	9.25	7.9	9.43	1.40
1909-1912	30.74	7.15	13.40	1.18
1913-1916	63.45	2.13	6.30	0.55
1917-1920	114.58	2.45	7.83	0.58
1921-1924	179.10	0.9	3.25	0.09
1925-1928	221.00	1.18	6.73	0.40
1929-1932	226.63	0.53	5.75	0.15
1933-1936	261.60	0.25	6.05	0.20

Sources: for 1889-1899, Hill 1963/97: 177; for 1900-1936, Kay 1972: 336-7.

The decline of palm product exports seems to have been the result of a direct shift of labour into cocoa production. Once the labour requirements of the new export crop exceeded a certain level, production of the old but less reumerative crop was bound to suffer. Rubber exports held up as long as there were sufficient wild rubber trees to avoid the necessity to plant trees. 'Slaughter tapping' was profitable in Ghanaian conditions into the 1900s. But government efforts to promote rubber planting failed: plantations in Ghana being apparently unable to compete with the emerging plantation industry in Malaya industry (Austin 2005: 90). In Ashanti, producers switched from artisanal gold mining to cocoa farming. They found that the former activity was not profitable enough to permit them to move from slave to hired labour (Austin 2005: 165). Kola producers, too, struggled to afford hired labour. Where they were able to do so, they had to offer relatively generous terms (Austin 2005: 165, 497).[30] Kola exports held up fairly well, despite the beginning of import substitution in Nigeria in the 1920s, being around 7-8,000 tons a year in 1929 and 1930 (Abaka 2005: 88-9). There are indications, though, that production became increasingly concentrated in areas where kola trees grew naturally rather than in those where, like cocoa trees, they had to be planted (Austin 2005: 49, 469).

Was 'de-industrialization' a further source of labour for cocoa production? The

[30] Though Abaka cites testimonies collected in 1966 that both the one-third and one-half share rates were paid in kola production, albeit without any details of timing (Abaka 2005: 122-3).

principal craft was cotton textiles, which for most producers were a dry-season activity. The combination of cheaper imports (helped by reduced transport costs as a result of mechanization) and higher incomes from cocoa farming almost certainly led many for whom textiles was a sideline – whether female spinners or male weavers, following the local division of labour – to give it up in favour of the cocoa harvest, also a dry-season activity. Simultaneously, however, the best weavers adjusted to the changing circumstances by adopting imported yarn and specialising in higher-quality cloth (Austin 2005: 53, 470). The more prosperous cocoa farmers provided an enlarged market for the latter, benefitting not only Ghanaian weavers, but also Nigerian dyers of originally imported cloth (Byfield 2002). With the spread of motor vehicles, a new craft developed: vehicle repair, the work of 'informal' workshops more often than European garages (Austin 2005: 53, 470).

Finally, cocoa growing benefitted from the mechanization of transport, not only through reduced transport costs, but also through the release of labour from head porterage (in the forest zone, endemic sleeping sickness prevented the use of large animals). Mechanization began with the opening of railways from the coast, from 1902 onwards, and continued with the adoption of motor lorries, from the 1910s and especially 1920s, on an increasing array of lateral routes. The construction of motor roads and the importation of motor lorries was largely endogenous to the cocoa take-off: villagers and government officials responded to the incentive to improve transport in order to raise returns to cocoa farmers, while the government road budget was largely financed by duties on imports themselves paid for mostly out of cocoa income.[31]

Thus the evidence suggests that the labour on cocoa farming during the take-off era was mobilized by reallocation from existing activities. There were exogenous elements in the decline of the latter, but the main driver was the steady growth in demand for labour on both young and bearing cocoa farms.

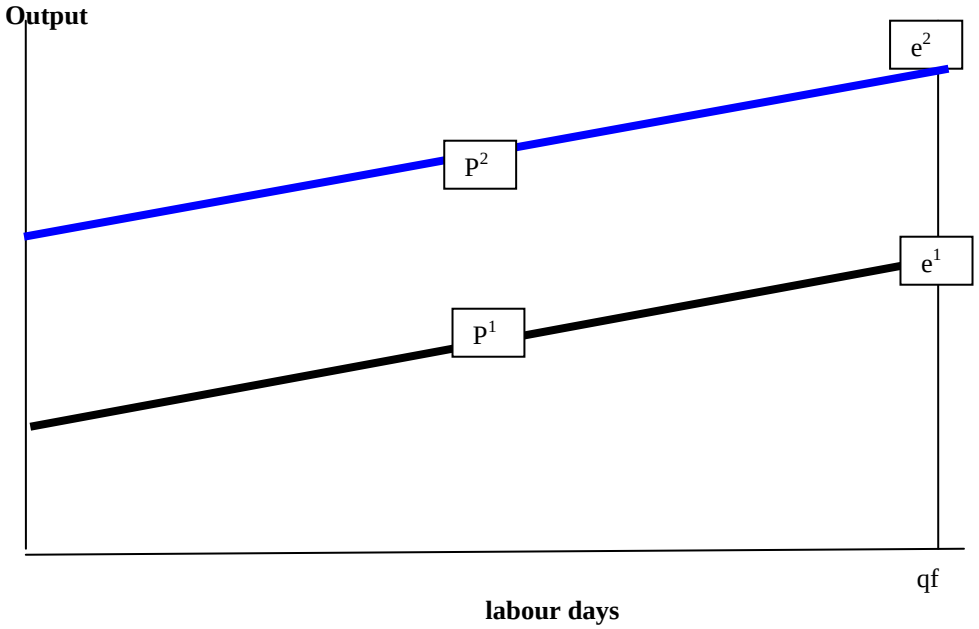
Conclusion: Cocoa, Productivity and Development in the Long Term

Preceding sections have investigated the factor inputs involved in the original expansion of cocoa production in Ghana, continuously from the beginning of cocoa exports to the point where the cocoa stock peaked, in the 1930s. Crucially, labour inputs were too great to be plausibly explained by a reduction in leisure time, especially as 'even' men were already busy throughout the year, notably in commodity production and trade. Further, the evidence for the cocoa era is that, while food production probably remained at least constant, cocoa production progressively displaced or marginalized the production of alternative commodities. The argument points to the conclusion that vent-for-surplus models should be rejected as the framework for explaining the cash crop revolution in Ghana. Rather, the cocoa take-off was achieved by the reallocation of labour from existing but less profitable forms of market-oriented economic activity. The situation on the eve of the take-off was not of under-employment but rather of low productivity. In terms of Figure 1, labour inputs were already at Q^f. The transition that followed was not in the level of labour utilization, but in the output it delivered. The adoption of cocoa constituted a shift to a higher production function, depicted in Figure 3 as a jump upwards from P^1 to P^2 , and towards a higher full-'employment'

[31] In addition to references given earlier see Gould 1960, Heap 1990, Wrangham 2004. In the late nineteenth century cask rolling was introduced in the Gold Coast Colony: a modest labour-saving innovation, intermediate between head loading and mechanization.

equilibrium, at e^2 rather than e^1.

Figure 3. The Adoption of Cocoa-Growing as a Productivity Shift



Hogendorn and Goldberg chose to depict the adoption of cocoa growing as a move within an unaltered production possibility frontier (Hogendorn and Goldberg 1982).[32] This otherwise baffling decision was presumably motivated by the knowledge that cocoa farming was already known on the Akwapim Ridge, where it been introduced and experimented with by Basel missionaries and then by Tetteh Quarshie, a Ghanaian who obtained beans from Fernando Po, for some years before the sudden proliferation of cocoa planting (Hill 1963/1997: 170-76). But for every other district in the country, cocoa was entirely exotic. Many of the early adopters, even in the Eastern Province of the Gold Coast Colony which included Akwapim, and the vast majority of early adopters in Ashanti, cannot have seen a bearing cocoa tree before they themselves began planting cocoa seedlings. In doing so, they were moving not simply to a higher production function, but to a new one that combined factors in radically different proportions, over a fundamentally different time horizon. Land was used more intensively, capturing the 'forest rent', and thereby ending the long-term crop rotations which had reproduced soil fertility under the precolonial agricultural system (Austin 2005). Cocoa trees constituted a new stock of fixed capital which greatly increased the returns on land and labour. Cocoa farming enabled the resident population to make more use of a given level of labour supply over the year: whereas most of the dry season had been an agricultural slack season, the harvesting of cocoa beans occupied most of the dry season.

Over a time-span of the subsequent half-century, this leap in total factor productivity turned out to be just one jump. Despite experiments by both the colonial agriculture department and farmers themselves, the next breakthrough occurred only in the late l940s and 1950s, in the form of higher- and earlier-yielding varieties and pesticides, and became widely available too late to make much contribution to the second planting boom in the history of Ghanaian cocoa, in the 1950s (Austin 2005: 70-86, 476-8; cf. Teal 1984: ch. 6). The postwar

[32] To the frontier, if from a starting point of under-employment as in vent-for-surplus, or along it, if a reallocation hypothesis is preferred.

innovations really paid off only with the third planting boom, around the most recent turn of century.[33]

Considered in the long term of Sub-Saharan history generally, the Ghanaian cocoa take-off is one of a series of jumps, of varying heights, as Africans followed a land-extensive path of development in order to take advantage of their environment(s) while overcoming its (their) constraints (Austin 2008a). By adopting a series of new crops they increased yields and improved food security. In the case of the nineteenth century Gold Coast, the closure of the Atlantic slave market was followed by the development of palm oil exports, taking advantage of the expanded market, in soap and candle manufacture, created in Britain by the industrial revolution (Sanders 1982; Lynn 1997: 17, 22-3, 39-41). Meanwhile, kola output in Ashanti increased to supply the enlarged market in what is now northern Nigeria, which followed from the creation of the Sokoto Caliphate, within which kola was in demand as a permitted stimulant, a demand made effective by economic growth based on an expanding textile industry (Lovejoy 1980). In the 1880s, producers in both the Gold Coast proper and Ashanti took advantage of naturally growing rubber trees to respond to the 'second industrial revolution' demand for rubber. This was followed, as we have seen, by what became a massive responsive to the demand for cocoa beans that was multiplied by the Swiss invention of milk chocolate in 1876. The growth of cocoa cultivation drew heavily on the preceding expansion of production for African and European markets. Profits from kola collection, gold mining and rubber tapping were reinvested directly, most importantly to buy land in the case of Akim Abuakwa, and through the acquisition of slaves, who directly or via their descendants contributed to the Asante labour force (Dumett 1971, Arhin 1980, Austin 1996a).

Despite its flaws, the vent-for-surplus approach was partly or wholly correct about two features of the response to external markets by the inhabitants of what became the forest zone of southern Ghana. First, the long-term problem had been how to make use of land that was relatively abundant in relation to labour, but inaccessible to productive labour for much of the dry season. Exporting kola and palm oil provided partial solutions: both products were mainly semi-cultivated, in the sense that farmers weeded around and then harvested naturally-planted trees, though some plantations were also established deliberately, notably by Krobo farmers with oil palms (Johnson 1964; Austin 2005: 64-5, 474). With cocoa, a fully-cultivated crop was adopted that permitted maximum utilisation of the potential of the ochrosol belt (Austin 2005: 65). Thus was the land surplus exploited. Second, while Myint and Szereszewski were wrong in thinking that there was no material opportunity cost, the latter was greatly outweighed by the returns.[34] A reflection of this is that the real value of Ghana's foreign trade – very much based on the earning-power of cocoa – multiplied more than seven times between 1897 and 1938 (Austin 2008: 612). The ability of Asante producers to switch from using the labour of pawns, slaves and the children of slaves to the employment of free labour was itself made possible by their income from selling cocoa beans: from the decisive increase in the returns on hiring labour which the adoption of cocoa brought to those with access to suitable land (Austin 2005). Recent studies have shown in detail that real wages rose considerably in colonial Ghana (Bowden, Chiripanhura and Mosley 2008; Frankema and van Waijenburg 2011): which is primarily attributable, directly and indirectly, to the success of cocoa cultivation. Though the data used in the real-wage studies must be assumed to be basically urban, the huge importance of migrant labour by the 1930s is

[33] Which has taken Ghanaian cocoa output to unprecedented levels, but has yet to receive the scholarly examination it abundantly deserves.

[34] I thank Leandro Prados de la Escosura for pointing this out, at a seminar on a related paper.

evidence that the labour market was relatively integrated, implying that wages on cocoa farms are likely to have evolved similarly. The average heights of the population also increased: not only in the areas where cocoa beans were produced, but also in those which increasingly supplied migrant labour to the cocoa industry (Moradi 2008; Moradi, Austin and Baten 2012). Over a span of several decades, however, cocoa farming did not generate the kind of linkages that might lead to industrialization (Austin 2003). But it eased certain obstacles to industrial growth, notably by fostering the diffusion of mechanical skills through the motor repair industry that it came to support, and by financing mass education, through a combination of private and public channels (Austin, in press).

Thus cocoa displaced earlier, less lucrative, extra-subsistence activities.[35] While new planting continued, cocoa growing complemented rather than competed with food production. As with Tosh's analysis of export agriculture in African savannas, the conclusion here is that the vent-for-surplus framework does not apply; but in this case, it was not because export cultivation threatened food security (though it did cause a long-term problem in that respect). Rather, the adoption of cocoa by Ghanaian producers constituted a breakthrough to a much higher level of productivity.

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[35] In this it resembled 'Dutch disease', but without the currency appreciation. The British West African pound was fixed to sterling.

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