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The Stock of Fixed Capital in Kenya
in the Monetary Economy, 1964-1971

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Introduction

The statistical estimates presented here were put together with the intent of making available a general-purpose series for the stock of fixed capital in Kenya. They were not compiled with a particular research objective in view but were meant to serve the various analytical and planning purposes to which such statistics are put elsewhere. They are, however, estimates of physical capital, valued in constant prices, which implies their applicability is in some degree limited. They are most appropriate for uses where capital is to be viewed as a productive input. They are not easily brought to bear on questions of the financing of capital or the distribution of its ownership.

The purpose of the estimates made it desirable also to retain, where feasible, consistency with the coverage, valuations, etc. of other, officially published, data. Although the findings include annual estimates for all years from 1964 to 1971 (i.e., from Independence to the most recent year for which data were available), interest is likely to attach primarily to the absolute figures for 1971. For this reason, the reliability of the 1971 estimates is of more concern than that of earlier years or that of growth rates over the whole period. The fact that the estimates show little sectoral detail is not explained by their purpose but is a regrettable defect, occasioned by the limitations of the procedures used.

In principle at least, the estimates cover equipment and structures of all kinds, including dwellings but excluding consumer-owned automobiles and other consumer durables. All structures in place, whether complete or in progress, are included. Assets both privately and publicly owned are included. Those owned jointly by the member countries of the East African Community are, generally speaking, assigned to Kenya on the basis of their location or, in the case of East African Airways, divided in equal shares.¹ Assets held outside the monetary sector, including traditional dwellings, are excluded. In all these particulars, the coverage of the present estimates corresponds to that of data published by the Statistics Division of the Ministry of Finance and Economic Planning for gross capital formation, in the monetary economy, except that the Statistics Division's tables include also "land improvement and plantation development" and

1. Cf. Appendix A, page 41.

"breeding stock and dairy cattle."² If these categories are to be included with fixed capital, they are better estimated by procedures different from those used here.

The weight year of the present estimates, 1964, is also that chosen by the Statistics Division for its various constant-price estimates. Prices are those actually paid (or estimated as paid), whether for assets imported or domestically produced, and without adjustment for tariffs or other taxes or other supposed departures from the rules of efficiency pricing. They are in those senses market prices and Kenya prices. While the Statistics Division publishes "factor cost" valuations of GNP, it does not do so for GNP by class of final expenditure. The dividing line between expenditures for new investment and for current costs is also that implicit in the Division's statistical series.

The fixed capital stock is obtained by the so-called perpetual inventory method. Gross annual investment is estimated for a period as long as the life of the longest-lived asset. The stream is then converted to a stock by cumulating investment and depreciating (or retiring) it, to the date for which the stock is measured. The central conceptual difficulty with this procedure, as with any constant-price estimate of capital, is the determination of weight-year prices for assets which were not acquired in the weight year. Although the "quality change" or "new products" problem is not peculiar to capital estimates, it is notoriously large and unmanageable there: equipment types and models change from year to year; individual structures are often custom-built and unique.

On conceptual grounds, it can be argued that the valuation of a "new" asset in terms of an old one should be based on their substitutability in use, their relative productivities (in the weight year); it can be argued on the contrary that it should be based on their relative costs.³ This issue is here, in effect, evaded, by the employment of simplifications in the deflation procedures which reduce the actual heterogeneity of the investment

2. Another non-correspondence is suggested by published statements (see Statistical Abstract, 1970, p. 30) that private construction is measured in the official accounts on a "completion" rather than a "work done" basis. It is understood, however, that this is in error, and all construction enters these accounts as work in place.

3. See R. Moorsteen and R.P. Powell, The Soviet Capital Stock, 1928-1962, Homewood, Illinois, 1966, pp. 7-10. This volume, it should be explained, underlies generally the present study and should be referred to for fuller explanations of concepts and procedures.

stream to homogeneous constituents or dimensions. The result is an explicit or implicit weight-year price for every kind of asset, which price, on the usual equilibrium assumptions, would equal both the value of its product and the cost of its production. These procedures and their likely consequences for the reliability of the results are discussed in more detail below.

While the discussion proceeds in terms of the capital stock, it is understood that the appropriate measure of capital inputs is more often capital services. An illustrative calculation of the service stream from the stock data is shown below. The stock valued net of depreciation would appear the analytically more useful, but alternative calculations, for the gross stock, are also shown.

Findings

The principal findings of the study are those shown in Table 1, for the total stock of fixed capital. Such sectoral breakdowns of the total as are possible are shown in Table 2. Table 3 contains future values of assets in existence at the beginning of 1971, which tabulation allows extension of the stock estimates to years following 1971, as annual investment data become available. Table 4 is the calculation of the service stream just referred to. Table 5 contains another calculation which is easily made from the stock data and may be of independent interest, of the average age of the stock. These several tables are explained in sequence.

Table 1: Derivation. The stock estimates for equipment and for structures are each derived from the corresponding series, shown in the appendixes, for annual gross investment: Tables A.1 and A.2, B.1 and B.2. Assets resulting from any given year's investment are assumed to enter the stock as of the end of that year, i.e., January 1 of the following year. For the gross estimates, assets are retired from the stock after a number of years equal to their estimated service lives. For the net estimates, they are depreciated over the same period at a rate equal to the reciprocal of their service lives.

The sources of the service life data and the details of their application are explained below. Although plainly a simplification, the choice of straight-line depreciation is not based on its conventionality. It can be argued, instead, to yield, under circumstances which are thought to be commonly approximated, the true present discounted value of an asset's future services. This argument and the relation between straight-line and other depreciation formulas are discussed in Moorsteen and Powell, op.cit., pp. 22 ff. The implicit assumption that salvage values are negligible is a further simplification made.

Table 1. Total Fixed Capital, Gross and Net, in 1964 Prices, 1964-71
(January 1; Kf million)

	Gross Values			Net Values		
	Equipment	Structures	Total	Equipment	Structures	Total
1964	234	499	733	124	343	467
1965	237	508	745	126	347	473
1966	240	519	759	127	352	479
1967	246	536	782	134	360	494
1968	259	560	819	149	374	523
1969	271	589	860	160	393	553
1970	286	617	903	173	412	585
1971	315	641	956	197	431	628

Source: See text.

Table 1: Reliability. The reliability of the stock estimates depends, necessarily, upon that of the investment estimates from which they are composed. Given the reliability of the latter (on which, see below), however, the reliability of the stock estimates is less sensitive to some aspects of the flow estimates than to others. For example, the flow estimates for pre-1964 years are unlikely to be accurate for year-to-year changes, but, so long as errors are offsetting within moderate spans of years -- as errors from some sources may well be -- the consequence for the stock is small. Other errors, however, may not be offsetting, and biases may affect the investment estimates which are larger the earlier, before 1964, their date. The best grounds for confidence in the stock estimates is that they turn out to be relatively little dependent upon the investment estimates for years earlier than the late 1940's.

Investment in the 1930's and early 1940's was unquestionably small -- even if the estimates for these years are in substantial percentage error -- relative to the level reached by the late 1940's and maintained thereafter. While investment in the 1920's was relatively large, its remaining values must also have been slight by the beginning of 1964. By that date, the whole of assets, as estimated, created before 1949 accounted for no more than 4 percent of the net equipment stock and 17 percent of net structures. By January 1, 1971, the pre-1949 shares had fallen, respectively, to 1 and 9 percent. The similar shares in the gross stock are larger but still not large -- 9 and 35 percent in 1964, 2 and 23 percent in 1971. In this respect, the gross estimates are less reliable than the net.

Table 2. Distribution of Fixed Capital by Sector, in 1964 Prices, 1964-71
(January 1; K£ million)

	<u>Equipment</u>					
	<u>Gross Values</u>			<u>Net Values</u>		
	<u>Total</u>	<u>Agri.*</u>	<u>Other</u>	<u>Total</u>	<u>Agri.*</u>	<u>Other</u>
1964	234	23	211	124	12	112
1965	237	22	215	126	11	115
1966	240	21	219	127	12	115
1967	246	23	223	134	14	120
1968	259	25	234	149	16	133
1969	271	27	244	160	17	143
1970	286	28	258	173	18	155
1971	315	31	284	197	20	177

	<u>Structures</u>							
	<u>Gross Values</u>			<u>Net Values</u>				
	<u>Total</u>	<u>Agri.*</u>	<u>Dwellings*</u>	<u>Other</u>	<u>Total</u>	<u>Agri.*</u>	<u>Dwellings*</u>	<u>Other</u>
1964	499	61	182	256	343	39	122	182
1965	508	63	182	263	347	41	121	185
1966	519	65	183	271	352	42	119	191
1967	536	67	184	285	360	43	118	199
1968	560	69	188	303	374	44	118	212
1969	589	71	194	324	393	45	120	228
1970	617	72	199	346	412	45	122	245
1971	641	73	202	366	431	46	125	260

	<u>Equipment and Structures</u>	
	<u>Gross Values</u>	<u>Net Values</u>
	<u>Total</u>	<u>Nonagricultural Nonresidential</u>
1964	733	467
1965	745	478
1966	759	490
1967	782	508
1968	819	537
1969	860	568
1970	903	604
1971	956	650

* Series for agriculture and dwellings are intended only for calculation of the nonagricultural nonresidential residual. They have no reliability for other purposes.

Source: See text.

Table 3. Projected Future Values of Fixed Capital in Existence on January 1, 1971, in 1964 Prices, 1972-81

(January 1; Kf million)

	<u>Equipment</u>					
	<u>Gross Values</u>			<u>Net Values</u>		
	<u>Total</u>	<u>Agricul- tural</u>	<u>Other</u>	<u>Total</u>	<u>Agricul- tural</u>	<u>Other</u>
1972	292	29	263	166	16	150
1973	268	27	241	137	12	125
1974	242	23	219	111	9	102
1975	213	19	194	89	6	83
1976	182	14	168	71	4	67
1977	148	9	139	55	2	53
1978	133	5	128	46	1	45
1979	116	0	116	37	0	37
1980	102	0	102	30	0	30
1981	84	0	84	25	0	25

	<u>Structures</u>							
	<u>Gross Values</u>			<u>Net Values</u>				
	<u>Total</u>	<u>Agricul- tural</u>	<u>Dwellings</u>	<u>Other</u>	<u>Total</u>	<u>Agricul- tural</u>	<u>Dwellings</u>	<u>Other</u>
1972	636	72	200	364	418	44	121	253
1973	631	71	199	361	406	43	117	246
1974	627	71	198	358	393	41	113	239
1975	621	70	196	355	381	40	109	232
1976	610	67	194	349	368	38	105	225
1977	599	65	191	343	356	37	101	218
1978	591	63	187	341	344	36	97	211
1979	578	62	183	333	332	34	93	205
1980	567	61	179	327	321	33	90	198
1981	559	60	175	324	310	32	86	192

Source: See text.

Table 4. Capital Services, at Assumed 10 Percent Interest Rate, in 1964
Prices, 1964-71
(K£ million)

	All Sectors			Nonagricultural Nonresidential Sectors		
	Depreciation	Interest	Total	Depreciation	Interest	Total
1964	32	47	79	24	30	54
1965	32	48	80	24	30	54
1966	33	49	82	25	31	56
1967	34	51	85	26	33	59
1968	36	54	90	28	36	64
1969	38	57	95	29	39	68
1970	42	61	103	33	42	75
1971*	44	66	110	34	46	80

* Provisional

Source: See text.

Table 5. Average Age of Fixed Capital, in 1964 Prices, 1964 and 1971.
(January 1; years)

	Gross Value Weights			Net Value Weights		
	Equipment	Structures	Total	Equipment	Structures	Total
1964	7.5	15.6	13.0	5.1	10.1	8.8
1971	5.4	16.4	12.8	3.4	10.9	8.6

Source: See text.

Secondly, the reliability of the stock estimates depends upon that of the estimated service lives (on which also, see below). The sensitivity of the stock to errors in the latter is illustrated in Table 6, where stocks in the terminal years are recalculated with lives one third shorter or longer than in the basic calculations. Because the investment series are not carried back to early enough years, the effects of lengthened lives cannot be fully calculated. It is nevertheless clear that the absolute values of the stock vary in proportion to the greater part of the one-third change in service lives -- generally, perhaps, by 20-25 percent of the stock total, and not uniformly enough to leave growth rates unaffected.⁴ While so large an error in service lives appears unlikely,

4. The sensitivity of the estimates to errors in service lives is a consequence of the shape of the investment streams from which they were generated. Cf. Moorsteen and Powell, *op.cit.*, pp. 67-68.

it is no doubt true that the stock estimates are particularly vulnerable to errors in this parameter.⁵

Table 6. Effect on Estimates of Varying Service Lives $\pm 1/3$, in 1964 Prices, 1964 and 1971

(January 1; Kf million)

	<u>Gross Values</u>		
	<u>1/3 Shorter Lives</u>	<u>Assumed Lives</u>	<u>1/3 Longer Lives</u>
1964			
Equipment	155	234	294 ^a
Structures	394	499	499 ^b
Total	549	733	793 ^{a,b}
1971			
Equipment	236	315	391 ^c
Structures	491	641	664 ^c
Total	727	956	1055 ^{c,d}
	<u>Net Values</u>		
1964			
Equipment	86	124	147 ^a
Structures	280	343	366 ^b
Total	366	467	513 ^{a,b}
1971			
Equipment	152	197	240 ^c
Structures	350	431	492 ^c
Total	502	628	732 ^{c,d}

a: Omits investment in equipment from 1911 through 1921.

b: Omits investment in structures from 1897 through 1913.

c: Omits investment in equipment from 1918 through 1921.

d: Omits investment in structures from 1904 through 1913.

Sources: See text.

A different test of the reliability of stock estimates obtained by perpetual inventory methods can be provided by a capital census. Two such censuses have been made in Kenya, one for 1958 and the other for 1963. Both,

5. The effect upon the estimates of variations in the depreciation formula used are not explored here. Reference may be made to Moorsteen and Powell, op.cit., pp. 27-30.

however, are restricted in coverage; only the first has been published;⁶ and it refers to a date earlier than the beginning of the present estimates. A comparison of sorts between the two may nevertheless be made.

The principal results of the 1958 census are shown in Row 1 of Table 7. These figures were gotten from responses to a mailed questionnaire, with employment data used to correct for non-responses. The survey covered private firms and organizations outside agriculture, but not households, government organizations, or agencies of the East African High Commission. Assets were reported at "book value", meaning net of depreciation and, presumably, at acquisition cost.

Row 2 in Table 7 shows so much of the total 1959 stock, in 1964 prices, as can be estimated from the investment series compiled for the Table 1 estimates. The lack of the first six years' investments is probably less consequential for these stock estimates than is the greater unreliability of the flow estimates for years more remote from 1964. Row 3 excludes agriculture and dwellings from the Row 2 totals by procedures like those used for Table 2 (see discussion below), which, again, are more unreliable the earlier the years dealt with. From the data used to obtain the Row 2 figures, it can be calculated (see the discussion of Table 5) that the average age of the equipment stock in 1959 was 4 years, that of the stock of structures 8-9 years. On the assumption that prices of assets of average age would approximate average acquisition prices, indexes which relate 1954 and 1950 prices to 1964 (but are themselves only incidentally come by) are used to deflate the Row 3 figures to those of Row 4. The last step, in Row 5, which may be wholly inaccurate, uses data on the private share in investment in the 1950's to approximate that share in the 1959 stock and, thus, to arrive at figures which are, in the senses described, comparable to those of the Census.

The comparison permits no strong conclusions. Perhaps the fact that the results of the two procedures do not differ from one another by as much as a factor of 2 can, under the circumstances, be taken as weakly reassuring evidence of their mutual consistency. The sign of the difference between particular estimates, for the total or either component, is not likely to be significant.

6. East African Statistical Department, A Survey of Capital Assets Held in Kenya, 1958, September 1960. The 1963 Census is understood to have covered only manufacturing and mining, which accounted for about a third of the assets held in the sectors covered by the 1958 Census (see Text Table 3 of that source).

Table 7. Comparison of the 1958-Census and Perpetual-Inventory Estimates of the Fixed Capital Stock, Net Values, January 1, 1959.

(K£ million)

	<u>Equipment</u>	<u>Structures</u>	<u>Total</u>
<u>1958 Census</u>			
1. Privately owned, nonagricultural nonresidential, in acquisition prices	30	46	76
<u>Perpetual Inventory</u>			
2. Total, in 1964 prices	144	280	424
3. Nonagricultural nonresidential in 1964 prices	128	139	267
4. Nonagricultural nonresidential equipment in 1954 prices, structures in 1950 prices	95	107	200
5. Privately owned, nonagricultural nonresidential, in 1954 and 1950 prices	57	32	89

Sources:

Row 1. East African Statistical Department, *op.cit.*, Table 1, "book value at end of year" for transport equipment and machinery and other equipment and for nonresidential buildings and other construction works. Figures shown for commercially owned dwellings and for land are omitted.

Row 2. Procedures are the same as for the Table 1 estimates, but the investment series lack the six earliest years required.

Row 3. Procedures are the same as for Table 2.

Row 4. Row 3 values are deflated from 1964 prices to those of 1954 or 1950 by means of the implicit price indexes obtained for those years in Table 10, Col. 3, and Table 11, Col. 3.

Row 5. Calculated from Row 4 on the assumption privately owned assets accounted for 60 percent of total equipment and 30 percent of total structures. These figures are based, roughly, on official data for the share of private in total investment, in current prices, in 1950 and 1954-58: See Appendix E and sources cited there.

A final aspect of the reliability, for one or another use, of the estimates is their comprehensiveness. On this, what can be said is at best only roughly indicative.

As has been noted, the stock estimates omit two components which are included in the Statistics Division's estimates of capital formation (in the monetary economy): land improvement and plantation development and, secondly, breeding stock and dairy cattle. Of total capital formation estimated for the entire period 1964-70, these components account, respectively, for 2.6 and 1.9 percent.⁷ Barring some oddity of service lives or large transfers from the non-monetary sector, these omissions are unlikely to have large effects on the stock estimates.

7. Cf. Economic Survey, 1971, pp. 12-13 and also Appendix A, Sources for Table A.1.

A more consequential omission, where total inputs of capital are wanted, is that of inventories ("stocks"). As a basis for its estimates of annual investment in inventories, the Statistics Division compiles, but does not publish, annual estimates of the stock of inventories. These were, e.g., in current prices, K£ 65.4 million at the beginning of 1965, 113.5 at the beginning of 1971, the latter figure reflecting a price rise of possibly 8 percent or so.⁸ These totals are equal to about 14 percent of the fixed capital stock (net) in 1965, 17 percent, after deflation, in 1971. If comparison is made, as is likely to be more appropriate, between inventory and nonagricultural nonresidential fixed capital only (the inventory figures evidently exclude agriculture), these fractions are raised to 22 and 24 percent. Moreover, the estimated inventory totals are thought to be significantly understated.

For capital outside the monetary economy, the Statistics Division estimates only investment in "traditional dwellings". As estimated, capital formation in these, over the 1964-70 period, equalled 10 percent of fixed capital investment in the monetary sector.⁹ How much other capital there may be in the non-monetary sector -- in the form of livestock, land improvement, etc. -- is not easily guessed at from immediately available data, nor are the conceptual problems which its valuation poses easily solved. The value of total land and other natural resources in the economy is similarly inaccessible.

Table 2. Procedurally, the Table 2 distribution of the stock totals by sectors is consistent with the derivation of the totals. Estimated annual gross investment in agriculture (in equipment and in structures, separately) and in dwellings is cumulated and retired or depreciated in accordance with estimated service lives, to obtain gross or net stocks. These two components are then deducted from the totals to obtain, as a residual, stocks in the nonagricultural nonresidential sectors. The logic of the calculation argues only for the reliability of the residual series and not very strongly for that.

The investment series for both agriculture and dwellings (see below), at least for years before 1964, are markedly less reliable than those for total investment, and service lives for the two sectors, while obtained from those used for the total stock calculations, are, because of the reduced scope for offsets, more vulnerable to serious error. For these reasons, the agricultural and the residential stock estimates are thought not to be useably reliable in themselves.

8. The GNP implicit deflator increases 7 percent from 1964 to 1970, the import price index 9 percent. See Economic Survey, 1971, pp. 3 and 30.

9. Ibid., pp. 12-13, and Appendix A, Sources for Table A.1.

The total minus these components might, nevertheless, be reliable, if their share in the total were small: a large percentage error in their estimated value could still be a small percentage error in the residual. As it turns out, agriculture appears, indeed, to account for only some 10-12 percent of the total (net) stock of equipment and of structures, and errors in those estimates cannot have much effect for the nonagricultural residual. Dwellings, however, account for roughly 30-35 percent of total structures, 20-25 percent of total capital, and netting them from the total leaves a residual which is itself quite sensitive to errors in the dwellings estimates. The dwellings share diminishes over time, however, and, on other grounds as well, the nonagricultural nonresidential calculations are more reliable for the more recent years covered.

Table 3. Of the stock in existence on January 1, 1971, future values can be estimated by an extension of the calculations which yield the 1971 stock: the retirement or depreciation of pre-1971 investment is simply carried forward to each future date shown. The purpose of these calculations is to allow the up-dating of the capital stock estimates, as new annual investment data become available. The stock resulting from investment in years after 1970 need simply be added to the stock remaining from investment through 1970.

Thus, in Table 8, the "provisional" estimates, published by the Statistics Division (Economic Survey, 1972, pp. 12-13 and 17) are added to the Table 3 figures for January 1, 1972, to obtain total stock figures for the latter date. These estimates could be corrected with the publication of final investment figures for 1971. They could be carried forward another year once 1972 investment data were available, 1971 investment then being depreciated for the one year's aging. And so on. Depreciation could be calculated with the rates and procedures used here, so long as these appeared appropriate.¹⁰

Table 4. Regarded as an input into a productive process, capital is more properly measured as a flow of services than as a stock of assets: as machine-hours rather than machines.¹¹ On the usual equilibrium assumptions, net services move with interest charges on the stock, gross services with the sum of interest charges and depreciation. Table 4 presents calculations which are essentially illustrative of the service streams implicit in the stock estimates.

10. The one somewhat complicated step is that the service-life distribution for investment in transport equipment is recalculated annually. On this and on depreciation procedures generally, see p. 33 and Table 13 below.

11. Cf. Moorsteen and Powell, op.cit., pp. 10-11.

Table 8. Derivation of "Provisional" Capital Stock
 Estimates for January 1, 1972, in 1964 Prices
 (Kf million)

	<u>Total</u>	<u>Agriculture</u>	<u>Dwellings</u>	<u>Nonagricultural Nonresidential</u>
<u>1971 gross investment</u>				
Equipment	57.6	6.3	--	--
Structures	42.0	2.0	8.9	--
<u>January 1, 1972 stock</u>				
<u>Gross</u>				
Equipment	350	35	--	315
Structures	678	74	209	395
Total	1028	109	209	710
<u>Net</u>				
Equipment	224	22	--	202
Structures	460	46	130	284
Total	684	68	130	486

Source: See text.

Depreciation is computed as the difference between annual gross and net investment, the latter being calculated from the annual change in the net stock.¹² Interest is calculated at a rate assumed for 1964 of 10 percent,¹³ on the average annual net stock, with the average obtained from the beginning-and end-of-year totals. An arguably realistic interest rate for the economy is not known.

Table 5. On account of "embodiment" hypotheses and for other reasons, interest may attach to the age of the capital stock as well as its size. Table 5 presents one measure of age, the arithmetic mean, of equipment and structures and their combined total, weighted alternatively with gross and net values. The data for the computation come directly from the perpetual inventory which yields the stock estimates, and correspond to them in coverage and reliability. Year-to-year changes in measured age are unlikely to be significant, and, therefore, figures are shown for 1964 and 1971 only.

Annual Investment

Total Investment, from 1964. The annual investment data have different origins for 1964-70 than for the pre-1964 period. For the more recent years (see Tables A-1 and B-1), the data are those compiled by the Statistics Division of the Ministry of Finance and Economic Planning. No detailed explanation of the derivation of these official series has been published.¹⁴ Separate series for equipment and construction, broken down by major components, are compiled. Both are obtained by estimating investment expenditures in current prices and deflating the results, by price indices, to 1964 prices.

The current expenditure data have diverse primary sources. Public expenditures, including those of the E.A.C. organs, are obtained from the appropriate budgetary accounts. Private expenditures for non-transportation equipment are based on import values, inclusive of duties and with assumed

12. To reduce rounding errors, the calculation is made from stock figures before their rounding.

13. Economic Survey, 1971, p. 11, for 1964 attributes K£ 108 million to rental and other operating surpluses, including depreciation which is here estimated as 32 million. Net fixed capital estimated here plus inventories as estimated by the Statistics Division come to some 535 million. The implied net rate of return is about 14 percent, which is understated by the inclusion in the stock of publicly owned assets earning no return but overstated -- presumably to a greater extent -- by the exclusion of livestock and land.

14. The investment data now published by the Statistics Division are a revised variant of series published before 1968. The sources of the earlier series are explained in East African Statistical Department, Capital Formation in Kenya, 1954-1960, July 1961. The character of the 1968 revisions is described in Economic Survey, 1968, p. 10. For certain investment categories, differences between the pre- and post-revision estimates are large. The revised series are believed to be more comprehensive and reliable than their predecessors.

markups for trade margins and transportation costs and for installation costs.¹⁵ Lags between the import and installation of large equipment items are, at least in recent years, allowed for. Private transportation equipment is estimated from vehicle registrations, a fixed fraction of automobiles registered being assigned to capital formation. Private construction is derived chiefly from building completions reported in main towns, with a lag allowed for between the putting in place of components and completion of the entire structure. Additional data come from the periodic census of large-scale agriculture, etc.

All investment in equipment is deflated by a single price index, all construction by another. The equipment deflator is an import price index: the East African Statistical Department's unit value index for SITC Section 7, Machinery and Transport Equipment.¹⁶ The index covers only a few, selected, components of the Section 7 category, accounting (in 1964) for 18 percent of the total value of such imports.¹⁷ The index is computed with a 1964 base, in accordance with the Fisher Ideal formula.¹⁸ The construction deflator is, in principle but with some departures in practice, an index of the building costs, per square meter, of residential units of a specified size-range in Nairobi.

An appraisal of the reliability of the official investment series is beyond the scope of the present study. They have, evidently, a considerable footing in expenditure data whose collection is motivated by administrative rather than statistical purposes, which motivation provides one kind of inducement to accuracy in reporting. The deflators are simple, but there is a clear rationale in the effort, evident in both, to define a relatively homogeneous product to be priced. This reduces the effects on the deflators of shifts in the composition of investment, including quality changes or the introduction of new products. Unless the deflators are radically in error, the 1964-70 period was one of less than extreme price changes.¹⁹ Constant-price investment series, it should be understood, are unlikely to be highly reliable anywhere; by comparative standards, the official Kenya series appear quite credible.

15. See the discussion in Sources for Table A.3.

16. See "East African Trade Indices" in East African Statistical Department, Economic and Statistical Review, Sept. 1968, pp. viii ff.

17. Ibid., p. xii. The items included are steam generator boilers; other wheeled tractors; pumps and centrifuges; mechanical handling equipment; ball roller or needle roller bearings; and passenger cars, including station wagons.

18. Strictly speaking, such an index does not in general deflate current values to 1964 prices. A Paasche index would do so.

19. Over the whole period, the equipment deflator rises by 3 percent, the construction deflator by 33 percent. Cf. Economic Survey, 1971, pp. 12 and 30.

Total Investment, to 1964: Derivation. For years before 1964, official constant-price investment series are unavailable. There are available foreign trade statistics, published continuously since before World War I. Constant-price investment indexes, from 1922 to 1964 for equipment and from 1914 to 1964 for construction, are composed here, chiefly from data for physical quantities of imports, of equipment in the one case and of construction materials in the other. These indexes are weighted internally with 1964 prices and set equal in 1964 to the known absolute values of investment in that year. Detailed statements of sources and procedures are given in Appendixes A and B.

The justification for the use of imports as an index of investment expenditures is that effectively all equipment and a large part of construction materials were, in these years in Kenya, imported. Some construction materials were produced domestically, and their share in the total doubtless changed over time. Data on such outputs are generally unavailable. An important exception is cement, for which "domestic consumption" is reported in official sources -- and is incorporated in the index -- back to 1948. Otherwise, the principal allowance made for domestic production is the total exclusion of wood and stone products, which appear in the import statistics but are likely to have been in domestic production continuously.²⁰ Adjustments of sorts are made also for the production before 1964 of some iron and steel products.²¹ Equipment imports are assigned to investment in the same year; construction materials are lagged a quarter of a year.

The logic of treating an index of materials consumed in construction as a measure of construction outputs has been discussed elsewhere.²² Essentially, it comes to the assumption -- which may be contrary to fact -- that substitutions among inputs, technological change, and changes in the composition of outputs, do not seriously alter the productivity of materials in construction, in the aggregate, over time.

Determination of the list of import categories to be included in the index commenced, for equipment, from the Statistics Division's calculations, from import values, of 1964 investment in nontransport equipment. In general, import categories appearing there were retained so long as they identifiably referred to new equipment and were reported in the trade statistics, in physical

20. From casual observation, wood is not commonly used in Kenya, presumably because of termites. Stone is quite commonly used.

21. See Sources for Table B.3 and B.4, for steel doors and windows and corrugated iron sheets.

22. Cf. Moorsteen and Powell, op.cit., pp. 43 ff., and sources cited there.

units, in 1964 and at least one year before 1964. Some categories were omitted because the share of the import assigned to investment was small, some because their coverage was excessively heterogeneous, some because their absolute value was trivially small. To that list were added all categories of transportation equipment, with the principal exception of passenger cars. These were wholly excluded, because of the impossibility of estimating changes in the investment share of their imports.

Selection of construction materials to be included started from the list of import categories classified by the East African Statistical Department as building materials in its end-use breakdown of imports.²³ Exclusions were made of wood and stone (and clay brick), of materials recognizably allocable in large part to non-construction uses, of categories of heterogeneous coverage or trivial value, etc. Steel rails and sleepers and insulated wire and cable (classed by the Department as "producers' capital goods") were added.

The foregoing yielded tabulations of 44 categories of equipment and 21 of construction materials. So far as the trade statistics permit, series for these categories were extended backward in time from 1964; due to consolidations and exclusions, their number was reduced to 15 for equipment by 1922 and two for materials (cement and corrugated iron sheets) by 1914. Predominantly, both equipment and materials are measured in units of weight, but, among equipment categories, measurement is fairly frequently, at least for a span of some years, by number.²⁴ For a few of the latter cases with heavy weights in the total index -- railway locomotives and cars and aeroplanes -- a crude system of price-weighting within the category was contrived.²⁵

To put together extended quantity series which could be linked to one another required solutions -- crude and makeshift, in the event -- to a variety of problems presented by the trade statistics. In the years covered, customs classifications underwent comprehensive revisions in 1964, 1954, and 1948 (and, subsequently, in 1968). For the 1964 revision, a key for conversions from one classification set to the preceding one

23. See East Africa Statistical Department, East African Retained Imports: Stage of Production and End Use Analysis, 1960/1961, September 1962, p. 4.

24. Up to 1953, the trade statistics showed certain equipment items in both units of weight and number. While, generally, the weight per unit ratio is highly unstable from year to year, it shows no obvious trend over time. Where the choice was open, data in weight units were usually employed.

25. See Sources for Table A.4.

is available. For the earlier general revisions and for various partial revisions, categories had to be matched on the basis of their numbers, titles, etc. The treatment of additions to stocks in bonded warehouses and of re-exports within East Africa changed over time: various extrapolations were made on the assumption of constant ratios. Detailed data dividing East African imports between Kenya and Uganda are available back only to 1949, before which date the division is shown in the sources only for broad classes of goods: shares in those classes were assumed to hold for component categories. The trade statistics attribute imports on account of E.A.C. organs to the country of initial consignment, and do not distinguish E.A.C. from other government imports. Kenya was assumed to account for fixed proportions of total government imports, of the three East African countries in combination, of railway rolling stock, ships, and aeroplanes, and of railway rails and sleepers.²⁶

The 1964 weights with which the quantity indexes are combined are, for equipment, approximations to actual expenditures on each category as new investment. That is, for private investment in nontransport equipment, they are the Statistics Division's previously-referred-to estimates from import values, with duties and markups. For transport equipment and all public expenditures, values are similarly obtained here, from import values, with duties if any and estimated markups. For each import category, private and public are combined into a single weight.

In the case of construction materials, 1964 weights are, a few exceptions aside, simply import values, private and public together, inclusive of duties but not otherwise adjusted. In particular, so long as a material is included at all, it is included to its entire value: no adjustment is made for possible differences among materials in the share going to construction.

From the 1964 weights, it can be calculated that the index of equipment imports covers, in 1964, 62 percent of private investment in non-transport equipment and 74 percent of public; of transport equipment, 45 percent of private and 67 percent of public; of the whole, 59 percent.²⁷ The relatively low coverage of private transport equipment reflects the exclusion of passenger cars. The total of construction materials, as valued, in 1964, equals 22 percent of reported expenditures on all non-labor inputs

26. See Sources for Tables A.3 and A.4, B.3 and B.4.

27. For the investment data, see Economic Survey, 1971, pp. 12-13.

by the building and construction industry.²⁸ On a variety of accounts, it is difficult to move from this figure to a guess at the share covered of total materials inputs in investment in construction, but, perhaps, something on the order of 30-40 percent would be credible. Besides the obvious and intended exclusions, the index omits numerous minor materials which in sum are likely to account for a substantial part of total materials costs. The coverage of both indexes, equipment and materials, doubtless diminishes the earlier the date.

In the determination of the 1964 weights, it should be noted, a given machine or material can enter with a different value, depending upon whether it was imported privately or by a public agency. That this is so is due to the fact that duties are charged on private imports only. The same difference is characteristic of the official investment series, in current prices, beyond 1964 as well. In the pre-1964 series composed here, however, that difference affects only the 1964 weights. In the component quantity series, public and private imports are combined, in physical units, into a single series.

Total Investment, to 1964: Reliability. The reliability of the foreign trade statistics which underlie the pre-1964 investment series, taken solely as measures of what they purport to measure, appears quite high -- perhaps, for so little-developed an economy, extraordinarily high. They are systematically assembled and annotated, and their tie to the collection of import duties gives a certain assurance of their completeness and accuracy. By the time, however, that they have been adjusted and processed and have been reinterpreted into indexes of investment, their presumptive reliability is doubtless quite low. There is room for errors of various sorts in the extrapolations made, the links between series, total omissions, etc., etc. Probably most consequentially, the coarseness of the equipment import categories -- "internal combustion engines", "metalworking machine tools", "printing and bookbinding machinery" -- means that quality changes are poorly accounted for and the equipment series for this reason may be seriously biased over the long run.²⁹ Quality changes are perhaps as badly

28. Industry data were provided by the Statistics Division.

29. While the direction of the bias is by no means certain, one would probably suppose that it is toward an overstatement of the value of investment in early years -- if, at least, equivalences among assets are meant to be based on their relative productivities -- and an understatement of the growth rate over time. This seems clearest for assets which are measured by number: typewriters, sewing machines, lorries, etc. A 1924 model lorry would be (in 1964) considerably less productive than a 1964 model lorry. The direction of the bias is less obvious for assets measured in units of weight, though casual observation here too suggests that newer assets included within an import class may well have tended over time toward a selection of increasingly sophisticated components.

handled in the construction series, since materials inputs, which are inadequately covered in any case, are not direct measures of construction outputs.

On the other hand, the reliability of these series can be tested in several ways. The first such test is shown in Table 9, where indexes for the years following 1964, composed in the same way as those up to 1964,³⁰ are compared with the official series for the period. The latter, it will be recalled, are obtained by deflating expenditures, the former by weighting physical quantities. There is some overlap in sources, in that both equipment series use import data, albeit the one current values and for some components only, the other physical quantities and for virtually all components. The construction comparison is somewhat misleading since the lag used in the estimated series was obtained by fitting it in this period to the official series.³¹ The year 1970 is omitted from the construction index because domestic production of rolled steel products had by that year become significantly large.

All things considered, the Table 9 comparison suggests a correspondence between the two sets of series which is close and which is reassuring with respect to the reliability of the pre-1964 estimates. It is reassuring, that is, in the sense that the procedures used here yield results similar to the official series for the post-1964 years.

Conceptually equivalent, although statistically less firm, comparisons for ten to twelve pre-1964 years are made in Tables 10 and 11. In both, the first column is a series for investment expenditures in current prices, on equipment or structures. These are based on official data, as published before 1968, which are here considerably adjusted to correspond more nearly with the current official series.³² The second column in both tables is the constant-price estimates made here, set equal to 100 in a year which facilitates the comparisons. Column 3 is the deflator implied by the first two columns. The remaining columns are other price indexes with which the implicit deflator may be compared.

In Table 10, Col. 4, the import unit value index is the SITC Section 7 index, as it was composed for the indicated years: it resembles the index of the same title now used to deflate equipment in the official

30. For the sake of brevity, detailed statements are not given of the derivation of the indexes in these years. Procedures differ in some details from the pre-1964 estimates.

31. See Sources for Table B.2.

32. See footnote 1, p. 17 and Appendix E.

Table 9. Comparison of Estimated with Official Investment Series, in 1964
Prices, 1964-70
(1964 = 100)

	Equipment		Structures	
	Official (1)	Estimated (2)	Official (3)	Estimated (4)
1964	100	100	100	100
1965	94	90	107	113
1966	124	132	131	133
1967	160	173	178	180
1968	154	162	217	226
1969	162	168	219	216
1970	224	201	226	not estimated

Sources:

Cols. 1 and 3. See Tables A.1 and B.1.
Cols. 2 and 4. See text.

Table 10. Comparison of Estimated Equipment Series with Official Data, 1950,
1954-64.

(1954 = 100)

	Official Equip- ment Series (Adjusted), in Current Prices (1)	Estimated Equip- ment Series, in 1964 Prices (2)	Col. 1 ÷ Col. 2 (percent) (3)	Official Index of Unit Values of Equipment Imports (4)	U.K. Index of Export Prices of Engineering Products (5)
1964	132	98	135	--	131
1963	101	71	142	--	129
1962	94	74	127	--	126
1961	91	81	112	115	122
1960	108	85	127	132	120
1959	97	77	126	133	117
1958	95	77	123	125	115
1957	118	104	113	115	112
1956	138	129	107	113	107
1955	137	142	96	106	103
1954	100	100	100	100	100
1950	55	64	86	--	82

Sources:

Col. 1. Table E.1, Row 2.
Col. 2. Tables A.1. and A.2.
Col. 4. East African Statistical Department, East African Trade Indices, Revised External Trade Indices, 1954-1961, with Commentary, Jan. 1963, Table 3.
Col. 5. United Kingdom Board of Trade, Report on Overseas Trade, Jan. 1960, p. 9; Dec. 1965, p. 9.

Table 11. Comparison of Estimated Construction Series with Official Data, 1950, 1954-64

	(1964 = 100)					
	Official Construction Series (Adjusted), in Current Prices (1)	Estimated Construction Series, in 1964 Prices (2)	Col. 1 ÷ Col. 2 (percent) (3)	Cost per Sq.M., Private Dwellings, Main Towns (4)	Cost per Sq.M., Other Private Buildings (5)	Wage Rates, Private Building (6)
1964	100	100	100	100	100	100
1963	95	125	76	96	103	103
1962	115	148	78	106	86	91
1961	116	151	77	107	94	90
1960	151	170	89	105	85	79
1959	160	170	94	104	83	79
1958	158	167	95	109	74	82
1957	178	193	92	110	71	88
1956	175	195	90	110	68	80
1955	157	199	79	108	67	69
1954	133	200	67.	100	69	--
1953	--	--	--	101	66	--
1950	89	115	77	--	--	--

Sources:

- Col. 1. Table E.1, Row 3.
 Col. 2. Tables B.1 and B.2.
 Col. 4. Calculated from data in Statistical Abstract, 1959, p. 91; 1961, p. 85, and 1969, p. 94.
 Col. 5. Same sources as Col. 4.
 Col. 6. Annual Statistical Abstract, from 1955, p. 99, to 1965, p. 114.

statistics, except that it has a broader coverage, on the order of 80 percent of total value. The Col. 5 series is also a unit value index, of machinery and transport equipment, but for exports (to any recipient) from the U.K. That country was in these years the principal supplier of equipment to Kenya. The correspondence between the Col. 3 implicit deflator and the two unit value indexes is, for present purposes, close (incredibly close, were it not that all the series have, in considerable part, common origins in foreign trade statistics). Again, if the Statistics Division's present method of obtaining equipment investment is taken as the standard of reliability, Table 10 makes clear that deflating Row 1 by an index derived from Rows 4 and 5 would have yielded an equipment series, from the early 1950's to 1964, similar to that actually obtained.

No comparable grounds for confidence can be found in Table 11. If Col. 4, the cost index for private dwellings, were taken to approximate most nearly the construction deflator presently used by the Statistics Division, it (with Col. 1) would imply a construction series lying from one tenth to one third below the Col. 2 estimates. When all three price indexes, Cols. 4 to 6, are considered, the Col. 3 deflator does not appear distinctively out of line, except in 1961-63 when it is low, real construction by implication high. However, with the odd exception of Rows 5 and 6, none of the price series closely resembles another and none merits, on conceptual or statistical grounds, much confidence. Hence, the most that can reasonably be inferred from the Table 11 comparison is that it leaves the reliability of the constant-price construction estimates unconfirmed.³³

A further test of the investment series, admittedly a loose one but one applicable to the whole span of time covered by them, is their historical plausibility. Viewed in their broad contours, the series seem certainly enough to trace out the actual sequence of historical events: a trough (in construction) in World War I; a boom in the 1920's; a trough again in the 1930's with a further drop in World War II; a postwar upswing to the mid-1950's, to levels a multiple of the 1920's peak, followed by a decade-long

33. The following statement appears in East African Statistical Department, Capital Formation in Kenya, 1954-1960, op.cit., p. 11: "It is not possible to estimate from the information at present available the extent to which price increases were responsible for this rise (in investment). Such evidence as there is indicates that building costs in 1954 were above the 1950 level, that they rose again sharply in 1955 and 1956, and did not recede until 1958-59. ... in Kenya during the decade of the 1950's it can be said that the fluctuation in building and construction expenditure have been less marked in real terms than in money terms since rising price were associated with rising building activity and lower prices with lower activity." Except for 1954/1950 and some discrepancies in timing, this passage matches fairly well the behavior of the first three columns in Table 11.

decline; and, after Independence, a renewal of rapid growth. The boom of the 1950's may be imprecisely rendered, but the fact of it is known,³⁴ and also that it faded as the anticipation of Independence grew. The levels of investment in the 1920's may be implausibly high relative to those attained subsequently, but inspection of the data indicates that their chief source is railway engines and rolling stock in equipment, rails and sleepers in construction. The 1920's were in fact the period in which the Nakuru-Kampala line was built and also branches of the line within Kenya.³⁵

That the series trace accurately the historical course of year-to-year fluctuations is unlikely in any case. That the long-term trends they imply are accurate, except in their sign, is hard to judge from historical plausibilities alone.

Investment in Dwellings and in Agriculture. Details of the derivation of the series for housing construction and agricultural investment in equipment and structures are given in Appendixes C and D. All series for 1964-70 are official data. From 1964 back, all series are obtained by dividing total investment, in equipment or structures, among its components. For roughly the first decade before 1964, the division is based on the official (pre-1968) current-price investment data. From there, the division of construction between dwellings and other structures and of equipment between agricultural and non-agricultural is extended on the basis of import data: of imported materials used disproportionately in dwellings (roofing tiles, window glass, etc.) versus all others; of imports of agricultural equipment versus all others. The separation of agricultural construction from the mid-1950's, from the total of construction less dwellings, is made to 1922 on the basis of the equipment division and before that on the assumption that the agricultural share was constant.

Perhaps for the years following 1964 and certainly for the years preceding, the component investment series are decidedly less reliable than the total series. This is so even for the last decade before 1964, because the reliability of the current-price figures is questionable (cf. p. 14, footnote 14, and Appendix E). The extrapolations on imports are probably relatively good for agricultural equipment, relatively poor for dwellings. The method of deriving agricultural construction in the earlier years is simply the best to suggest itself.

34. Cf. East African Statistical Department, The External Trade of East Africa Indices 1954-1958 and Commentary, Sept. 1960, p. 6, which, inter alia, attributes the boom to "general optimism" and to government expenditures induced by the emergency.

35. John King and Roger van Zwanenberg were helpful in the preparation of this paragraph but bear no responsibility for it.

None of the series appears grossly implausible historically, at least in a period when it can be of much consequence for the stock estimates, with the possible exception of the housing boom of the 1950's: the indicated building levels are well above anything attained in the post-Independence years. Statistically, this is the product of the high total investment level of the period (as estimated, in constant prices) and the large share of dwellings in total construction (as reported, with adjustments, in current prices: see Table E.1). The result, however, is borne out by casual observation of the housing stock now standing in Nairobi, much of which is post World War II but at least 10-20 years old, and also by the recollection of long-time Kenya residents.

Service Lives

Data on the service lives of capital assets in Kenya have not previously been assembled, nor do write-off rates permitted for taxation purposes provide any useable guide to them.³⁶ The procedure adopted here, then, was to take as a basis of comparison two sets of lives which have, at various times, been employed in U.S. tax practice, the so-called "Bulletin F" lives, as revised in 1942, and the -- generally much shorter -- "Guideline" lives adopted in 1962. There was no presumption that asset service lives in Kenya should approximate either of these standards but that, given a sample of Kenya lives, the likely order of magnitude of Kenya lives in general could be judged by comparison with the U.S. standards.

To this purpose, interviews were arranged with representatives of five businesses which are either major distributors or users of equipment (four are private, one an E.A.C. agency). Enquiries were made also of a few individuals. Interviews were informal and non-systematic and were meant to elicit the respondent's knowledge of the lives of assets in his own business or in that of his customers and, on occasion, his impression of lives elsewhere. The results of these interviews are summarized in Col. 3 of Table 12.

As can be seen, the reported lives were, except for railroad equipment, quite short -- on the order of the "Guidelines" and not "Bulletin F." Informants' knowledge of the lives of assets used in their own business was impressively precise and firm. There was considerable mutual confirmation

36. The Kenya income tax (see East African Community, A Guide to Income Tax in East Africa, Nairobi, 1969, pp. 38-39) distinguishes, for depreciation purposes, two classes of buildings and three classes of machinery and plant, allows under certain circumstances a 20-40 percent "investment deduction" in the year of the assets's purchase, and sets rates (e.g., 37.5 percent on tractors, 25 percent on other self-propelling vehicles) for "declining-balance" depreciation which appears high relative to any likely service life. In this, Kenya evidently follows practice in the U.K., for which reason that country's authorized depreciation rates also are unuseable here (see Percy F. Hughes and J.M. Cooper, eds., Taxation, 1971-72, London, 1971, pp. 127-8 and 139).

among respondents. Concrete illustrations were cited to justify assertions that lives are short: assets are used intensively and maintenance is difficult. On the other hand, it should be noted, the cited instances were not typically in manufacturing, for which sector, indeed, it was impossible to get a satisfactory sample, because of the extreme diversity of businesses and assets within it.

No effort was made to obtain interview data on the lives of structures. In the case of buildings, especially of a sort now important in the capital stock, little experience of actual lives can have accumulated in Kenya, and little basis otherwise is available for predicting future lives. A number of commercial and public buildings in Nairobi and Mombasa carry construction dates on their facades, and survivals from the 1920's and 1930's are not uncommon. Old buildings are generally masonry and much current construction is reinforced concrete. At least within the monetary economy, buildings in Kenya, as elsewhere, doubtless have a relatively long life. As the "Bulletin F" figures imply, the lives of structures other than buildings are extremely varied in the United States, which is surely true in Kenya as well.

Given the foregoing information and suppositions, the set of estimated lives shown in Col. 4 of Table 12 was composed. These were based where possible on the interview responses, or on analogy with similar sectors, or on the kinds of assets likely to be held (the office furniture life was assigned to service sectors), or on the U.S. "Guidelines". The length of some lives was deliberately adjusted to reduce the variety of lives to be dealt with in the stock calculations. Overall, clearly, the Col. 4 lives are in the nature of first guesses, which, of the several components of the present calculations, could most easily be improved by further research.

The choice of categories in Table 12 was made in part to conform to available data on the distribution of investment by sector or kind of assets, from which its distribution among assets of different lives (or depreciation rates) could be estimated. Thus, for 1964-70, official sources distribute investment in nontransport equipment among the 13 sectors distinguished in Table 12. Rearranged by the estimated service life of each sector's assets, these imply the distribution by service-life classes shown in the first half of Table 13. Because this distribution shows little change over time, the single distribution for all seven years in combination (the last column in the table) was, for simplicity, assumed in the capital stock calculations to hold in every year. Similar sectoral data are lacking for years before 1964: the 1964-70 service-life distribution is assumed to hold in the pre-1964 years as well. Because 20 years is the longest life of this class of equipment, investment in it before 1944 does not enter the stock estimates.

Table 12. Derivation of Estimated Service Lives

	U.S. "Bulletin F" (1942) (1)	U.S. "Guidelines" (1962) (2)	Responses of Kenyan Informants* (3)	Estimated Lives (4)
<u>Equipment by sector</u>				
Agriculture	15	10	8;9;7	8
Forestry	12	6	same as construction	6
Fishing	5	--	--	6
Mining and quarrying	17	10	--	10
Manufacturing and repairing	18	12	12; longer than U.K. or U.S.	14
Building and construction	8	5	6	6
Electricity and water	25	--	20; same as U.K. or U.S.	20
Transport, storage, and communications	25	16	--	16
Wholesale and retail trade	15	10	shorter than U.K.	10
Banking, insurance, and real estate	--	--	--	10
Ownership of dwellings	--	--	--	10
Other services	13	10	10; shorter than U.K.	10
General government	--	--	--	10
<u>Equipment by kind</u>				
Office equipment	15	10	--	10
Power generating equipment	22	--	15	--
Railway locomotives	32	14	40 until 1950's, 20 since 1949	40 through 1948; 20 from 1949
Railway cars	32	14	40	40
Buses	8	9	6	6
Lorries	8	5	5;6	6
Automobiles	5	3	5;3	4
Trailers, wagons, etc.	10	6	--	6
Aeroplanes	5	6	6 for small planes	6
Ships and boats	33	18	--	20
<u>Structures, by kind</u>				
Dwellings	60	45	--	50
Nonresidential buildings	50-75	40-60	--	50
Construction and works	10-150	--	--	50

* Semicolons separate responses of different respondents.

Sources:

Col. 1. U.S. Treasury Department, Internal Revenue Service, Bulletin "F" Tables of Useful Lives of Depreciable Property, Washington, 1955, passim. The lives in this source are those last revised in 1942.

Col. 2. Idem, Depreciation Guidelines and Rules, Revenue Procedure 62-21, Washington, revised Aug. 1964, pp. 3-13, and Asset Depreciation Range (ADR) System, Washington, June 1971, pp. 30-52. The "guideline" lives of these sources date from 1962.

The U.S. lives shown in Table 12 are drawn somewhat impressionistically from their sources. "Composite" lives are used when available, median lives often, average lives occasionally. The matching of sectors is also sometimes imprecise.

Cols. 3 and 4. See text.

For transport equipment, investment data by sectors is published but is not of much use, since the transport sector accounts for most of the whole. Instead, annual distributions of investment by kind of asset are estimated from import data. These, rearranged by service lives, yield the life distributions, for years from 1964 to 1970, shown in the second part of Table 13. Since the transport equipment distribution changes radically from year to year, each year's investment is retired or depreciated on the basis of its own distribution. For the same reason, separate distributions for each pre-1964 year are estimated from the import data used in the investment estimates,³⁷ and survivals or present values calculated for each accordingly.

The division of investment between nontransport and transport equipment for 1964-70 comes from the same sources as the investment data and for pre-1964 years is estimated from the import data underlying the investment estimates.³⁸

Since a single life is assumed for all construction, the stock calculation proceeds directly from total annual investment, without distinctions among its components.

Some Implications

Although it is not intended to put the capital estimates to any serious use here, a few comparisons with other data may nevertheless be of interest. Comparisons of quite conventional sorts are shown in Table 14, 15, and 16. None of these has analytical implications in itself, although it could on one or another assumption. In reading the tables, it should be kept in mind that all the data involved are for the monetary economy only. The nonmonetary component, in Kenya, in the official income statistics, accounts for roughly one fourth of GDP and, undoubtedly, for a much larger share of the total labor force. Even when nominally comprehensive of all sectors, the data used here are for part of an economy. They are also, one would judge, heavily influenced by a process of recovery from a depressed level of activity associated with Independence.

Among other elements of this process, the sequence of depression and recovery in the investment stream (Tables A.1, A.2, B.1, B.2) is responsible

37. The share of each kind of equipment in the total is calculated as the product of its 1964 value in Table A.3 times its index number in Table A.4 divided by the sum of such products for all transport categories. Because this calculation is easily reproduced, its result is not shown here.

38. The calculation is parallel to that described in the preceding footnote and is similarly based on Tables A.3 and A.4.

Table 13. Distribution by Service Life of Investment in Equipment, 1964-70
(Percent)

<u>Service Life</u> (years)	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1964-70</u>
<u>Nontransport Equipment</u>								
6	10.6	11.3	13.4	13.8	10.8	11.8	15.4	12.8
8	14.2	17.0	16.6	13.8	15.7	13.1	12.1	14.2
10	31.9	31.3	34.3	25.7	26.0	34.9	29.7	30.2
14	33.4	33.4	25.5	27.7	32.7	24.0	28.6	29.0
16	6.4	3.5	5.1	10.9	10.3	11.8	7.8	8.5
20	<u>3.5</u>	<u>3.5</u>	<u>5.1</u>	<u>8.1</u>	<u>4.5</u>	<u>4.4</u>	<u>6.4</u>	<u>5.3</u>
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>Transport Equipment</u>								
4	23.8	29.9	21.5	20.0	18.1	21.2	22.2	--
6	46.0	63.6	71.6	51.9	56.2	72.5	74.0	--
20	21.5	1.6	0.7	8.3	20.6	5.9	3.8	--
40	<u>8.7</u>	<u>4.9</u>	<u>6.2</u>	<u>19.8</u>	<u>5.1</u>	<u>0.4</u>	<u>0.0</u>	--
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	--

Sources:

Nontransport Equipment. Distributions of investment in "machinery and other equipment" by sector, in 1964 prices, are from the annual Economic Survey (Table 1.11 in late volumes). Service lives for each sector are from Table 12, col. 4.

Transport Equipment. Kenya imports of transport equipment, in current prices, net of duties, public and private separately, are published annually in the Economic Survey (Table 3.8 in late volumes). Of the categories distinguished in the source, the following are used: railway rolling stock; motor cars; buses, lorries, and chassis for assembly; and aircraft. These distributions are extended or adjusted, from the import data of the Annual Trade Report, as follows: (i) series for imports of trailers, wagons, etc., and for boats and ships are added (cf. Table A.3). (ii) Rolling stock is divided between locomotives and cars, and parts for the latter, which are included in the original series, excluded. (iii) Public imports of railway rolling stock and of boats and ships by Uganda and Tanzania are added and, of the combined totals, 60 percent assigned to Kenya; of public imports of aircraft to Kenya, 1/3 are assigned to Kenya (see Sources for Table A.3). (iv) Of total private auto imports, 42 percent are retained (the portion of registrations included in investment). Service lives for each kind of asset are from Table 12, Col. 4.

The fact that valuations here are exclusive of duties means that they are not fully consistent with the valuation of the same assets in the investment data. In particular, the weight of private autos is here significantly reduced.

for the most distinctive feature of the capital series: their acceleration from near-stagnation in 1964 to a rate of increase close to 10 percent by 1971 (Tables 1 and 8). Partly also, no doubt, reflecting recovery phenomena, the average capital-output ratio (Table 14) fell initially but appears then to have stabilized;³⁹ the marginal has risen, though erratically, to what may by 1970-71 be rough equality with the average. The capital-labor ratio (Table 15) has risen almost uninterruptedly and by about 18 percent over the whole period, which figure is probably significant within the margins of error of the data. Over the whole period also, the combined quantities of capital and labor employed rose at about the same rate as did their productivity (Table 16). It may be significant that, in the earlier part of the period, the rate of input growth was relatively low and that of productivity high; in the later part, input growth was relatively high and that of productivity low. The entire period covered, however, like the history of independent Kenya itself, is extremely short.

Table 14. Capital-Output Ratio, 1964 Prices, 1964-71
(Net capital stock/GDP at factor price)

	Average		Incremental	
	All Sectors	Nonagricultural Nonresidential	All Sectors	Nonagricultural Nonresidential
1964	1.96	1.70	--	--
1965	1.90	1.60	.55	.43
1966	1.72	1.50	.31	.50
1967	1.73	1.48	1.77	1.27
1968	1.67	1.46	1.07	1.18
1969	1.65	1.47	1.35	1.69
1970	1.63	1.47	1.36	1.42
1971*	1.65	1.49	2.04	1.75

* Provisional

Sources:

Capital stock data are from Tables 1 and 8; average annual stocks are computed from January 1 figures.

Output data are from Economic Survey, 1972, Table 1.1, and the equivalent table in earlier volumes.

39. International comparisons of capital stocks encounter formidable obstacles in any case and are further complicated here by the limited coverage of the present estimates and by the oddities in relative values likely to follow from the fact that most of Kenya's capital has been imported. A more appropriate comparison than most, however, may be made between Kenya and India, for the latter of which the ratio of net reproducible capital to net domestic product, in current prices, has been estimated at 1.4 in 1949-50, 1.8-1.9 in 1960-61, or figures which are of the same order of magnitude as those in Table 14. (The Indian figures are from Reserve Bank of India Bulletin, January 1963, pp. 1 ff.; livestock and land improvement have been netted from the totals shown there; inventories evidently remain. The citation was suggested by Raymond W. Goldsmith. See also Moorsteen and Powell, op.cit., p. 252 and footnote and sources cited there).

Table 15. Capital-Labor Ratio, 1964 Prices, 1964-71
(Kf of net capital stock per employed worker)

	<u>All Sectors</u>	<u>Nonagricultural Nonresidential</u>
1964	817	794
1965	818	797
1966	831	788
1967	853	781
1968	888	827
1969	907	858
1970	941	909
1971*	965	941

* Provisional

Sources:

Capital data are the same as in Table 14.

Employment data are from Economic Survey, 1972,
Table 9.2, and Statistical Abstract, 1970, Table 188(a).

Table 16. Combined Inputs, Output, and Implied Productivity
(1964 = 100)

	<u>All Sectors</u>			<u>Nonagricultural Nonresidential</u>		
	<u>Capital and Labor Inputs</u>	<u>GDP in 1964 Prices</u>	<u>Produc- tivity</u>	<u>Capital and Labor Inputs</u>	<u>GDP in 1964 Prices</u>	<u>Produc- tivity</u>
	(1)	(2)	(3)	(4)	(5)	(6)
1964	100	100	100	100	100	100
1965	101	105	104	101	108	107
1966	103	118	115	105	119	113
1967	106	123	116	112	128	114
1968	108	134	124	117	140	120
1969	113	144	127	122	150	123
1970	118	155	131	128	163	127
1971*	125	165	132	136	177	130

* Provisional

Sources:

Cols. 1 and 4. Indexes of capital services are obtained from Table 4, of labor from the series cited for Table 15. The two indexes are added in the logs, with 1964 weights of 37/63 for all sectors, 32/68 for nonagricultural nonresidential sectors. The weights are obtained from 1964 reported wages (Statistical Abstract, 1970, Table 44 and 188.b) and the absolute 1964 value of capital services, at an annual 10 percent interest rate, in Table 4.

Cols. 2 and 5. Sources are those cited for Table 14.

Cols. 3 and 6. Col. 2 divided by Col. 1 and Col. 5 divided by Col. 4, respectively.

Appendix A. Investment in Equipment, in 1964 Prices, 1922-70

As is explained in the text, the capital stock estimates for equipment are derived from an annual investment series which, for 1964-70, is the series compiled by the Statistics Division of the Ministry of Finance and Economic Planning, and, for 1922-63, is a series composed here, for the purposes of this study, from data on equipment imports. The two parts of the series are shown separately, in Tables A.1 and A.2 respectively.

Sources for Table A.1.

Except for 1965 and 1970, all figures are taken from the investment data published in Economic Survey, 1971, pp. 12-13, which are revisions of data previously issued in earlier volumes of the same publication. For 1965, similarly revised figures were supplied directly by the Statistics Division, as were final figures for 1970, prior to their publication. Totals shown here are the sum of figures given in the source for (i) transport equipment and (ii) machinery and other equipment.

Sources for Table A.2.

The equipment series for years before 1964 is obtained by linking to 1964 an index derived by combining the Table A.4 component indexes with the Table A.3 1964 weights. Not all of the indexes for component assets are available either for 1964 or for particular given years. In the total index, therefore, given years are not linked directly to 1964 but to one another, each year being chained to those immediately contiguous to it. Unless the contrary is indicated in Table A.4, the link in each case includes all the component indexes shared by the two years involved.

Sources for Table A.3.

Cols. 1 and 2, excepting combined rows.

The meaning of asset categories in Table A.3 is determined by the foreign trade classification system in use in 1964 by the East African Statistical Department: see that body's Annual Trade Report for 1964. Category numbers are identical with those used in the Trade Report. Titles are often abbreviated or otherwise simplified. For the full title of any category, reference should be made to the source.

Col. 3, Rows 1 through 44, excepting combined rows.

These rows cover all categories other than transport equipment. With exceptions to be noted, the 1964 value for each category is obtained by the same procedure. The values shown in the table are the sum of private and government investment, which are obtained separately.

For private investment, values are those assigned to the same categories by the Statistics Division in deriving its estimates of 1964 gross private capital formation. These values are based on the "home consumption" figures in the published import statistics. For each category, private capital formation is estimated as the sum of home consumption plus import duties, multiplied by the following percentages: (i) the share of the total import allocated to capital formation, (ii) a markup for trade margins and transportation costs, and (iii) installation costs. Details of these calculations have not been published but were made available, in the form of worksheets, by the Statistics Division.

Values for government investment are based on the value in the trade statistics of government imports of each category of assets. The whole of such government imports is assumed to be for investment purposes. Import values are raised, to allow for transportation costs but not trade margins, by a factor equal to one half of that on private imports.

Exceptions to this general procedure are the following.

Row 22: 717.32, industrial sewing machines. As is possible, the 1964 Trade Report gives home consumption of these machines as a positive quantity but a negative value. In the Statistics Division's worksheet, capital formation is computed from the negative value figure as a negative total. That total cannot be accepted here, since, given the positive quantity, it would imply a negative price. Instead, the price per unit implied by the 1963 import data, for which both signs are positive, is assumed to have applied also to the 1964 quantities. Procedures are otherwise as for other categories.

Row 39: 719.89, part of, coffee making machinery. This machinery, which until 1963 was shown in the import data separately, was in 1964 absorbed into an "other" category, 719.89. The 1963 figure for home consumption is used here, with the markups for 719.89, to approximate the 1964 value total.

Row 40: 719.89, part of, sawmilling machinery. Like the preceding one, this category is evidently absorbed in the "other" class, but from 1954 on. To provide an approximate weight for its inclusion in years earlier than 1954, when it is reported separately and is of substantial volume, it is assigned a 1964 weight equal to the value of its 1953 imports, with markups as for 719.89.

Col. 3, Rows 45 through 53, excepting combined rows.

These rows cover transport equipment. For such equipment, the Statistics Division derives its investment estimates from data other than imports (see text) and, therefore, provides no basis for calculating appropriate weights for import categories. That lacking, equipment in any one category is here, if included at all, attributed wholly to capital formation. Values for private imports are calculated as the sum of home consumption and duties, increased by 25 percent to allow for trade margins and transportation costs. The percentage is suggested by the Statistics Division's markups on non-transport equipment. Values of government imports are increased by 12.5 percent.

However, government imports to Kenya of railroad rolling stock, ships, and aeroplanes cannot be read directly from the trade statistics, because of the treatment of imports on account of the East African Community. These are divided in the Trade Reports according to the country to which any particular shipment is initially consigned, not according to its ultimate location nor the ownership shares in it of the participating countries.

In its preparation of balance of payment statistics, the East African Statistical Department divides imports in the proportions 60/20/20/, among Kenya, Uganda, and Tanzania, for goods imported on account of E.A. Rails and Harbors; 1/3 each for E.A. Airline; and 50/25/25 for E.A. Post and Telegraph. Practise in the Statistics Division of the Ministry is, generally, to assign investment in immovable assets to the country in which they are located but movable assets -- which are immediately relevant -- in the same proportions as does the E.A.S.D. for rails and harbors and for the airline. The distribution of actual consignments to E.A.P. & T. is thought to correspond approximately to the 50/25/25 proportion. Aeroplanes imported by E.A.A. are all consigned to Kenya. Government imports as published do not distinguish imports by E.A.C. agencies from those of other government bodies.

In the light of the foregoing, Kenya government imports are assumed to amount to (i) 60 percent of railway rolling stock and of ships and boats imported by the three E.A. governments in combination and (ii) 1/3 of government imports to Kenya of aeroplanes.

Cols. 1, 2, and 3, combined rows.

As is evident, these have the combined coverage and value of the other rows from which they are composed.

An exception is the treatment in Row 29 (where it is deducted from Row 28) and Row 41 (in which it is included) of mining machinery, for which there is no separate row. Imports of mining machinery were not reported separately in 1964. Their share in 1964 of the total value of the assets combined in Row 28 is assumed equal to their share of the combined tonnage in 1945. Row 41 enters the index from 1944 back.

Sources for Table A.4.

Table A.4 is drawn entirely from the East African Statistical Department's Annual Trade Report and its antecedent publications. Data for any given year are generally from the Trade Report for the same year. Import categories for 1964 are the same as those used in Table A.3. Comprehensive revisions of import classifications occurred in 1964, 1954, and 1948. A key, for linking data in one classification system to another, is available only for the revision of 1964. For the earlier comprehensive revisions, and for various partial revisions, the coverage of categories has to be inferred from their descriptions in the sources.

The index for any equipment category included in the table is meant in principle to cover total imports of it to Kenya, on account of both private and government importers, less reexports and less net additions to stocks in bonded warehouses. This coverage is attained with varying accuracy in various periods.

(i) From 1964 to 1951, imports are the sum of "net home consumption" and government imports. As such, they exclude reexports to other East African countries and additions to warehouses, but do not exclude reexports outside East Africa. The failure to net out the latter is in accordance with the practise of the Statistics Division of the Ministry, in the preparation of its investment estimates (see sources for Table A.3): as reported, reexported equipment items are thought to be used assets and otherwise of lower quality than imports in the same category. Imports can be negative because of reexports (here, within East Africa) or net additions to warehouses. Imports on account of East African Community agencies are treated as in Table A.3: see sources to that table and detailed notes below.

(ii) From 1950 back, data are for "imports" or "net imports" and cease to be met of additions to warehouses. Home consumption data occasionally appear in these years but not regularly nor with clearly the same coverage as in 1964-51.

(iii) From 1949 through 1938, imports are calculated net of reexports and linked to data of the same coverage for 1950. The reason for this shift in procedures is a change in the coverage of the reported data: in 1949-38, both imports and reexports were gross of reexports to other East African countries, which were subsequently netted out of both in the published figures. Indexes can be negative because of reexports in excess of imports.

(iv) From 1948 back, imports are reported in detail only for Kenya and Uganda in combination. Data are published for the divisions of totals, for broad categories of imports, between the two countries, as is shown in Table A.5. The Kenya shares shown there are applied to imports of particular items, falling within the broader categories.

(v) From 1937 back, detailed data for reexports are not published. The ratio of reexports to imports is assumed, generally, to have been the same as in 1938.

In the construction of particular indexes, instances arise where changes in coverage or other incomparabilities, in data for two contiguous years, are serious enough that it appears best to exclude the series from the link joining those two years in the total index. Such exclusions are indicated in the table. The series is retained for other years in the total index, although its weight, for years not linked to 1964, is in error by the amount of error in the excluded annual link.

Instances arise also in which several indexes are linked to one, representing their coverage in combination. To make the link, the indexes of the components in the year to be linked are combined with their 1964 value weights into a single index number, which is joined, on the basis of a physical measure, with the single series.

Sources in detail for individual series are shown below, in an abbreviated form. Generally, sources in the Trade Reports are indicated only by the import classification number, in various time periods, of the data used. The units in which the import is measured is given separately. The derivation of the Kenya share in years before 1949 is, if not otherwise explained, indicated by reference to a column in Table A.5.

Row 1.

Sources. 1964: 698.20; 1963-54: 699.11; 1953-48: 318; 1947-34: III.C.17; 1933-22: III.C.16.

Units. 1964-22: weight.

Kenya share. 1948-22: assumed the same as in 1949.

Row 2.

Sources. 1964: 711.10; 1963-54: 711.01; 1953-48: included in Row 4; 1947-22: omitted.

Units. 1964-54: weight.

Row 3.

Sources. 1964: 711.20; 1963-54: 711.02; 1953-48: included in Row 4; 1947-22: omitted.

Units. 1964-54: weight.

Row 4.

Sources. 1964-54: included in Rows 2 and 3; 1953-48: 333.a; 1947-22: omitted.

Units. 1953-48: weight.

Kenya share. 1948: Table A.5, Col. 3.

Row 5.

Sources. 1964: 711.30; 1963-54: 711.03; 1953-48: 333.b and .c; 1947-22: III.G.5.

Units. 1964-22: weight.

Kenya share. 1948-22: Table A.5, Col. 3.

Row 6.

Sources. 1964: 711.54; 1963-54: 711.05.b; 1953-48: 333.d.4 and .5; 1947-34: III.G.4.a; 1933-22: III.G.4.

Units. 1964-54: number; 1953-22: weight.

1953 is linked to 1954 in numbers.

Kenya share. 1948-22: Table A.5, Col. 3.

Row 7.

Sources. 1964: 711.60 and .80; 1963-54: 711.09; 1953-48: 333.e; 1948-22: omitted.

Units. 1964-48: weight.

Kenya share. 1948: Table A.5, Col. 3.

Row 8.

Sources. 1964: 712.11 and .19; 1963-54: 712.01.a; 1953-48: 334.a; 1947-32: III.G.1.a; 1931-22: included in Row 14.

Units. 1964: weight; 1963-54: number; 1953-22: weight.

1963 is linked to 1964 by deflating a 1963 current-price relative (including 712.01.b to match the 1964 coverage) with a price index, of 91.3, composed from current-price and physical-quantity series for Rows 10, 11, and 12. The reason for this elaborate procedure is to retain Row 8 in the index of agricultural equipment (see Appendix D). 1953 is then linked to 1963 in weight units and the years between interpolated on numbers, along a straight percentage line.

Kenya share. 1948-32: Table A.5, Col. 1.

Row 9.

Sources. 1964: 712.21, .22, .23, .29; 1963-54: 712.02.a; 1953-48: 334.b.1 and .2; 1947-34: III.G.1.b and .c; 1933-32: III.G.1.b; 1931-22: included in Row 14.

Units. 1964: weight; 1963-54: number; 1953-32: weight. Links and interpolation, 1964-53, are made as for Row 8.

Kenya share. 1948-32: Table A.5, Col. 1.

Row 10.

Sources. 1964: 712.30; 1963-54: 712.03; 1953-32: included in Row 13; 1931-22: included in Row 14.

Units. 1964-54: weight.

Row 11.

Sources. 1964: 712.52; 1963-54: 712.01.a; 1953-48: 351.a, .b, .c, and .d; 1947-34: III.R.8 and 8.a; 1933-27: III.R.7; 1927-22: included in Row 49.

Units. 1964-54: number; 1953-32: weight; 1931-27: number.

1963 is linked to 1964 inclusive of 712.51. 1953 is linked to 1954 in numbers. 1931 is linked to 1932 on assumption weight per unit was the same as the 1934-32 average.

Kenya share. 1948-27: Table A.5, Col. 5.

Row 12.

Sources. 1964: 712.90; 1963-54: 712.09; 1953-32: included in Row 13; 1931-22: included in Row 14.

Units. 1964-54: weight.

Row 13.

Sources. 1964-54: included in Rows 10 and 12; 1953-48: 334.c; 1947-32: III.G.1.d; 1931-22: included in Row 14.

Units. 1953-32: weight.

Kenya share. 1948-32: Table A.5, Col. 1.

Row 14.

Sources. 1964-32: included in Rows 8, 9, and 13; 1931-22: 3.G.1.

Units. 1931-22: weight.

Kenya share. 1931-22: Table A.5, Col. 1.

Row 15.

Sources. 1964: 714.10; 1963-54: 714.01; 1953-48: 335.a; 1947-34: III.G.10; 1933-30: III.G.14; 1929-22: omitted.

Units. 1964-30: number.

Kenya share. 1948-30: Table A.5; Col. 3.

Row 16.

Sources. 1964: 714.21 and .91; 1963-54: 714.02.a; 1953-48: 335.c and .d; 1947-34: omitted (evidently absorbed in III.G.8, machinery and parts, n.e.s.); 1933-30: III.G.9, .10, and .11; 1929-22: omitted.

Units. 1964-54: number; 1953-48: weight; 1933-30: number.

1953 is linked to 1954 (including 714.02.b) in current values: the link is excluded from the total index. 1933 is linked, in numbers, directly to 1964.

Kenya share. 1948, 1933-30: Table A.5, Col. 3.

Row 17.

Sources. 1964: 715.10; 1963-54: 715.01; 1953-48: included in Row 34; 1947-22: omitted.

Units. 1964-54: weight.

Row 18.

Sources. 1964: 715.20; 1963-54: 715.02; 1953-22: omitted.

Units. 1964-54: weight.

Row 19.

Sources. 1964: 717.11; 1963-54: 716.08.a; 1953-48: 337.e; 1947-45: III.G.6.b; 1944-22: included in Row 41.

Units. 1964-45: weight.

Kenya share. 1948-45: Table A.5, Col. 2.

Row 20.

Sources. 1964: 717.19; 1963-54: 716.08.b and .c; 1953-48: 337.f; 1947-45: III.G.6.c; 1944-22: included in Row 41.

Units. 1964-45: weight.

Kenya share. Table A.5, Col. 2.

Row 21.

Sources. 1964: 717.31; 1963-54: 716.11.a.2; 1953-48: included in Row 23; 1947-34: III.G.9; 1933-30: III.G.13; 1929-22: omitted.

Units. 1964-54, 1947-30: number.

Kenya share. 1947-30: Table A.5, Col. 3.

Row 22.

Sources. 1964: 717.32; 1963-54: 716.11.a.1; 1953-48: included in Row 23; 1947-22: omitted.

Units. 1964-54: number.

Row 23.

Sources. 1964-54: included in Rows 21 and 22; 1953-48: 337.L.1; 1947-30: partly included in Row 21; 1929-22: omitted.

Units. 1953-48: weight.

Kenya share. 1948: Table A.5, Col. 3.

Row 24.

Sources. 1964: 718.10; 1963-54: 716.06; 1953-22: omitted.

Units. 1964-54: weight.

Row 25.

Sources. 1964: 718.20; 1963-54: 716.07; 1953-48: 337.c; 1947-42: III.G.14; 1941-34: omitted; 1933-32: III.G.1.a; 1931-22: omitted.

Units. 1964-42, 1933-32: weight.

Kenya share. 1948-42, 1933-32: Table A.5, Col. 2.

Row 26.

Sources. 1964: 718.31; 1963-54: 716.13.b; 1953-48: 337.h; 1947-45: III.G.6.e; 1944-22: included in Row 41.

Units. 1964-45: weight.

Kenya share. 1948-45: Table A.5, Col. 2.

Row 27.

Sources. 1964: 718.32; 1963-55: 716.13.f; 1954-22: omitted.

Units. 1964-55: weight.

Row 28.

Sources. 1964: 718.41 and .42; 1963-54: 716.03; 1953-48: 333.f, 337.b., and 337.g; 1947-45: III.G.2, 6.d, and .15; 1944-22: included in Rows 29 and 41.

Units. 1964-45: weight.

Kenya share. 1948-45: Table A.5, Col. 2 for mining machinery; Col. 3 for other components.

Row 29.

Sources. 1964-45: included in Row 28; 1944-42: III.G.2 and .15; 1941-22: III.G.2.

Units. 1944-22: weight.

Kenya share. 1944-22: Table A.5, Col. 3.

Row 30.

Sources. 1964: 719.11, .12, and .19; 1963-54: 716.12; 1953-22: omitted.

Units. 1964-54: weight.

Row 31.

Sources. 1964: 719.20; 1963-54: 716.01, 1953-48: 337.a; 1947-22:

III.G.7.

Units. 1964-22: weight.

Kenya share. 1948-22: Table A.5; Col. 3.

Row 32.

Sources. 1964: 719.30; 1963-54: 716.02; 1953-22: omitted.

Units. 1964-54: weight.

Row 33.

Sources. 1964: 719.50; 1963-54: 716.04 and .05; 1953-48: included in Row 34; 1947-22: omitted.

Units. 1964: physical quantities are not reported in the source; 1963-54: weight.

1963 is linked to 1964 in current values, which link is excluded from the total index.

Row 34.

Sources. 1964-54: included in Rows 17 and 33; 1953-48: 337.m; 1947-22: omitted.

Units. 1953-48: weight.

The match in coverage between Rows 17 and 33, in combination, and Row 34 is imperfect, and the 1954-53 link between the two is excluded from the total index.

Kenya share. 1948: Table A.5, Col. 2.

Row 35.

Sources. 1964: 719.61; 1963-54: 716.13.e; 1953-48: 337.n.1 and .2; 1947-34: III.G.11; 1933-30: III.G.15; 1929-22: omitted.

Units. 1964-48: weight; 1947-34: number; 1933-32: weight; 1931-30: number.

Index numbers for 1947-34 are interpolated, along a straight percentage line, on the data in numbers, between values for 1948 and 1933 obtained from weights. 1931 and 1930 are similarly extrapolated from 1932.

Kenya share. 1948-22: Table A.5, Col. 3.

Row 36.

Sources. 1964: 719.81; 1963-54: 716.13.d; 1953-48: 337.j; 1947-45: III.G.6.g; 1944-22: included in Row 41.

Units. 1964-45: weight.

Kenya share. 1948-45: Table A.5, Col. 2.

Row 37.

Sources. 1964: 719.82; 1963-56: 716.13.g; 1955-22: omitted.

Units. 1964-56: weight.

Row 38.

Sources. 1964: 719.83; 1963-54: 716.13.c; 1953-48: 337.i; 1947-45: III.G.6.f; 1944-22: included in Row 41.

Units. 1964-45: weight.

Kenya share. 1948-45: Table A.5, Col. 2.

Row 39.

Sources. 1964: 719.89, part of; 1963-54: 716.13.a; 1953-48: 337.d; 1947-45: III.G.6.a; 1944-22: included in Row 41.

Units. 1964-45: weight.

1963 is assumed equal to 1964 (see notes for Table A.3); the 1964-63 link is not used in the total index.

Kenya share. 1948-45: Table A.5, Col. 2.

Row 40.

Sources. 1964: 719.89, part of; 1963-54: omitted; 1953-48: 337.k; 1947-45: III.G.6.h; 1944-22: included in Row 41.

Units. 1964, 1953-45: weight.

1953 is assumed equal to 1964 (see notes for Table A.3).

Kenya share. 1948-45: Table A.5, Col. 2.

Row 41.

Sources. 1964-54, partly, 1953-45, wholly: included in Rows 19, 20, 26, 28, 36, 38, 39, and 40; 1944-22: III.G.6.

Units. 1944-22: weight.

Kenya share. 1944-22: Table A.5, Col. 3.

Row 42.

Sources. 1964: 722.11; 1963-58: 721.01.a; 1957-22: included in Row 44.

Units. 1964-58: weight.

Row 43.

Sources. 1964: 722.12 and .20; 1963-58: 721.01.b; 1957-22: included in Row 44.

Units. 1964-58: weight.

Row 44.

Sources. 1964-58: included in Rows 42 and 44; 1957-54: 721.01; 1953-48: 339; 1947-45: III.G.3.a; 1944-22: III.G.3.

Units. 1957-22: weight.

1944, III.G.3, is linked to 1945 inclusive of III.G.3.b, .c, and .d.

Kenya share. 1948-22: Table A.5, Col. 3.

Row 45.

Sources. 1964: 731.10, .20, and .30; 1963-54: 731.01, .02, and .03; 1953-48: 347; 1947-22: III.R.16.

Units. 1964-54: number; 1953-22: weight.

From 1964 to 1954, in order to deal with imports by the East African Railways (see notes to Table A.3), quantities imported are the sum of home consumption to Kenya and 60 percent of government imports to Kenya, Uganda, and Tanzania, combined. Inspection of the detailed data, moreover, suggests that the import categories include railway locomotives of extremely diverse value and quality, which vary in number quite erratically over time. Because of the weight of rolling stock in the total index, some adjustment for this heterogeneity is required. Therefore, a price-weighted index is composed, using weights, inclusive of markups, of Ki 2.5 thousand for locomotives recorded in home consumption (for actual values, before markups; ranging from 1.4-7.5 but largely concentrated between 1.4 and 2.3), 2.5 for one class of government imports (ranging 1.1-7.6); 35.0 for a second (24.3-42.5), 55.0 for a third (52.3-58.2), and 90.0 for a fourth (83.2-103.6). The implicit assumption is that price changes were small enough over this period to be contained within any of the indicated ranges and not jump from one to the other. The procedure, admittedly, is very crude.

1953-49, home consumption is taken as total imports less government, to Kenya. Total imports remain the sum of home consumption and 60 percent of total East African government imports. 1953 is linked to 1954 in current values. From 1953 back, annual values are derived from physical weights and are not price weighted. From 1948 back, quantities are the Kenya share of total, private and government, imports by Kenya and Uganda combined.

Kenya share. 1948-22: Table A.5, Col. 6. This division, assigning 80 percent of the combined total to Kenya, is roughly consistent with the post-1948 division.

Row 46.

Sources. 1964: 731.40; 1963-54: 731.04; 1953-22: omitted.

Units. 1964-54: number.

Procedures to account for imports by East African Railways are as in Row 45.

Row 47.

Sources. 1964: 731.50 and .60; 1963-54: 731.05 and .06; 1953-48: 348; 1947-27: III.R.15; 1926-22: III.R.12.

Units. 1964-54: number; 1953-22: weight.

Procedures to account for imports by East African Railways are as in Row 45. Procedures, 1964-54, to allow for wide qualitative differences within categories by price-weighting are also as in Row 45, but divisions by price classes are more clearly arbitrary. Price weights, for government passenger cars, are 7.0 (for 5.3-8.5 range) and 12.0 (10.5-17.3); for home consumption freight cars, .1 (.07-.3); for government freight cars .1 (.07-.3), 1.6 (1.5-1.8), 2.7 (2.2-3.2).

Kenya share. 1948-22: Table A.5, Col. 6.

Row 48.

Sources. 1964: 732.20, .30, .40, and .50; 1963-54: 723.02; 1953-48: 353.a and .b; 1947-34: III.R.6.a and .b; 1933-27: III.R.6; 1926-22: included in Row 49.

Units. 1964-27: number.

Kenya share. 1948-27: Table A.5, Col. 4.

Row 49.

Sources. 1964-27: included in Rows 11 and 48; 1926-22: III.R.6.

Units. 1926-22: number.

Kenya share. 1926-22: Table A.5, Cols. 4 and 5.

Row 50.

Sources. 1964: 732.70; 1963-54: 732.05; 1953-48: 355.a and .b; 1947-22: assumed zero. Trade statistics pre-1948 neither contain a category for "chassis with engine mounted" nor show quantitative changes suggestive of their inclusion elsewhere, but they may have been included with lorries and buses.

Units. 1964-48: number.

Kenya share. 1948: Table A.5, Col. 6.

Row 51.

Sources. 1964: 733.31 and .32; 1963-54: 733.09; 1953-48: 359.a; 1947-26: III.R.13; 1925-22: III.R.10.

Units. 1964-22: number.

The coverage of the series in 1963 and earlier may not be closely comparable with that of 1964; the 1964-63 link is excluded from the total index.

Kenya share. 1948-22: Table A.5, Col. 6.

Row 52.

Sources. 1964: 734.10; 1963-54: 734.01; 1953-48: 360.a; 1947-22: III.R.1.

Units. 1964-22: number.

The index covers all aeroplanes imported privately (home consumption) and, to allocate imports by East African Airways, 1/3 of government imports (see notes for Table A.3). To allow for large quality differences, all imports with unit values of Kf 7 thousand or less are weighted with that value, all with higher unit values at their actual import values. The higher values, however, appear only in 1964-57, and the index is price-weighted only over that interval. Before 1950, all imports can be identified as, or are assumed to be private.

Kenya share. 1948-22: Table A.5, Col. 6.

Row 53.

Sources. 1964: 735.30 and .90; 1963-54: 735.02 and 735.09; 1953-48: 361 and 362; 1947-34: III.R.19; 1933-27: III.R.22; 1927-22: III.R.17.

Units. 1964-22: weight.

Procedures to allow for imports on account of E.A.R. & H. are as in

Row 44.

Kenya share. 1948-22: Table A.5, Col. 6.

Sources for Table A.5.

With exceptions to be explained, the percentages shown in Table A.5 are computed directly from absolute data given in the Annual Trade Reports. From 1948-38, the figures refer to imports less reexports; before 1938, to total imports (cf. the notes to Table A.4). The kinds of equipment included in each series are identifiable by comparisons with the import data. Col. 1 covers items classed, in the pre-1948 classificatory system, under III.G.1; Col. 2, III.G.6; Col. 3, all other III.G; Col. 4, III.R.6; Col. 5, III.R.8. Col. 6 appears to be of changing coverage. Data for Cols. 1 and 2 are given in the source in weight units, for Cols. 4 and 5 in numbers, and for Cols. 3 and 6 in current values.

Exceptions or special cases are the following

(i) Because of the 1948 change in import classifications, figures for this year may not be fully comparable with those for earlier years. Col. 2 is estimated from data given in values, on the assumption that the percentage in physical units relative to that in values was the same in 1948 as in 1947. Col. 3 is from data given separately for "electrical" and for "other" machinery.

(ii) 1948-46, Col. 4: data are not given in the source; figures are interpolated along a straight percentage line, between 1949 and 1945.

(iii) 1939, Col. 2: because of an evident misprint in the source, the figure is interpolated between 1940 and 1938.

(iv) 1933-32, Col. 3: because of apparent incomparabilities in the data, figures are interpolated between 1934 and 1931.

(v) 1943-33, Col. 5: data are lacking in the source; the 90 percent figure is assumed on the basis of those in other years.

(vi) 1932, Col. 5: computed from data reported in values.

(vii) 1948-22, Col. 6: because of the apparent variation in the coverage of the reported data, this column is assumed constant, at 80 percent, throughout. The reported data imply ratios generally close to that figure.

(viii) 1925-22, Cols. 1, 2, and 3, 1924-22, Col. 4-5: data are unavailable or clearly incomparable. Percentages are assumed to equal those, on the average, of the last three preceding years.

Table A.1. Total Investment in Equipment, 1964 Prices, 1964-70.

(Kf million)	
1964	23.89
1965	22.39
1966	29.65
1967	38.13
1968	36.88
1969	38.75
1970	53.53

Table A.2. Total Investment in Equipment, 1964 Prices, 1922-63
(K£ million)

1922	1.07	1943	6.02
1923	1.83	1944	4.32
1924	2.80	1945	3.94
1925	5.57	1946	6.96
1926	4.98	1947	8.60
1927	5.59	1948	16.60
1928	7.01	1949	21.49
1929	6.24	1950	15.70
1930	4.75	1951	19.48
1931	2.88	1952	23.15
1932	.71	1953	22.57
1933	1.24	1954	24.48
1934	2.19	1955	34.79
1935	3.54	1956	31.52
1936	4.09	1957	25.46
1937	6.14	1958	18.90
1938	5.21	1959	18.90
1939	5.09	1960	20.73
1940	7.88	1961	19.87
1941	3.03	1962	18.19
1942	2.11	1963	17.31

Table A.3. Investment in Equipment, by Type of Asset, Current Prices, 1964

<u>1964 Trade Classification</u>	<u>Type of Asset^a</u>	<u>Value^a</u> (Kf thousand)
<u>Number</u> (1)	<u>(2)</u>	<u>(3)</u>
1. 698.20	Safes, etc.	32
2. 711.10	Steam boilers	25
3. 711.20	Boiler house plant	2.0
4.	(Rows 2 and 3)	(27)
5. 711.30	Steam engines, etc.	0.6
6. 711.54	Internal combustion engines, other than for vehicles	165
7. 711.60 and .80	Other engines	7.6
8. 712.11 and .19	Ploughs, harrows, cultivators, etc.	321
9. 712.21, .22, .23, and .29	Agricultural machinery for harvesting, threshing, and sorting	289
10. 712.30	Dairy farm equipment	172
11. 712.52	Tractors, except caterpillar	686
12. 712.90	Other agricultural machinery	100
13.	(Rows 10 and 12)	(272)
14.	(Rows 8, 9, and 13)	(882)
15. 714.10	Typewriters	116
16. 714.21 and .91	Calculating and other office machines	376
17. 715.10	Metalworking machine tools	555
18. 715.20	Other metalworking machinery	167
19. 717.11	Cotton ginning machinery	1.6
20. 717.19	Other textile machinery	360
21. 717.31	Household sewing machines	56
22. 717.32	Industrial sewing machines	92
23.	(Rows 21 and 22)	(148)
24. 718.10	Pulp and paper manufacturing machinery	47
25. 718.20	Printing and book-binding machinery	291
26. 718.31	Grain milling machinery	20
27. 718.32	Sugar machinery	1,922
28. 718.41 and .42	Conveying, hoisting, and excavating machinery	845
29.	(Row 28 less mining machinery)	(570)
30. 719.11, .12, and .19	Air-conditioning and refrigerating equipment	266
31. 719.20	Pumps	382
32. 719.30	Mechanical handling equipment	277
33. 719.50	Powered tools, woodworking, etc.	52
34.	(Rows 17 and 33)	(607)
35. 719.61	Weighing machinery	65
36. 719.81	Soap-making machinery	42
37. 719.82	Tea machinery	58
38. 719.83	Vegetable oil extracting machinery	2.5
39. 719.89, part of	Coffee factory machinery	19
40. 719.89, part of	Sawmilling machinery	22
41.	(Rows 19, 20, 26, 36, 38, 39, 40, and mining machinery)	(742)
42. 722.11	Electric motors	66
43. 722.12 and .20	Electric generators, switchgear, etc.	394
44.	(Rows 42 and 43)	(460)
45. 731.10, .20, and .30	Railway locomotives	819
46. 731.40	Self-propelled railway cars	2.1
47. 731.50 and .60	Railway passenger and freight cars	515
48. 732.20, .30, .40 and .50	Buses and lorries	1,254
49.	(Rows 11 and 48)	(1,940)
50. 732.70	Chassis with engines mounted, of lorries etc.	1,743
51. 733.31 and .32	Trailers, wagons, etc., not motorized	26
52. 734.10	Aeroplanes	342
53. 735.30 and .90	Ships and boats	459

a: Titles and values shown in parentheses are included elsewhere in 1964.

Table B.4. Indexes of Imports (or Consumption) of Construction Materials,
by Type of Material, Physical Quantities, 1913-63
(1964=100)

	1963	1962	1961	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949
1. Cement	140	148	142	219	223	206	210	218	231	164	160	140	142	140	103
2. Asbestos cement pipe	247	158	269	615	413	313	398	452	424	320	270	323	200	283	366
3. Asbestos cement sheets, etc.	146	116	135	453	745	445	1088	1064	659	878	517	569	641	503	1041
4. Rows 2 and 3	e	e	e	e	e	e	e	e	e	e	e	e	e	-e	e
5. Refractory bricks and other materials	//356	275	312	382	471	587	452	368	156	11	//284	322	171	180	168
6. Glazed tiles for walls, etc.	85	17	13	39	26	80	41	58	44	26	x	x	x	x	x
7. Roofing tiles	82	114	-510	2970	6490	4210	11800	10500	9440	3510	27800	22300	-214	36900	27300
8. Ceramic pipes	//-21	33	-58	-130	-248	-1820	-858	-7410	-4050	-5180	-132	-2310	-1010	-643	-8000
9. Window glass	85	82	78	157	140	107	159	155	139	138	61	94	165	87	51
10. Glass bricks, tiles, etc.	61	-18	183	215	358	213	685	1140	867	1160	324	462	1530	6	68
11. Iron or steel bars, rods, angles, shapes, etc.	67	54	53	93	79	68	93	102	107	73	27	13	10	9	21
12. Iron or steel sheets, galvanized and corrugated	98	157	212	1000	906	729	489	940	1640	1460	450	135	1060	223	579
13. Iron or steel sheets, galvanized flat	237	280	158	25	40	23	25	34	73	32	20	5	27	13	18
14. Rows 12 and 13	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
15. Iron or steel rails	1170	4920	6070	2270	6550	5890	4890	880	2840	10000	8820	2630	4870	4910	3910
16. Iron or steel sleepers, etc.	90	781	1060	474	608	713	828	624	785	1670	1020	526	492	422	109
17. Rows 15 and 16	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
18. Cast iron pipes	313	241	523	716	838	1350	804	1340	673	1060	1050	983	255	282	374
19. Other iron or steel pipes	106	115	76	159	129	105	164	131	137	234	120	82	162	144	137
20. Rows 18 and 19	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
21. Steel doors and windows	x	x	x	x	x	x	x	x	x	x	15800	14100	11400	13800	6580
22. Wire cables, etc.	61	50	60	86	72	51	213	486	68	26	76	20	20	56	25
23. Insulated wire and cable	125	109	119	141	72	109	333	199	81	119	190	477	256	219	125
24. Ceramic plumbing fixtures	105	90	140	241	225	162	196	266	119	71	167	143	6	93	122
25. Iron or steel plumbing fixtures	96	79	148	222	286	216	279	362	326	94	436	370	373	327	388
26. Total (unlagged)	123.8	157.5	153.6	178.8	184.2	167.6	203.9	206.2	206.1	227.1	168.0	130.0	143.5	126.4	109.2

Table B.4. (cont.)

	1948	1947	1946	1945	1944	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
1.	88	37	26	18	14	6	16	15	11	21	20	24	23	15	12	16	14	29	50
2.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
3.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
4.	290	152	73	16	2	4	3	16	14	48	56	68	27	59	25	48	35	61	18
5.	71	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7.	13100	13900	18300	2700	8940	3330	599	1590	4540	7280	4930	3550	1530	985	1250	929	750	1860	3980
8.	-4560	-3420	-8160	-2020	-1020	-344	-335	-970	-1230	-3250	-7470	-5140	-1840	-356	-189	-72	-1	-210	-300
9.	81	139	23	12	18	6	10	14	17	18	11	28	12	15	8	12	8	11	14
10.	201	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11.	14	20	7	5	8	5	11	3	12	9	8	16	11	6	5	3	4	4	9
12.	259	170	64	89	105	17	39	137	361	351	250	532	514	316	227	324	190	347	522
13.	12	4	5	2	14	3	5	7	7	12	4	13	7	7	4	5	2	5	9
14.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
15.	5380	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
16.	186	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
17.	e	368	401	2	80	94	8	278	50	99	222	111	211	169	160	42	9	469	234
18.	304	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
19.	44	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
20.	e	31	38	59	37	15	12	14	33	25	25	53	27	19	21	6	46	36	37
21.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22.	80	22	16	4	9	10	5	13	9	5	3	7	5	4	4	4	1	2	4
23.	86	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24.	92	68	22	34	7	7	6	11	22	34	42	48	20	16	17	15	14	94	118
25.	290	40	54	37	15	8	11	32	22	54	49	47	34	14	13	7	13	x	x
26.	78.88	47.13	38.12	20.00	20.52	10.52	10.79	22.74	23.11	28.05	29.05	39.20	33.48	23.54	19.78	15.81	17.43	42.83	44.80

Table A.

	1963	1962	1961
31. Pumps	122	106	117
32. Mechanical handling equipment	26	12	59
33. Powered tools, woodworking, etc.	// 56	9	34
34. Rows 17 and 33	e	e	e
35. Weighing machinery	109	85	84
36. Soap-making machinery	181	44	84
37. Tea machinery	229	101	207
38. Vegetable oil extracting machinery	172	52	30
39. Coffee factory machinery	// 100	42	446
40. Sawmilling machinery	x	x	x
41. Rows 19, 20, 26, 36, 38, 39, 40, and mining machinery	e'	e'	e'
42. Electric motors	59	25	54
43. Electric generators, switchgear, etc.	87	101	140
44. Rows 42 and 43	e	e	e
45. Railway locomotives	1	-1	15
46. Self-propelled railway cars	400	700	1300
47. Railway passenger and freight cars	12	79	30
48. Buses and Lorries	99	86	93
49. Rows 11 and 48	e	e	e
50. Chassis with engines mounted, of lorries, etc.	120	66	71
51. Trailers, wagons, etc., not motorized	// 105	54	155
52. Aeroplanes	43	812	934
53. Ships and boats	1	1	17

4. (cont.)

1960	1959	1958	1957	1956	1955	1954	1953	1952	1951
174	188	158	172	236	188	159	173	195	151
9	18	14	46	21	26	7	x	x	x
35	60	69	148	338	163	138	e	e	e
e	e	e	e	e	e	e//	118	100	78
183	169	118	200	175	159	133	414	148	184
11	12	250	265	13	-6	18	114	-5	196
423	351	576	815	569	x	x	x	x	x
104	171	105	247	173	14	343	46	139	370
119	1640	1420	715	654	456	463	759	558	404
x	x	x	x	x	x	x	100	300	125
e'	e'	e'	e'	e'	e'	e'	e	e	e
92	53	77	e	e	e	e	e	e	e
128	135	92	e	e	e	e	e	e	e
e	e	e	277	266	239	232	313	278	143
64	3	0	23	76	315	148	29	58	21
100	167	-167	167	800	1200	600	x	x	x
29	0	-1	11	130	313	446	44	63	201
141	111	176	193	181	271	110	101	116	189
e	e	e	e	e	e	e	e	e	e
134	104	145	155	186	178	117	94	113	95
127	131	400	176	240	133	109	418	269	155
46	46	51	136	13	34	25	82	51	23
1	1	1	14	16	2	41	2	29	24

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	<u>1950</u>	<u>1949</u>	<u>1948</u>	<u>1947</u>	<u>1946</u>	<u>1945</u>	<u>1944</u>
31.	77	263	164	183	84	81	31
32.	x	x	x	x	x	x	x
33.	e	e	e	x	x	x	x
34.	68	115	50	x	x	x	x
35.	71	100	109	55	39	20	14
36.	52	109	52	10	0	7	e
37.	x	x	x	x	x	x	x
38.	0	500	333	185	111	139	e
39.	48	-168	420	120	264	144	e
40.	57	100	488	89	135	82	e
41.	e	e	e	e	e	e	11
42.	e	e	e	e	e	e	e
43.	e	e	e	e	e	e	e
44.	101	141	70	45	29	5	13
45.	11	89	6	1	0	6	20
46.	x	x	x	x	x	x	x
47.	173	74	78	30	5	25	27
48.	103	40	12	13	0	11	52
49.	e	e	e	e	e	e	e
50.	89	78	117	0	0	0	0
51.	119	345	206	116	93	34	62
52.	20	15	16	37	23	0	0
53.	64	109	22	8	8	-8	1

Table A.4. (cont.)

1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932
41	23	56	49	56	57	54	41	51	47	30	21
x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x	x	x	x
5	6	13	8	6	24	61	17	13	11	20	12
e	e	e	e	e	e	e	e	e	e	e	e
x	x	x	x	x	x	x	x	x	x	x	x
e	e	e	e	e	e	e	e	e	e	e	e
e	e	e	e	e	e	e	e	e	e	e	e
e	e	e	e	e	e	e	e	e	e	e	e
7	2	11	18	8	20	19	16	20	10	10	3
e	e	e	e	e	e	e	e	e	e	e	e
e	e	e	e	e	e	e	e	e	e	e	e
12	7	6	13	0	13	10	8	8	5	7	5
0	0	12	9	7	1	1	0	0	0	0	0
x	x	x	x	x	x	x	x	x	x	x	x
197	0	7	9	110	57	9	2	9	2	5	0
40	21	47	220	81	80	120	85	64	47	24	8
e	e	e	e	e	e	e	e	e	e	e	e
0	0	0	0	0	0	0	0	0	0	0	0
16	11	59	15	9	13	25	24	20	16	14	8
0	0	0	0	21	5	0	7	11	9	7	0
7	27	8	20	17	19	38	14	18	1	0	10

Table A.4. (cont.)

	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922
31.	69	67	110	56	29	23	19	27	17	4
32.	x	x	x	x	x	x	x	x	x	x
33.	x	x	x	x	x	x	x	x	x	x
34.	x	x	x	x	x	x	x	x	x	x
35.	8	9	x	x	x	x	x	x	x	x
36.	e	e	e	e	e	e	e	e	e	e
37.	x	x	x	x	x	x	x	x	x	x
38.	e	e	e	e	e	e	e	e	e	e
39.	e	e	e	e	e	e	e	e	e	e
40.	e	e	e	e	e	e	e	e	e	e
41.	5	10	8	14	10	4	11	10	10	0
42.	e	e	e	e	e	e	e	e	e	e
43.	e	e	e	e	e	e	e	e	e	e
44.	5	5	5	7	5	3	8	6	1	2
45.	37	19	0	61	22	70	26	0	32	10
46.	x	x	x	x	x	x	x	x	x	x
47.	41	137	50	151	158	34	98	55	21	14
48.	15	42	75	66	30	e	e	e	e	e
49.	e	e	e	e	e	36	53	17	2	1
50.	0	0	0	0	0	0	0	0	0	0
51.	18	31	22	13	14	19	36	20	9	36
52.	14	20	7	9	2	2	0	0	0	0
53.	4	40	33	32	4	48	43	23	20	7

e: included elsewhere

e': partly included elsewhere

x: omitted

//: series excluded from link in total index for two contiguous years.

Table A.5. Kenya Share in Combined Kenya-Uganda
Imports of Equipment, 1922-48
(Percent)

	<u>Agricultural Machinery</u> (1)	<u>Industrial Machinery</u> (2)	<u>Other Machinery</u> (3)	<u>Lorries</u> (4)	<u>Tractors</u> (5)	<u>Other Vehicles</u> (6)
1948	88.2	67.2	82.2	60.2	92.1	80.0
1947	86.6	48.3	85.1	52.5	88.4	80.0
1946	85.2	69.4	86.2	45.8	91.9	80.0
1945	89.4	65.0	80.7	40.0	93.3	80.0
1944	89.0	71.0	83.6	79.0	83.3	80.0
1943	94.3	58.5	89.3	72.5	90.0	80.0
1942	81.0	26.9	87.0	89.7	90.0	80.0
1941	71.1	67.5	86.8	76.1	90.0	80.0
1940	82.5	72.8	86.6	95.5	90.0	80.0
1939	80.9	69.4	76.9	91.3	90.0	80.0
1938	69.6	65.9	77.8	72.8	90.0	80.0
1937	68.4	66.9	74.5	64.8	90.0	80.0
1936	56.7	50.5	78.5	66.3	90.0	80.0
1935	61.7	79.9	77.1	70.1	90.0	80.0
1934	41.8	63.6	74.1	58.7	90.0	80.0
1933	62.2	66.3	76.6	57.9	28.6	80.0
1932	51.3	57.9	79.1	24.0	39.6	80.0
1931	91.3	61.0	81.6	55.7	80.0	80.0
1930	88.0	63.1	84.2	57.1	95.4	80.0
1929	96.6	47.2	94.5	64.1	95.5	80.0
1928	98.8	80.4	92.0	61.2	94.8	80.0
1927	99.4	71.8	91.8	59.1	97.2	80.0
1926	97.6	29.5	89.8		74.3	80.0
1925	98.6	64.0	91.3		71.2	80.0
1924	98.6	64.0	91.3		73.9	80.0
1923	98.6	64.0	91.3		73.9	80.0
1922	98.6	64.0	91.3		73.9	80.0

Appendix B. Investment in Structures, in 1964 Prices, 1914-70

In general, procedures for deriving gross investment in structures are similar to those employed for investment in equipment. For that reason, explanations here are considerably abbreviated. Reference should be made also to Appendix A.

Sources for Table B.1.

All figures are obtained from those compiled by the Statistics Division of the Ministry. The totals shown here are the sum of data for dwellings, nonresidential buildings, and construction and works. Land improvement and plantation development are omitted. Data for 1964 and 1966-69 are from the Economic Survey for 1971, pp. 12-13. Data for 1965 and 1970 were supplied by the Statistics Division.

Sources for Table B.2.

Figures are obtained by linking to the absolute total for 1964, from Table B.1, an index computed by combining the indexes of Table A.4 with the weights of Table A.3. The latter index, however, to allow for the lag between the import (or production) of a material and its being put in place in a structure, is computed as $\frac{3}{4}$ times the unlagged index for the given year and $\frac{1}{4}$ of the index of the preceding year. This lag, as against a 1 to 0 or $\frac{1}{2}$ to $\frac{1}{2}$ weighting, was chosen on the basis of a comparison of similarly lagged indexes with the Table B.1 series for years following 1964.

Sources for Table B.3.

With some exceptions, the data in Table B.3 are drawn from the 1964 Annual Trade Report. Trade classification numbers are those used in that source and category titles are, with considerable simplifications, also those of that source. Values are for imports net of reexports or, more precisely, "home consumption" plus duties plus government imports less reexports. Though this treatment of reexports is different from that of reexports of equipment (see sources for Table A.3), it seems appropriate in the case of construction materials. In the cases of corrugated iron or steel sheets (Row 12), and, implicitly, of cement (Row 1), exports are also deducted from gross imports. Special allowance for imports by E.A.C. agencies is made only in the case of iron or steel rails and sleepers (Rows 15 and 16).

For lack of information, no adjustment in imports values is made for differences in the share of materials allotted to investment uses, or for differences in trade markups and transportation costs, or for differences in

the costs of incorporating the material in the finished structure. Adjustment for the consumption of a material domestically produced, other than by its total exclusion (see the text), is made by the inclusion of domestic production in the case of cement (Row 1), its exclusion from the 1964 value of the total index in the case of steel doors and windows (Row 21), and the inclusion of both raw material and finished product in the case of flat and corrugated galvanized sheets (Rows 12 and 13).

In several cases, the 1964 unit values implied by import quantities and values in that year appear possibly unrepresentative. These are checked against data for other years or for Uganda and Tanzania and, in the case of roofing tiles (Row 7) and ceramic pipes (Row 8), replaced by values from those sources.

In more detail, special cases are as follows.

Row 1: 661.21 and .22, cement. The values of imported cement, computed as for other imports, were Ks 19 thousand. Kenyan consumption of East African produced cement was 83,628 tons (1970 Statistical Abstract, p, 100), for which the Statistics Division suggests a price of Ks 7.625 per ton. The Table B.3 value is the sum of the imported and domestically produced components. The per unit prices of the two are similar.

Row 7: 662.42, roofing tiles. Imports of roofing tiles in 1964 were very small and the price per unit implied by their quantity and value clearly implausible. From data for 1960, the latest year in which imports were large, and for 1961-63 and for Uganda and Tanzania, a 1964 price of Ks 15.0 per thousand is assumed.

Row 8: 662.44, ceramic pipes. Imports of ceramic pipes in 1964 were both small and negative and the implied unit value implausible. The unit value is assumed instead to have equaled that for all East African countries together, which value appears consistent with that for Kenya alone in 1956-58, when imports were large.

Rows 12 and 13: 673.20 and .90 and 674.91 and .92: galvanized sheets. Comparison of both import and export data suggest that, from 1961, when exports appear, domestic production of corrugated galvanized sheets was significant and, also, that corrugated sheet was produced from flat. To allow roughly for this, exports are deducted from imports of corrugated sheet, and flat sheet, which also has direct uses in construction, is included in its entirety.

Rows 15 and 16: 676.10 and .20: rails and sleepers, etc. To allow for imports of rails and sleepers by East African Railways, 60 percent of government imports by the three East African countries is assigned to Kenya

(see the notes for Table A.3). Relevant to this allocation, it may be pointed out that, at least from 1954 to 1968, no government rail imports whatever are shown in the Trade Reports for Uganda.

Rail imports in 1964 are very small, but the implicit value per unit is the same as that for a large volume in 1963.

Row 21: 691.11, steel doors and windows. Domestic production of steel doors and windows, of unreported volume, commenced in 1954, and the material is excluded from the total index for years later than 1953. However, to provide a 1964 weight for this component in the earlier period, the value of imports in 1964 is entered in Table B.3. Imports in 1964 were small, but their unit value was about the same as the unit value of the considerable volume of exports in that year.

Sources for Table B.4.

Quantity indexes are obtained, substantially, by the same procedures and from the same sources as those of Table A.4, to the notes for which reference should be made. That is, in principle, the indexes are for physical quantities of imports net of reexports and of additions to stocks in bonded warehouses (or, where it differs, for domestic consumption) of construction materials, as they are reported in the Annual Trade Reports. Because of various approximations, the objective is only partially attained. The chief procedural difference here from Table A.4 is that reexports outside of East Africa are deducted throughout the period from 1964 to 1951 (cf. the notes for Table B.3).

The year 1913 is included in Table B.4 to provide a 1914 value for the lagged total index.

Detailed statements of sources, abbreviated as for Table A.3, follow.

Row 1.

Sources. 1964-1948: data are not for imports but for "domestic consumption" as estimated in the annual Statistical Abstract (1970, p. 100; 1967, p. 94; 1965, p. 81; and 1955, p. 71); 1947-34: "net retained imports" as reported directly in the Trade Reports (figures for 1947-45 are consistent with those for domestic consumption in the same years); 1933-22: III.B.c.2; 1921-13: "cement".

Units. 1964-13: weight.

Annual figures for 1921-13 are interpolated from data given in the source for years beginning March 1.

Kenya share. 1964-34: see source notes; 1933-13: Table B.5, Col. 1.

Row 2.

Sources. 1964: 661.81; 1963-54: 661.09.a; 1953-49: 278.b; 1948-22: included in Row 4; 1921-13: omitted.

Units. 1964-49: weight.

Row 3

Sources. 1964: 661.82; 1963-54: 661.09.b; 1953-49: 278.a; 1948-22: included in Row 4; 1921-13: omitted.

Units. 1964-49: weight.

Row 4.

Sources. 1964-49: included in Rows 2 and 3; 1948: 278; 1947-22: III.B.c.1; 1921-13: omitted.

Units. 1948-22: weight.

Kenya share. 1948-22: assumed the same as the average for 1951-49.

Row 5.

Sources. 1964: 662.30; 1963-54: 662.03.a and .b; 1953-48: 265.a and .c; 1948-13: omitted.

Units. 1964: weight; 1963-54: 662.03.a is reported in numbers, 662.03.b in weight units; 1953-48: weight.

Because of the incomparabilities in units, 1963 is linked to 1964 and 1953 to 1954 in current values; these links are excluded from the total index. Between 1963 and 1954, the two components are combined into a weighted index, with weights given by their 1963 current values.

Kenya share. 1948: assumed the same as in 1949.

Row 6.

Sources. 1964: 662.42; 1963-54: 662.02.a; 1953-13: omitted.

Units. 1964-54: number.

Row 7.

Sources. 1964: 662.42; 1963-54: 662.01.b; 1953-48: 264.a.2; 1947-33: III.B.a.3; 1932: III.B.a.3.b and .c; 1931-30: III.B.3; 1929-22: III.B.2; 1921-13: omitted.

Units. 1964-22: number.

Consistency of the coverage of this category throughout is doubtful. For greater consistency, the 1932-31 link is made with 1932 inclusive of III.B.a.3.a, the 1930-29 link is made with 1930 inclusive of III.B.2.

Kenya share. Table B.5, Col. 2.

Row 8.

Sources. 1964: 662.44; 1963-54: 662.01.c and 662.02.b; 1953-48: 264.4; 1947-33: III.B.a.4; 1932-30: III.B.4; 1929-24: III.B.3; 1923-13: omitted.

Units. 1964-24: weight.

Because of differences in product coverage, the link between 1963 and 1964 is excluded from the total index. Figures in the index are generally negative because imports were negative in the base year, 1964.

Kenya share. 1948: given in the Trade Report; 1948-24: assumed equal to the 1951-48 average.

Row 9.

Sources. 1964: 664.30; 1963-54: 664.03; 1953-48: 268.b; 1947-33: III.B.b.6.b; 1932: III.B.b.5.b; 1931-22: III.B.b.5; 1921-13: omitted.

Units. 1964-22: area.

1931 is linked to 1932 inclusive of III.B.b.5.a and .c.

Kenya share. 1948-22: assumed equal to 1951-49 average, 80 percent.

Row 10.

Sources. 1964: 664.60; 1963-54: 664.06; 1953-48: 269; 1947-13: omitted.

Units. 1964-48: weight.

Kenya share. 1948: assumed the same as in 1949.

Row 11.

Sources. 1964: 673.20 and .90; 1963-54: 681.04; 1953-48: 292.b; 1947-22: III.C.2 and .7; 1921-13: omitted.

Units. 1964-22: weight.

Kenya share. 1948: figure of required coverage is given in the Trade Report; 1947-44: Table B.5, Col. 3, for III.C.2, Col. 6 for III.C.7; 1943-22: Table B.5, Col. 6.

Row 12.

Sources. 1964: 674.91 and .92; 1963-54: 681.07.a.1; 1953-48: 294.b.1; 1947-22: III.C.5; 1921-13: included in Row 14.

Units. 1964-22: weight.

From 1964 to 1961, the index is net of exports, before which the latter are nil.

Kenya share. 1948-22: Table B.5, Col. 4.

Row 13.

Sources. 1964: 674.93 and .94; 1963-54: 681.07.a.2; 1953-48: 294.b.2; 1947-22: III.C.6; 1921-13: included in Row 14.

Units. 1964-22: weight.

Kenya share. 1948-22: Table B.5, Col. 4. The applicability of these percentages for years before 1936, in which they refer to corrugated sheets, is questionable.

Row 14.

Sources. 1964-22: included in Rows 12 and 13; 1921-13: "galvanized iron sheets and plate."

Units. 1921-13: weight.

Annual figures for 1921-13 are interpolated from data given in the source for years beginning March 1.

Row 15.

Sources. 1964: 676.10; 1963-54: 681.08; 1953-48: 296.a; 1947-22: included in Row 17; 1921-13: omitted.

Units. 1964-48: weight.

For 1964-49, rails imported on government account are calculated as 60 percent of imports by the three East African governments (see introductory notes). From 1953 to 1948, Kenyan home consumption is calculated as total imports less government imports.

Kenya share. 1964-49: see immediately above; 1948: assumed equal to Kenya share of imports of rolling stock, 80 percent.

Row 16.

Sources. 1964: 676.20; 1963-54: 681.11; 1953-48: 296.b; 1947-22: included in Row 17; 1921-13: omitted.

Units. 1964-22: weight.

Procedures are as in Row 15.

Kenya share. 1964-48: procedures are as in Row 15.

Row 17.

Sources. 1964-48: included in Rows 15 and 16; 1947-22: III.C.14; 1921-13: omitted.

Units. 1947-22: weight.

Kenya share. 1947-22: assumed 80 percent throughout.

Row 18.

Sources. 1964: 678.10; 1963-54: 681.14; 1953-48: 295.a; 1947-22: included in Row 20; 1921-13: omitted.

Units. 1964-48: weight.

1963 is linked to 1964 inclusive of a share of fittings (678.50) equal to the share of cast iron in total pipes.

Kenya share. 1948: Table B.5, Col. 5.

Row 19.

Sources. 1964: 678.20, .30, .40, and .50; 1963-54: 681.14; 1953-48: 295.b; 1947-22: included in Row 20; 1921-13: omitted.

Units. weight.

1963 is linked to 1964 as in Row 18.

Kenya share. 1948: Table B.5, Col. 5.

Row 20.

Sources. 1964-48: included in Rows 18 and 19; 1947-33: III.C.19; 1932-22: III.C.17; 1921-13: omitted.

Units. 1947-22: weight.

Kenya share. 1947-22: Table B.5, Col. 5.

Row 21.

Sources. 1964: 691.11; 1963-54: omitted; 1953-49: 311.c; 1948-13: omitted.

Units. 1953-49: weight.

Steel doors and windows began to be reported separately in the import data only from 1949 and began to be produced domestically in 1954. Data on domestic production are unavailable.

Row 22.

Sources. 1964: 693.10; 1963-54: 699.03 and .04; 1953-48: 312; 1947-33: III.C.20; 1932-22: III.C.18; 1921-13: omitted.

Units. 1966-22: weight.

Kenya share. 1948-22: Table B.5, Col. 6.

Row 23.

Sources. 1964: 723.10; 1963-54: 721.13; 1953-48: 343; 1947-13: omitted.

Units. 1964-48: weight.

Kenya share. 1948: interpolated between 1949 share and 1947 figure from Table B.5, Col. 6.

Row 24.

Sources. 1964: 812.20; 1963-54: 812.02; 1953-48: 267.b; 1947-30: III.B.5; 1929: III.B.4; 1928-13: omitted.

Units. 1964-29: weight.

Kenya share. 1948-29: assumed 70 percent throughout, or approximately the 1951-49 average.

Row 25.

Sources. 1964: 812.30; 1963-54: 812.03; 1953-48: 324.g., .h, and .i; 1947-33: III.C.18; 1932: III.C.1b.a; 1931-13: omitted.

Units. 1964-32: weight.

Kenya share. 1948: interpolated between 1949 and 1947. 1947-32: Table B.5, Col. 6.

Row 26.

This series is the total materials index, as obtained for each calendar year. The index used to compute the annual investment series is lagged by a quarter of a year: see notes for Table B.2.

Sources for Table B.5.

Sources for Table B.5 are the same as for A.5, q.v. Data are given in units of weight, except for Col. 2, which is in numbers, and Col. 6 which is in current values.

Exceptions are the following.

- (i) 1948: data may not be fully comparable with those for earlier years.
- (ii) 1938, Col. 5: the reported figure appears a misprint; the figure entered is interpolated.
- (iii) Reported data are lacking and the percentages shown are rough interpolations or extrapolations in Col. 1, 1924-13; Col. 2, 1943-22; Col. 4, 1943-42 and 1924-13; Col. 5, 1933-22; Col. 6, 1933-22.

Table B.1. Total Investment in Structures, 1964 Prices, 1964-70
(Kf million)

1964	13.99
1965	15.02
1966	18.39
1967	24.89
1968	30.34
1969	30.58
1970	31.56

Table B.2. Total Investment in Structures, 1964 Prices, 1914-63
(Kf million)

1914	5.40	1936	4.09	1958	23.32
1915	3.64	1937	4.98	1959	23.77
1916	1.93	1938	4.17	1960	23.77
1917	1.07	1939	3.73	1961	21.10
1918	1.03	1940	3.28	1962	20.65
1919	2.42	1941	3.01	1963	17.45
1920	8.00	1942	1.82		
1921	5.39	1943	1.40		
1922	5.01	1944	2.38		
1923	3.59	1945	2.66		
1924	5.87	1946	4.43		
1925	11.16	1947	5.92		
1926	10.66	1948	9.36		
1927	8.77	1949	13.40		
1928	12.18	1950	16.10		
1929	11.78	1951	18.37		
1930	7.24	1952	17.60		
1931	5.71	1953	20.92		
1932	3.14	1954	28.02		
1933	2.14	1955	27.88		
1934	2.48	1956	27.21		
1935	2.98	1957	26.99		

Table B.3. Imports (or Consumption) of Construction Materials, by Type of Material, Current Prices, 1964

<u>1964 Trade Classification Number</u> (1)	<u>Type of Material</u> (2)	<u>Value^a</u> (K£ thousand) (3)
1. 661.21 and .22	Cement	657
2. 661.81	Asbestos cement pipe	28
3. 661.82	Asbestos cement sheets, etc.	17
4.	(Rows 2 and 3)	(45)
5. 662.30	Refractory bricks and other materials	22
6. 662.41	Glazed tiles for walls, etc.	26
7. 662.42	Roofing tiles	.41
8. 662.44	Ceramic pipes	(-).26
9. 664.30	Window glass	69
10. 664.60	Glass bricks, tiles, etc.	1.4
11. 673.20 and .90	Iron or steel bars, rods, angles, shapes, etc.	586
12. 674.91 and .92	Iron or steel sheets, galvanized and corrugated	54
13. 674.93 and .94	Iron or steel sheets, galvanized flat	357
14.	(Rows 12 and 13)	(411)
15. 676.10	Iron or steel rails	6.0
16. 676.20	Iron or steel sleepers, etc.	95
17.	(Rows 15 and 16)	(101)
18. 678.10	Cast iron pipes	8.8
19. 678.20, .30 .40, and .50	Other iron or steel pipes	434
20.	(Rows 18 and 19)	(443)
21. 691.11	Steel doors and windows	2.2
22. 693.10	Wire cables, etc.	102
23. 723.10	Insulated wire and cable	140
24. 812.20	Ceramic plumbing fixtures	67
25. 812.30	Iron or steel plumbing fixtures	79

a: Titles and values shown in parentheses are included elsewhere in 1964.

Table B.4. (cont.)

	1948	1947	1946	1945	1944	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
1.	88	37	26	18	14	6	16	15	11	21	20	24	23	15	12	16	14	29	50
2.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
3.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
4.	290	152	73	16	2	4	3	16	14	48	56	68	27	59	25	48	35	61	18
5.	71	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7.	13100	13900	18300	2700	8940	3330	599	1590	4540	7280	4930	3550	1530	985	1250	929	750	1860	3980
8.	-4560	-3420	-8160	-2020	-1020	-344	-335	-970	-1230	-3250	-7470	-5140	-1840	-356	-189	-72	-1	-210	-300
9.	81	139	23	12	18	6	10	14	17	18	11	28	12	15	8	12	8	11	14
10.	201	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11.	14	20	7	5	8	5	11	3	12	9	8	16	11	6	5	3	4	4	9
12.	259	170	64	89	105	17	39	137	361	351	250	532	514	316	227	324	190	347	522
13.	12	4	5	2	14	3	5	7	7	12	4	13	7	7	4	5	2	5	9
14.	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
15.	5380	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
16.	186	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
17.	e	368	401	2	80	94	8	278	50	99	222	111	211	169	160	42	9	469	234
18.	304	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
19.	44	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
20.	e	31	38	59	37	15	12	14	33	25	25	53	27	19	21	6	46	36	37
21.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22.	80	22	16	4	9	10	5	13	9	5	3	7	5	4	4	4	1	2	4
23.	86	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24.	92	68	22	34	7	7	6	11	22	34	42	48	20	16	17	15	14	94	118
25.	290	40	54	37	15	8	11	32	22	54	49	47	34	14	13	7	13	x	x
26.	78.88	47.13	38.12	20.00	20.52	10.52	10.79	22.74	23.11	28.05	29.05	39.20	33.48	23.54	19.78	15.81	17.43	42.83	44.86

Table B.4. Indexes of Imports (or Consumption) of Construction Materials,
by Type of Material, Physical Quantities, 1913-63
(1964=100)

	1963	1962	1961	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949
1. Cement	140	148	142	219	223	206	210	218	231	164	160	140	142	140	103
2. Asbestos cement pipe	247	158	269	615	413	313	398	452	424	320	270	323	200	283	366
3. Asbestos cement sheets, etc.	146	116	135	453	745	445	1088	1064	659	878	517	569	641	503	1041
4. Rows 2 and 3	e	e	e	e	e	e	e	e	e	e	e	e	e	-e	e
5. Refractory bricks and other materials	//356	275	312	382	471	587	452	368	156	11	//284	322	171	180	168
6. Glazed tiles for walls, etc.	85	17	13	39	26	80	41	58	44	26	x	x	x	x	x
7. Roofing tiles	82	114	-510	2970	6490	4210	11800	10500	9440	3510	27800	22300	-214	36900	27300
8. Ceramic pipes	//-21	33	-58	-130	-248	-1820	-858	-7410	-4050	-5180	-132	-2310	-1010	-643	-8000
9. Window glass	85	82	78	157	140	107	159	155	139	138	61	94	165	87	51
10. Glass bricks, tiles, etc.	61	-18	183	215	358	213	685	1140	867	1160	324	462	1530	6	68
11. Iron or steel bars, rods, angles, shapes, etc.	67	54	53	93	79	68	93	102	107	73	27	13	10	9	21
12. Iron or steel sheets, galvanized and corrugated	98	157	212	1000	906	729	489	940	1640	1460	450	135	1060	223	579
13. Iron or steel sheets, galvanized flat	237	280	158	25	40	23	25	34	73	32	20	5	27	13	18
14. Rows 12 and 13	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
15. Iron or steel rails	1170	4920	6070	2270	6550	5890	4890	880	2840	10000	8820	2630	4870	4910	3910
16. Iron or steel sleepers, etc.	90	781	1060	474	608	713	828	624	785	1670	1020	526	492	422	109
17. Rows 15 and 16	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
18. Cast iron pipes	313	241	523	716	838	1350	804	1340	673	1060	1050	983	255	282	374
19. Other iron or steel pipes	106	115	76	159	129	105	164	131	137	234	120	82	162	144	137
20. Rows 18 and 19	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e
21. Steel doors and windows	x	x	x	x	x	x	x	x	x	x	15800	14100	11400	13800	6580
22. Wire cables, etc.	61	50	60	86	72	51	213	486	68	26	76	20	20	56	25
23. Insulated wire and cable	125	109	119	141	72	109	333	199	81	119	190	477	256	219	125
24. Ceramic plumbing fixtures	105	90	140	241	225	162	196	266	119	71	167	143	6	93	122
25. Iron or steel plumbing fixtures	96	79	148	222	286	216	279	362	326	94	436	370	373	327	388
26. Total (unlagged)	123.8	157.5	153.6	178.8	184.2	167.6	203.9	206.2	206.1	227.1	168.0	130.0	143.5	126.4	109.2

Table B.4. (cont.)

	1929	1928	1927	1926	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916	1915	1914	1913
1.	67	54	54	28	26	23	12	8	4	5	3	2	2	2	3	4	4
2.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
3.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
4.	139	94	82	33	17	8	10	22	x	x	x	x	x	x	x	x	x
5.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7.	4980	2500	4690	2530	1070	80	933	519	x	x	x	x	x	x	x	x	x
8.	-543	-541	-334	-178	-219	-228	x	x	x	x	x	x	x	x	x	x	x
9.	15	14	14	10	6	6	2	3	x	x	x	x	x	x	x	x	x
10.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11.	14	10	8	7	8	6	4	2	x	x	x	x	x	x	x	x	x
12.	776	631	624	467	301	367	170	120	e	e	e	e	e	e	e	e	e
13.	4	6	8	3	1	1	5	0	e	e	e	e	e	e	e	e	e
14.	e	e	e	e	e	e	e	e	16	44	11	3	2	5	13	19	37
15.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
16.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
17.	757	1620	566	1350	2040	921	328	898	x	x	x	x	x	x	x	x	x
18.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
19.	e	e	e	e	e	e	e	e	x	x	x	x	x	x	x	x	x
20.	92	55	62	32	18	16	10	7	x	x	x	x	x	x	x	x	x
21.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22.	4	3	9	4	1	1	9	1	x	x	x	x	x	x	x	x	x
23.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24.	116	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
25.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
26.	85.02	102.0	63.34	75.94	95.29	52.46	22.75	40.61	29.96	73.64	21.71	8.06	7.05	11.34	24.38	37.25	52.03

e : included elsewhere
x : omitted
// : series excluded from link in total index for two contiguous years

Table B.5. Kenya Share in Combined Kenya-Uganda Imports of Construction Materials, 1913-48
(Percent)

	Cement (1)	Bricks and Tiles (2)	Iron and Steel Bars and Rods (3)	Iron or Steel Galvanized Sheets (4)	Iron or Steel Tubes and Pipes (5)	Other Iron or Steel Manufactures (6)
1948	78.7	81.0	-	62.8	79.8	-
1947	76.3	96.8	79.0	44.1	82.9	86.1
1946	71.7	98.0	66.1	53.1	83.0	84.6
1945	78.6	98.3	77.2	74.3	92.5	93.1
1944	86.6	96.7	93.3	85.2	92.2	93.9
1943	98.0	96.7	-	79.0	92.4	91.9
1942	93.8	96.7	-	74.0	89.2	95.3
1941	79.5	96.7	-	69.0	72.1	88.1
1940	70.8	96.7	-	79.8	84.9	84.0
1939	64.7	96.7	-	64.1	60.3	70.7
1938	55.2	96.7	-	64.0	44.6	66.4
1937	68.9	96.7	-	63.8	78.4	78.5
1936	72.7	96.7	-	60.7	61.6	77.8
1935	72.2	96.7	-	58.2	66.2	77.2
1934	68.2	96.7	-	52.5	88.9	77.8
1933	78.2	96.7	-	73.3	75.0	80.0
1932	79.9	96.7	-	65.6	75.0	80.0
1931	89.4	96.7	-	67.7	75.0	80.0
1930	94.5	96.7	-	75.2	75.0	80.0
1929	95.0	96.7	-	76.0	75.0	80.0
1928	88.9	96.7	-	80.4	75.0	80.0
1927	94.9	96.7	-	78.7	75.0	80.0
1926	90.6	96.7	-	67.9	75.0	80.0
1925	91.7	96.7	-	55.4	75.0	80.0
1924-22	91.7	96.7	-	70.0	75.0	80.0
1921-13	91.7	-	-	70.0	-	-

Appendix C. Investment in Dwellings, in 1964 Prices, 1914-70

As is explained in the text, the estimates of investment in dwellings are not meant to provide an independently reliable series but to allow deduction of dwellings from the total capital stock.

Sources for Table C.1.

1970-64.

Figures are the official estimates of the Statistics Division. Sources are the same as for Table B.1.

1963-54 and 1950.

Dwellings are assumed to account for the same share of total construction in 1964 prices (Table B.2) as they do in current prices (Table E.1, Rows 3 and 4).

1953-51.

Interpolated between 1954 and 1950 on the index of materials imports described immediately below.

1949-14.

Investment in dwellings and in nonresidential structures are extrapolated, separately, from 1950 on indexes of materials imports and the resulting estimates adjusted equiproportionately to the known construction totals (Table B.2). The extrapolator for dwellings is composed, over the years for which each is available, from the series in Tables B.3 and B.4 for roofing tiles, window glass, corrugated iron, steel doors and windows, and plumbing fixtures (Rows 7, 9, 12 and an extrapolation of 12 on 14, Rows 21, 24, and 25). For other structures, the index is composed from the remaining series in Tables B.3 and B.4. Component series are combined by the same procedures as are used for the index of total construction and the results similarly lagged. The two separate indexes, before adjustment, project quite closely the total index forward to 1960 and back to 1929, despite the fact that the dwelling components are given about twice the weight, in 1950, that they have in the total index. Possibly because of the disappearance of component series in the dwelling index, the projection is less close from 1928 to 1922 and poor from 1922 to 1914.

Table C.1. Investment in Dwellings, 1964 Prices, 1914-70
(Kf million)

1914	2.07	1942	.59
1915	1.32	1943	.39
		1944	.92
1916	.76	1945	1.06
1917	.14		
1918	.15	1946	1.55
1919	.77	1947	2.52
1920	3.50	1948	4.02
		1949	5.95
1921	2.15	1950	6.44
1922	.95		
1923	1.04	1951	7.71
1924	1.93	1952	7.41
1925	2.22	1953	7.78
		1954	9.44
1926	2.86	1955	9.98
1927	3.55		
1928	4.02	1956	11.70
1929	4.76	1957	9.26
1930	3.71	1958	7.98
		1959	8.20
1931	2.68	1960	8.15
1932	1.44		
1933	1.35	1961	6.18
1934	1.34	1962	4.19
1935	1.75	1963	3.33
		1964	1.98
1936	2.39	1965	1.98
1937	2.88		
1938	2.18	1966	2.47
1939	2.16	1967	4.01
1940	2.02	1968	5.35
		1969	5.81
1941	1.34	1970	6.77

Appendix D. Investment in Agriculture, in 1964 Prices, 1914-70

As is explained in the text, the agricultural investment estimates are composed in order to obtain the nonagricultural nonresidential residual and are not presented as independently reliable.

Sources for Table D.1.

Equipment.

1970-64. Figures are the official estimates of the Statistics Division, published in the 1971 Economic Survey, pp. 18-19, for 1964, and supplied directly for the remaining years. Totals are the sums of data for transport equipment and for machinery and other equipment.

1963-55. Estimated on the assumption that agriculture accounted for the same share of total investment in equipment in 1964 prices as it did in current prices. The 1964 price totals are from Table A.2. The current-price shares are calculated from Rows 1 and 5 in Table E.1. The 1954 current price data are not used (see the discussion in Appendix E).

1954-22. Investment in agricultural and nonagricultural sectors are extrapolated separately from 1955, on indexes of equipment imports, and adjusted proportionately to the known totals (Table A.2). The index of agricultural equipment imports is obtained, for 1955-54, from Rows 8 to 12 in Tables A.3 and A.4; for 1953-32, from Rows 8, 9, 11, and 13; for 1931-27, from Rows 11 and 14; for 1926-22, from Row 11 extrapolated on Row 49 and from Row 14. In 1955, it may be noted, the share of agricultural equipment in the whole of equipment imports covered in Table A.2 is nearly equal to the share of agriculture in total investment in equipment, as estimated from Table E.1, 12.0 as against 12.5 percent.

Structures.

1970-64. Data are official estimates, obtained from the same sources as those for equipment. Figures are sums of nonresidential buildings and of construction and works.

1963-55. Procedures are the same as for equipment. Total structures in 1964 are from Table B.2; the agricultural share in current prices is calculated from Table E.1, Rows 3 and 6. The current-price figure for 1954 is disregarded (see Appendix E).

1954-22. For these years, the only guide we have for agricultural construction is agricultural investment in equipment, as estimated here. The relation between these two forms of investment, in years later than 1954, is highly erratic and shows no obvious trend. For lack of better, agricultural

construction is assumed equal to the same fraction of agricultural equipment as its 1955-70 average, 64.9 percent; nonagricultural nonresidential construction is similarly assumed equal to its 1955-70 average ratio to nonagricultural equipment, 61.9 percent; the two series so extrapolated are adjusted equiproportionately to the known total of construction other than dwellings (Tables B.2 and C.1).

1921-13. From data for years following 1921, agriculture is assumed to have accounted for 25 percent of nonresidential construction (Tables B.2 and C.1).

Table D.1. Investment in Agriculture, 1964 Prices, 1914-70

(Kf million)

	<u>Equipment</u>	<u>Structures</u>		<u>Equipment</u>	<u>Structures</u>
	(1)	(2)		(1)	(2)
1914	--	.9	1942	1.0	.6
1915	--	.6	1943	2.5	.4
			1944	1.9	.7
1916	--	.3	1945	2.2	.9
1917	--	.3			
1918	--	.2	1946	3.2	1.4
1919	--	.4	1947	3.4	1.4
1920	--	1.1	1948	5.8	2.0
			1949	8.0	2.9
1921	--	.8	1950	2.7	1.8
1922	.2	.8			
1923	.4	.6	1951	3.5	2.0
1924	.7	1.0	1952	4.7	2.2
1925	1.7	2.8	1953	2.8	1.7
			1954	2.5	2.0
1926	1.3	2.1	1955	4.3	1.7
1927	1.6	1.6			
1928	1.1	1.3	1956	3.9	1.7
1929	1.0	1.2	1957	3.4	2.2
1930	.5	.4	1958	2.9	2.4
			1959	2.9	2.4
1931	.1	.1	1960	2.7	2.6
1932	.1	.2			
1933	.1	.1	1961	2.8	2.5
1934	.4	.2	1962	2.1	2.0
1935	.9	.4	1963	2.1	3.6
			1964	2.7	2.9
1936	1.1	.5	1965	3.1	2.2
1937	1.8	.6			
1938	1.5	.6	1966	4.5	2.5
1939	1.0	.3	1967	5.2	2.0
1940	1.1	.2	1968	4.4	2.1
			1969	4.0	2.0
1941	.9	.5	1970	5.4	1.8

Appendix E. Investment in Current Prices, 1950, 1954-64

The figures presented in this appendix, other than for 1964, serve two, limited, purposes. One is to permit certain checks on the reliability of the estimates of total investment, in the derivation of which these current-price data are not themselves used (see Tables 10 and 11 in the text). The other is to provide a means of dividing total investment among agriculture, dwellings, and all other sectors (see Appendices C and D).

The source of the current-price figures is official estimates, as these were published up to 1968. In that year, the official estimates were revised radically, but the revisions were not carried back further than 1964 (see p. 14, fn. 14). Data for 1964 and later years were revised again, moderately, in 1971.

The procedure used here is to make such adjustments as are possible in the coverage of the unrevised, pre-1968, figures, and then extrapolate earlier years from the revised (1971) figures for 1964, on the unrevised but adjusted current-price series. The extrapolation is done, generally, by more detailed components than are shown in Table E.1. Only so much of the current-price figures as are used here are included in that table.

Although 1954 figures for agriculture are shown in Table E.1, they are not used. On inspection, they appear (as published) to have been simply assumed equal to 1955, which assumption, in the case at least of equipment, makes for an implausibly high agricultural share in total 1954 investment. Data for agriculture are not included in the source for 1950.

Sources for Table E.1.

1964

Figures are from Economic Survey, 1971, pp. 12-13, which is the source also of the 1964 data in Tables A.1, B.1, C.1, and D.1.

1963-54, 1950

Estimates are based on current-price series published, for 1964-57, in the 1967 Statistical Abstract, p. 37; for 1956-54, in the 1964 Statistical Abstract, p. 103; and for 1950, in East African Statistical Department, Capital Formation in Kenya, 1954-60, op.cit., p. 11. In the sources, data are shown separately for three classes of structures (dwellings, nonresidential buildings, and construction and works) and two classes of equipment (transport equipment and machinery and other equipment).

As published, these data include and show separately expenditures by East African Community Service Organizations. In the division of the total of such expenditures among the member countries, Kenya is assigned one third of expenditures on "mobile" assets and so much of expenditures on immobile assets as occurred within its territory (see E.A.S.D., op.cit., p. 4). For better consistency with the division made here (see sources for Table A.3, Col. 3, Rows 45-53), the E.A.C.S.O. equipment expenditures shown in the source are raised in the ratio 60/33.3.

As published, these data also include and show separately the whole of private expenditures on automobiles (E.A.S.D., op. cit., p. 8), whereas the present practice of the Statistics Division is to include 42 percent of such expenditures. In agriculture, however, private expenditures on automobiles are included but not shown separately. In Table E.1, the 1st estimate of total equipment (Row 1) is calculated from the series inclusive of 100 percent of private automobiles, the 2nd row (Row 2) 42 percent. The former is required for comparison between total and agricultural equipment.

For 1950, separate data are not shown either for E.A.C.S.O. or private automobiles, which are assumed the same fraction of the totals in which they are included as in 1954.

On the series adjusted for expenditures by E.A.C.S.O. and adjusted or not adjusted for expenditures on private automobiles, component series are extrapolated from 1964 and summed as necessary to the Table E.1 totals.

Table E.1. Investment in Current Prices, 1950, 1954-64
(Kf million)

	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955	1954	1950
Total												
Equipment												
1. 1st estimate ^a												10.49
2. 2nd estimate ^a	23.89	19.05	17.51	16.94	20.42	18.34	18.09	22.13	25.24	24.34	18.04	10.49
3. Structures	13.99	13.35	16.02	16.22	21.14	22.34	22.13	24.88	24.44	22.02	18.65	12.51
4. Dwellings	1.98	2.55	3.25	4.76	7.25	7.70	7.57	8.53	10.52	7.88	6.28	5.01
Agriculture												
5. Equipment	2.70	2.26	2.03	2.36	2.66	2.83	2.77	2.94	3.13	3.05	3.05	--
6. Structures	2.90	2.73	1.59	1.95	2.29	2.29	2.27	2.06	1.57	1.33	1.33	--

a: For explanation, see statement of sources.