

The Ghanaian Manufacturing Sector

Firm Growth, Earnings, Productivity, Exports and Investment

1991-1995

REP98-2

Francis Teal
Centre for the Study of African Economies
University of Oxford

September 1998

The data used in this Report were collected over the period 1992 to 1996 by a team from the Centre for the Study of African Economies (CSAE), University of Oxford, the University of Ghana, Legon and the Ghana Statistical Office, Accra. The first three surveys, from 1992 to 1994, were part of the Regional Program on Enterprise Development (RPED) organised by the World Bank. The questionnaire was designed by a team from the World Bank. Numerous individuals have assisted in the collection of this data. The Department for International Development of the UK government has financed the surveys. The CSAE is funded by the Economic and Social Research Council of the UK.

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Executive Summary

Background

In this Report survey data on sales, exports, investment, finance and labour, from the Ghanaian manufacturing sector, is used to assess the rate of growth of the sector, the numbers of jobs created in the sector, the determinants of the productivity of the firms and the extent of exporting and investment. The data covers the period from 1991 to 1995. The firms are a sample drawn from the major sectors of manufacturing: Food, textiles, garments, sawmills, metal working (which includes some forms of machinery manufacture) and furniture. These sectors are believed to cover by far the largest part of employment in the manufacturing sector. The sample was structured to cover firms from these six sectors, located in Accra, Kumasi, Takoradi and Cape Coast, ranging in size from micro (less than six employees) to large (firms with more than 100 employees).

The Growth Rate of the Manufacturing Sector

The value-added of the firms in the survey has grown over this period in real terms by 4 per cent per annum. The growth rate of labour and capital inputs has been similar, Table 5. The implication is that there has been no increase in the underlying productivity of firms in the sector. For real value-added and the real capital stock there is no evidence of significant differences in the growth rate across the sectors surveyed within manufacturing. There is evidence that employment in textile and garment firms has grown more rapidly than in other sectors, Appendix Table 1. If firms are classified by the average of the firm's employment in the current and previous year then firm growth is independent of firm size, Table 3. These findings suggest a growth rate of the manufacturing sector as a whole of approximately 4 per cent per annum over the period from 1991 to 1995.

Job Creation and Real Earnings

The Ghanaian manufacturing sector has one of the highest rates of job creation of any manufacturing sector in the world, Tables 3 and 4. The earnings from these jobs have been declining over the period, Tables 10 and 14. While all earnings have fallen the earnings of unskilled workers have fallen by substantial amounts relative to the earnings of skilled workers. For male unskilled workers real earnings declined by 52 per cent over the period from 1992 to 1996 while for skilled workers the decline was of 13 per cent, Table 14.

In the longer term it is shown that the average earnings of unskilled workers for the period 1992-96 at 16,714 (1991 cedis) per month is similar to real starting wage for production workers in 1981-85 of 17,644 (1991 cedis) per month. Real earnings for young unskilled workers in 1996 were below the level of the mid 1980s, see Tables 8 and 10.

Information is available on the earnings of apprentices. There is a very marked difference between female and male apprentices. Only 25 per cent of female apprentices are paid as compared with 85 per cent of male ones. Further, for both female and male apprentices, the decline in real earnings has been much greater than for other classes of workers. This decline has been effected, in part by a fall in the percentage of apprentices which are paid and, in part, by a decline in wages if they are paid. Most of the fall has been effected by declines for paid work. Such earnings have halved over the period, Table 13. Apprentices are the least skilled of the workers in the sample in terms of work experience. These declines are consistent with the finding that the earnings of unskilled workers are declining relative to skilled ones over the period of the survey.

The factors that determine differences in earnings are documented in the Report. A worker in a firm of 100 employees is paid 18 per cent more than one in a firm employing 10, holding all other characteristics of the worker constant. Unionised firm pay 32-34 per cent more than non-unionised

ones. Firms with some foreign ownership pay 14-16 per cent more than privately owned Ghanaian ones. An increase of four years of education (from 8 to 12) increases earnings by 2-3 per cent. Ten years on the job tenure increases earnings by 4 per cent. Twenty years of work experience increases earnings by 82 per cent for women and 123 per cent for men, Table 14. The direct gains on earnings from formal education, as measured by years of education, are small.

Productivity

The differences in labour productivity across firms of differing size are substantial, Table 17. In the Report both value-added per employee and capital per employee are measured in purchasing power parity (ppp) dollars. For micro firms value-added per employee is US\$ (ppp) 3,350; that for large firms is nearly four times greater. There is also substantial variation across sectors. The sector with the highest labour productivity is sawmills with US\$ (ppp) 11,087; the lowest is in the textile and garment sector where it is US\$ (ppp) 1,939.

The range of physical capital per employee across firms of differing size is even larger than that for labour productivity. Micro firms have US\$ (ppp) 2,729 of capital for each employee while large firms have more than ten times as much at US\$ (ppp) 30,326. In comparison the differences in the human capital characteristics of the firms are small. The average years of education of workers in micro and small firms is ten years. For large firms the comparable number is 12, only 20 per cent higher. Tenure is longer in large and medium firms than the smaller ones, on average workers in large firms have 9 year of tenure while in micro firms they have only 5.

Differences in the physical capital endowments across the firms are a much more important determinant of differences in labour productivity than differences in human capital as measured by years of education and tenure.

The employment size of firms differs greatly across sectors. By far the largest firms are to be found for sawmills where average employment is 183. The smallest firms are in the textile and garment sector with an average size of 17. It is possible to use the data to show if large firms have higher labour productivity, once the fact that they have more capital per employee is allowed for. There is no evidence that this is so, Appendix Table 2. For only one sector is firm size important and that is for textiles and garments. For that sector labour productivity declines with firm size.

Rates of return on both physical and human capital are reported with determinants of firm productivity, Table 19. The rates of return on capital are a measure of the increase in value-added that could be effected by increased investment. The rates of return on physical capital are far higher than those on human capital. If the costs of investment were low then such high returns on physical capital would imply high investment rates. In fact investment rates in the firms are very low. The high rates of return on physical capital combined with low investment rates imply that the costs of capital to the firms are high. Older firms are more efficient than younger firms. However, this effect is not large. Firms aged 10 are 12 per cent more efficient than they were at foundation. The most important, and rather surprising, finding is that unionised firms are 70 per cent more efficient than non-unionised firms. There is no evidence of rises in the underlying efficiency of the sector over the period from 1991 to 1995.

Exports

The amount of exporting from firms in the survey is very small. Only 11 per cent of the firms in the sample export any of their output, Table 20. Exporting is largely confined to large firms in the wood processing sector. No other sector exports more than 14 per cent of its output. For those firms that do export, on average, they only export 33 per cent of their output. Thus for the whole sample only

4.2 per cent of output is exported. As the sample greatly over-represents large firms this figure is a considerable over-statement of the extent of exporting from Ghana's manufacturing sector. The relatively few firms that export do not specialise in exporting.

While large firms are more likely to export there is no evidence that, once in the export market, they export a larger percentage of their output, Appendix Table 4. A lack of specialisation in firms that are exporting seems to be a characteristic of all sizes of firms. There is no evidence that more efficient firms are more likely to export where efficiency refers to the underlying efficiency with which the firm operates, Appendix Table 4. Older firms are less likely to export and more capital intensive firms more likely to export. There is some evidence that increased skills, in terms of tenure, increases the probability of exporting.

The only factor that predicts exporting outside of Africa is whether the firm is in the wood processing sector, Appendix Table 5. It is clear that exporting outside of Africa is of negligible importance for any other sector of manufacturing, Table 21. Only 6 per cent of firms in the sample export to the world. As on average they export 47 per cent of their output the total exported is less than 3 per cent. Once the focus is on exports outside of Africa the fact that exporting is almost entirely confined to the wood processing sector, in which firms are relatively large, is apparent. These firms are, as already noted, relatively capital intensive. Increasing wood processing exports is an expensive way of generating jobs in the manufacturing sector. In fact it is the most expensive possible way in terms of the amounts of capital required.

It is possible to compare the firms in Ghana with those in Mauritius, Table 22. Mauritius is the only country within the sub-Saharan Africa region which has been able to grow through exporting labour intensive manufactures. While, on average, the Mauritian manufacturing sector has 3.7 times the capital per employee of Ghana, it produces 6.7 times the amount of value-added per employee. In the textile and garment sector this differential is even greater. The Mauritian sector has twice the capital per employee of Ghana but it produces over seven times as much value-added per employee. In other words the differences in productivity are largely the result of the efficiency with which the firms are operated, rather than the amounts of physical capital. The other striking difference is in the respective size of firms in the two countries; average employment is 181 in Mauritius compared with 17 in Ghana. It is clear that large firms in Mauritius are much more labour intensive than large firms in Ghana. Such large, labour intensive, firms may be the key to export success.

Investment

For the whole sample the average rate of investment in plant and equipment, ie the ratio of such investment to the value of the capital stock of the firm, is 10 per cent, Table 23. In an internationally comparative context this is a very low rate of investment. The rate of investment in building and land is 3 per cent. There is no evidence, for either type of investment, of rises over the period of the surveys. So the levels of investment are low and they have not risen over the survey period.

About half of the firms in the sample, in any year, do not invest, Table 23. This may be due either to risk and uncertainty affecting the timing of investment or that, for small firms, many investments are relatively large so there is a problem of capital goods being indivisible.

The sector which has the lowest rate of investment is the textile and garment sector. This is the sector in which rapid growth has occurred in countries which have been able to successfully export their manufacturing goods. In any year only one-third of firms in this sector carry out any investment in plant and equipment and only 8 per cent invest in land and buildings. The overall

investment ratio is 7 per cent for plant and equipment and 1 per cent for land and buildings. Most firms in this sector are neither exporting nor investing.

By far the most important source for the financing of investment are the own resources of the firms. On average, across all the firms, 71 per cent of investment in plant and equipment is financed by the firm's retained earnings. This percentage differs very little by the size of firm, Table 24; the importance of retained earnings is very similar for micro and large firms. For investment in plant and equipment the next most important sources of funding are personal savings and bank loans (both 8 per cent), Table 24. Here, as would be expected, most bank loans go to larger firms. The survey did find some loans to micro enterprises but very few.

The survey showed much lower rates of investment in land and building than in plant and equipment. The financing of such investment is similar to that for plant and equipment. The firm's retained earnings finance 62 per cent of the investments, personal savings 16 per cent and bank loans and overdrafts 9 per cent. The proportion of finance coming from banks is very similar for investments in land and buildings and for investments in plant and equipment.

1 Introduction

In this Report information is presented on the performance of a panel of firms in the Ghanaian manufacturing sector, and the earnings and skills of their workforce, over the first half of the 1990s. The manufacturing sector has played a major role historically in the growth of nations and, in the recent past, in the rapid export growth of the NICs. Thus, although the sector is small in Ghana - some 10 per cent of GDP - it is seen as a potential catalyst for rapid growth. The rate of growth of the sector, how that growth has been effected and the levels of productivity are, therefore, important questions for policy makers.

Four size categories were used to structure the sample: Micro, which are defined as firms employing less than 6; small firms, employing between 6 and 29 persons; medium firms, employing from 30 to less than 99 persons and large firms, employing more than 100. In the sampling from the Industrial Census large enterprises were over sampled. The two other criteria used in stratifying the sample were sector and location. The firms are a sample drawn from the major sectors of manufacturing: Food, textiles, garments, sawmills, metal working (which includes some forms of machinery manufacture) and furniture. These sectors are believed to cover by far the largest part of employment in the manufacturing sector. The initial sample was structured to cover firms from these six sectors, located in Accra, Kumasi, Takoradi and Cape Coast, ranging in size from micro to large.

The survey data provides information on firm sales and costs, exports, investment, finance and skilled and unskilled labour use over the period 1991 to 1995. In this Report this information is used to assess the rate of growth of the sector, the numbers of jobs created in the sector, the determinants of the productivity of the firms and the extent of exporting and investment.

At the same time as the firms were surveyed information was collected on the earnings and skills of the workers in the firm. The surveys provide individual earnings data for the period 1992 to 1996. The sample of workers and apprentices chosen from each firm was designed to cover the full range of personnel employed by the firms. The measure of skill used in the Report is based on the occupational classifications. Information is presented on real earnings for workers of different skill levels and how these have changed over time.

Measures of firm growth are presented in sections 2-4. Section 5 sets out the information on the real earnings of skilled and unskilled workers. Section 6 documents the determinants of firm productivity. Section 7 links the issues of firm size, growth and efficiency to exporting. Finally section 8 shows the amounts of investment undertaken and how the investment has been financed.

2 Firm Growth from 1992 to 1995

In this section the data from the firm survey is used to assess the rate of growth of firms in the Ghanaian manufacturing sector over the period 1991 to 1995. It is possible to compare the evidence from the survey with data available from the Ghanaian Statistical Office (GSO). The GSO has assembled data from the Custom Excise and Prevention Service (CEPS) to assess the growth in sales for firms which pay sales tax. In Table 1 a comparison is presented of the CEPS data with information from the surveyed firms. Figures from the CEPS are available for 1992 and 1995.

The CEPS data shows an increase in nominal sales of 232 per cent from 1992 to 1995 while, for all the firms surveyed for which there is information for both 1992 and 1995, sales grew by 211 per cent. In Table 1 the sample is divided between those firms which paid sales tax in 1995 and those

which did not. For those that did pay sales tax the sample data gives a rise in sales of 269 per cent, which is a larger rise than for the CEPS data. For the firms in the survey which did not pay sales tax the percentage increase in sales was substantially lower; their nominal sales rose by 123 per cent.

There is no reason, from this comparison of the sample data to that using sales tax return, to believe the survey data is understating the growth of that part of the manufacturing sector which pays sales tax. There may in fact be some over-statement of the growth rate.

In Table 2 these nominal values are converted to real terms. Inflation over the period from 1992 to 1995 was substantial. In Table 2 the nominal value for sales is deflated by an average of the Consumer Price Index (CPI) and the exchange rate. The data for both the CEPS and the survey is presented. In real terms the CEPS data gives a growth rate over the period of 27 per cent (7.9 per cent per annum) while the survey gives a figure of 19 per cent (5.8 per cent per annum).

How many workers are employed in large enterprises in Ghanaian manufacturing? It is possible to make an inference from Table 1. The CEPS data for 1992 identifies sales values 18.6 times greater than those from the survey. This suggests that there are some 427 firms (18.6x23) with some 52,600

Table 1 Manufacturing Sector Sales: a comparison of CEPS and RPED/GMES Data for 1992 and 1995			
Source	1992	1995	Percentage Increase
CEPS Sales (Cedis)	157,925,750,000	524,595,510,000	232
RPED/GMES			
If firm pays sales tax in 1995			
Sales (Cedis)	8,536,566,705	31,457,285,299	269
Number of Firms	23		
Employment	2832	3130	10.5
Sales Tax paid		3,004,371,792	
Average sales tax rate (%)		10.5	
Average employment size	123	136	

RPED/GMES			
If firm did not pay sales tax in 1995			
Sales (Cedis)	5,597,377,197	12,501,914,035	123
Number of firms	82	82	
Employment	1908	2256	18.2
Sales Tax paid		0	
Average employment size	23	28	
RPED/GMES			
All Firms			
Sales (Cedis)	14,133,943,902	43,959,199,334	211
Number of firms	105	105	
Employment	4740	5386	14

Table 2 Manufacturing Sector Sales: a comparison of CEPS and GMES Data for 1992 and 1995 in Nominal and Constant Prices			
	1992	1995	Percentage Increase
Nominal			
CEPS Sales (Cedis)	157,925,750,000	524,595,510,000	232
RPED/GMES Sales (Cedis)	14,133,943,902	43,959,199,334	211
Price Indices			
National CPI (1977=100)	18,630	46,355	148.8
National CPI (1991=100)	110.02	273.76	
Cedis/US\$	437.09	1200.43	174.6
Index of Cedis/US\$ (1991=100)	118.83	326.35	
Price Index which is the average of the CPI and Exchange Rate (1991=100)	114.4	300.1	162
Real			
CEPS Sales (1991 cedis)	138,046,980,000	174,806,900,000	27
RPED/GMES Sales (1991 cedis)	12,354,021,000	14,648,184,000	19

employees (18.6x23x123). A distinction is often drawn between the formal and informal sector. One way to provide a workable definition of such a distinction is to view the formal sector as the one subject to sales tax.

In assessing whether the firms in the survey are representative of non-sales tax paying firms two considerations are relevant. The first is that firms which are paying sales tax are likely to be the more successful firms. Such firms may be growing faster than the average. The second consideration is that non-sales tax paying firms are smaller than tax paying ones. If such firms grow faster than larger firms then the sample may be underestimating the growth of the whole sector, as the sample under-represents small firms. The issue of firm growth is considered first in the context of how employment in the firms has been changing.

3 Job Creation and Destruction 1991-1995

One of the most important features of firms in the manufacturing sector is that they provide a source of jobs to the economy. Increasing the supply of jobs is a key element in successful policy. How many jobs have been created in Ghana's manufacturing sector over the period from 1991 to 1995? In this section we consider the process of job creation and destruction and how it has varied across firms of different size.¹

Gross job creation at time t is defined as equal to the employment gains summed over all plants that expand or start-up between $(t-1)$ and t . The converse of this is gross job destruction which equals employment losses summed over all plants that contract or shut down between $(t-1)$ and t . The net employment change at time t is the difference between employment at time t and employment at time $(t-1)$. These definitions ensure that the net employment growth equals the job creation rate minus the job destruction rate.

In Table 3 firms are classified by the simple average of the firm's employment in the current and previous year. Four size classes are used, large which is firms with more than 100 employees, medium which is firms with from 30 to 99 employees, small which is 6 to 29 and micro which is firms with less than six employees. In examining the process of job creation and destruction shown in Table 3 two findings are clear. First, the rate of net job creation is small relative to the flow of gross job destruction and creation. Second, the net flows does not vary by the size of firm. Firm growth, as measured by employment, appears to be independent of firm size. On average over the four periods for which growth rates can be calculated the average growth rate is 4 per cent.

How does this process of job creation and destruction compare with other countries? Table 4 provides such a comparison. Across all the studies net job growth is small relative to the gross rates of job creation and destruction. The unweighted averages for the rate of job creation is 12.3 per cent and for job destruction it is 12.0 per cent. In Ghanaian manufacturing the rate of job creation is very similar at 11.4 per cent. It is the rate of job destruction which is well below the average at 7.2 per cent. The rate of net employment growth in Ghana of 4.2 per cent is exceeded only by Morocco in the studies shown in Table 4.

¹The measurement concepts used are taken from the work of S. J. Davis, Haltiwanger, J.C. and S. Schuh (1996) *Job Creation and Destruction*, The MIT Press, Cambridge, Massachusetts..

Table 3 Job Creation and Destruction
Firms classified by the average of the two years of employment

	1991/92	1992/93	1993/94	1994/95	Average all four periods
Annual percentage changes					
Large					
Creation	6.4	16.3	8.0	4.9	8.9
Destruction	9.4	1.9	2.9	6.0	5.1
Flow	-3.0	14.4	5.1	-1.1	3.8
Medium					
Job Creation	20.4	13.9	17.0	7.2	14.6
Job Destruction	4.6	14.1	12.9	3.6	8.8
Net Flow	15.8	-0.2	4.1	3.6	5.8
Small					
Job Creation	22.0	17.1	12.2	10.9	15.6
Job Destruction	6.3	14.4	19.5	10.0	12.6
Net Flow	15.7	2.7	-7.3	0.9	3.0
Micro					
Job Creation	32.6	26.9	17.4	4.2	20.3
Job Destruction	17.0	15.1	19.1	14.7	16.5
Net Flow	15.6	11.8	-1.7	-10.5	3.8
All Firms					
Job Creation	13.2	15.8	10.6	5.9	11.4
Job Destruction	7.7	7.7	7.4	6.1	7.2
Net Flow	5.5	8.1	3.2	-0.2	4.2

Table 4 Job Creation and Destruction in an International Context					
Country	Period	Coverage	Job Creation	Job Destruction	Net Employment Growth
USA	1973-88	Manufacturing	9.1	10.2	-1.1
USA	1976-85	Pennsylvania	13.3	12.5	0.8
Canada	1979-84	Tax-paying firms	10.6	10.0	0.6
France	1978-84	Private, non-farm	11.4	12.0	-0.6
Germany	1978-88	Private	8.3	7.7	0.6
Sweden	1982-84	All employees	11.4	12.1	-0.8
Italy	1984-89	Social Security Employees	9.9	10.0	-0.1
Australia	1984-85	Manufacturing	16.1	13.2	3.9
New Zealand	1987-92	Private	15.7	19.8	-4.1
Denmark	1983-89	Private	16.0	13.8	2.2
Finland	1986-91	Private	10.4	12.0	-1.6
Norway	1976-86	Manufacturing	7.1	8.4	-1.2
Colombia	1977-89	Manufacturing	13.2	13.0	0.2
Chile	1976-86	Manufacturing	13.0	13.9	-1.0
Morocco	1984-89	Manufacturing	18.6	12.1	6.5
Average			12.3	12.0	0.3
Ghana	1991-95	Manufacturing	11.4	7.2	4.2
Source: Davis, Haltiwanger and Schuh (1996) Table 2.2 p.21.					

The data in Table 3 shows that there is substantial variance across the four rounds of the survey. Gross job creation is highest in 1992/93 at 15.8 per cent and lowest in 1994/95 at 5.9 per cent. There is much less variation in the rate of gross job destruction. In Ghana, in common with other countries, the net rate of job creation is much below the gross rate. In a comparative context the rate of net job creation in Ghanaian manufacturing is high and it is as high in large as in small firms.

4 Growth Rates of Value-added, Capital and Labour

In Table 5 three measures of the growth of the firms in the survey are presented: Real value-added, employment and the real capital stock. While the survey was planned as a panel the number of firms for which there are complete observations for all five years is rather small. Rather than rely on this complete sample the growth rates are calculated from the maximum possible sample for the adjacent years. The figures given in Table 5 link the growth each year to construct the profile of growth of the firms over the five year period.

The results presented in Table 5 show that, over the five year period, real value-added rose by 17, employment grew by 16 and the real capital stock by 13 per cent. Both inputs and output grew by approximately 4 per cent per annum. In Appendix Table 1 a formal analysis is presented of the growth rates of the firms. It is shown there that, for capital and value-added, there are no significant differences in growth rates across sectors. In the case of employment the textile and garment sector grew significantly faster than other sectors. In Appendix Table 2 it is shown that these figures are consistent with their being no growth in the underlying efficiency of Ghanaian firms. These findings suggest a growth rate for the sector over this period of approximately 4 per cent per annum with value-added and inputs growing at similar rates.

	1991	1992	1993	1994	1995	1991-95 [%]
Real Value-added (millions of 1991 cedis)	38	44	49	52	45	17
Employment (numbers of employees)	38	41	43	44	44	16
Real Capital Stock (millions of 1991 cedis)	136	139	146	151	153	13

In Table 6 the sample is confined to firms for which there are a complete set of observations for both 1991 and 1995 in order to assess how firms of differing sizes and ages have grown over the period. In Table 6 firms are classified by their size in 1991. Large means more than 100 employees, medium is 30-99, small is 6-29 and micro is less than six. For all size categories firms have grown. There is very little difference in the growth rates for small to large firms. Micro firms grow much faster. However small and micro firms have not, on average over this period, grown to become large firms. Small and micro firms are younger than medium and large ones. To consider if, over the longer term, micro and small firms have grown to become large Table 7 documents firm growth, measured by employment, since foundation.

In Table 7 firms are classified by their size when founded. The findings are of importance for understanding how firms in Ghana's manufacturing sector become large. Table 7 show that small and micro firms do not grow to becoming large (>100 employees). Some medium sized firms make it into the large category but large firms can start large. Firms which were large at foundation were, in 1991-95, still far larger than other firms in the sample. The formal analysis in Appendix Table 1 shows that younger firms do grow faster than older ones, allowing for the fact that such firms are

smaller. One interpretation of this result, which has been found in other studies of firm growth, is that firms learn about being good performers over time. This implies that firm efficiency will grow with firm age. The extent of this effect is considered in section 6 below.

Table 6 Growth Rate of Firms from 1991 to 1995 by Employment Size in 1991				
Size in 1991	Employment in 1991	Employment in 1995	Growth Rate from 1991 to 1995 (%pa)	Firm Age in 1995
Large in 1991 No of obs. =10	226	254	3	25
Medium in 1991 No. of obs. = 19	52	61	1	20
Small in 1991 No. of obs. = 58	13	19	3	14
Micro in 1991 No of obs. = 21	4	6	8	16
Average across all firms No of obs. = 108	38	45	3	16

Table 7 Growth Rate of Firms since Foundation by Employment Size at Foundation				
Size of Firm at Foundation	Employment at Foundation	Average Employment 1991-1995	Growth Rate from Foundation to 1993	Firm Age in 1995
Large at Foundation No. of obs. =5	515	317	7	14
Medium at Foundation No. of obs. = 15	47	110	4	18
Small at Foundation No. of obs. =61	12	60	8	16
Micro at Foundation No. of obs. = 54	3	16	17	14
Average across all firms No. of obs. = 135	31	58	11	15

5 Real Earnings of Skilled and Unskilled Labour

In this section the evidence for the earnings of workers and apprentices in the firms is presented. The figures for earnings include both basic wages and allowances and are measured before tax. Figures are available for these earnings and for the wages paid when workers started work in their current firm. The occupational classification of the workers was also obtained and the skill measure used in this Report is based on these occupational classifications. The Tables also present information on earnings by the type of firms in which the workers are employed.

As part of the survey, workers were asked their pay when they started to work at their current firm. A comparison of minimum wages rates with starting wages for production workers over the period 1971 to 1995 is presented in Table 8 as five year averages. For each period recalled starting wages are substantially higher than the official minimum wage. The differential between minimum wages and starting wages was lowest in 1971-75 at 20 per cent. This differential rose to 176 per cent in the period 1981-85. This reflects the fact that, while both real minimum wages and real starting wages fell over the 1970s, the fall in real minimum wages was much greater. In the decade from 1981-85 to 1991-95 the differential has narrowed to 72 per cent. It will be noted that while, over this period of structural adjustment, real minimum wages have roughly doubled, they remain below the real starting wages for workers in the manufacturing sector.

In Tables 9 and 10 the wages of all workers and a breakdown, by gender, between skilled and unskilled workers is presented. A breakdown by union status firm size and foreign ownership is given in Table 11. Skilled workers are defined as those classified as managers, sales or administrative staff or supervisors. Unskilled workers are defined as those belonging to the other occupations. This occupational classification mirrors the education levels of the workforce so skilled workers are those whose education level is above the average. Table 12 presents earnings by occupational classification.

In Table 9 the average earnings for full time workers and apprentices who earn some income are presented. The figures exclude those apprentices who are not paid (see Table 13 below). Over the period from 1992 to 1996 average earnings rose from 27,735 cedis to 98,509 cedis per month. From the Table there is some differential between female and male workers. Men earn, on average, 24 per cent more than women. There is a large differential based on the skill categories used. Skilled workers earn three times the amounts of unskilled workers.

The substantial rise in nominal earnings shown in Table 9 occurred in a period of high inflation. In Table 10 figures for real earnings (using 1991 prices) are presented. From 1992 to 1996 the fall in average real wages shown in Table 10 is 10 per cent. For unskilled workers the figures show a fall of 27 per cent while for skilled workers there was a rise of 8 per cent. The falls for women were larger than those for men.

Table 11 shows how wages vary by the union status of the firm, by size and by foreign ownership. Unskilled workers in unionised firm earn approximately twice those in non-unionised firms. Unskilled workers in large firms earn 2.6 times those in micro firms; while some foreign ownership increases wages of the unskilled by 65 per cent and the wages of skilled workers by 40 per cent. Unskilled workers gain more than skilled for each of the categorisations shown in Table 11.

In Table 12 the earnings by occupational classifications are shown. It was noted above that starting wages for workers in the manufacturing sector were substantially higher than for basic wages in the public sector. The data in Table 12 shows that apprentices earnings are very substantially lower than

basic wages in the public sector and about one quarter that of production workers. At the margin those who are entering the labour force, who can obtain a public sector job, are relatively well paid.

Table 8 Minimum Wage Rates and Starting Wages for Production Workers in Ghana: 1971-1995

	National CPI 1991= 100	Minimum Wages (a) Cedis per Month	Starting Wages (b) Cedis per month	Real Minimum wages 1991 Cedis per month	Real Starting Wages 1991 Cedis per month
1971-1975	0.12	37	44	29,624	36,678
1976-1980	1.18	114	278	12,131	24,846
1981-1985	13.3	970	2,684	6,976	17,644
1986-1990	52.0	6,914	11,800	13,594	22,932
1991-1995	158.6	19,769	34,000	12,633	21,296

(a) The figures for 1975 and 1980 are taken from H. Alderman *Downturn and Economic Recovery in Ghana: Impacts on the poor*, Cornell Food and Nutrition Policy Program, Monograph 10, March 1991, p.76. The figures after 1980 were supplied by the Ghana Statistical Office. Since 1977 there has been both a statutory minimum wage and minimum allowances. The figures given include these minimum allowances. Rates are cited on a daily basis and have been converted to a monthly rate by assuming 27 working days per month.

(b) These wages are the median values of reported wages of production workers in the surveys for their pay when they started work in their current firm.

Table 9 Nominal Earnings of Workers, by Gender and by Skill (Cedis per month)			
Female workers and apprentices who earn			
Round	Unskilled	Skilled	All
1992	18,667	38,427	25,768
1993	19,300	36,497	26,257
1994	24,364	58,415	36,208
1995	41,181	103,007	65,830
1996	45,824	143,265	84,227
Average 1992/96	30,459	80,147	49,335
No. of obs.	475	291	766
Male workers and apprentices who earn			
1992	21,340	45,480	28,172
1993	26,452	70,060	38,277
1994	29,505	78,094	39,734
1995	48,109	151,097	76,993
1996	62,383	197,627	100,984
Average 1992/96	39,739	120,647	61,106
No. of obs.	3,029	1,087	4,116
All workers and apprentices who earn			
1992	20,897	43,928	27,735
1993	25,425	62,189	36,229
1994	28,808	73,394	39,171
1995	47,289	142,153	75,448
1996	60,261	187,130	98,509
Average 1992/96	38,481	112,094	59,259
No of. obs.	3,504	1,378	4,882

Table 10 Real Earnings of Workers, by Gender and by Skill (Monthly 1991 cedis)			
Female workers and apprentices who earn			
Round	Unskilled	Skilled	All
1992	17,078	35,157	23,575
1993	14,026	26,524	19,082
1994	14,067	33,727	20,905
1995	14,692	36,749	23,486
1996	10,632	33,240	19,542
Average 1992/96	13,956	33,163	21,253
No. of observations	475	291	766
Male workers and apprentices who earn			
1992	19,524	41,610	25,775
1993	19,224	50,916	27,817
1994	17,035	45,089	22,941
1995	17,163	53,905	27,468
1996	14,474	45,853	23,430
Average 1992/96	17,147	47,857	25,257
No. of observations	3,029	1,087	4,116
All workers and apprentices who earn			
1992	19,119	40,190	25,375
1993	18,477	45,196	26,329
1994	16,633	42,376	22,616
1995	16,871	50,715	26,917
1996	13,982	43,418	22,856
Average 1992/96	16,714	44,754	24,629
No. of observations	3,504	1,378	4,882

Table 11 Real Earnings of Workers (1992-96) (Monthly 1991 cedis)			
by Union Status			
	Unskilled	Skilled	All
Non-Union	12,677	29,691	15,449
Union	23,770	52,100	35,792
All	16,638	44,880	24,537
by Firm Size			
	Unskilled	Skilled	All
Large	26,067	57,648	40,666
Medium	17,341	42,368	24,892
Small	12,835	26,144	14,908
Micro	10,508	47,974	15,133
All	16,638	44,880	24,537
by Foreign Ownership Status			
	Unskilled	Skilled	All
No foreign ownership	14,725	39,156	20,483
Some foreign ownership	24,242	54,816	36,898
All	16,638	44,880	24,537
No. of observations	3,389	1,316	4,705

Table 12 Real Earnings, Education, Age and Tenure by Occupational Classification					
	No. of obs.	Real Earnings Monthly 1991 Cedis	Education	Age	Tenure
			years		
Skilled Occupations					
Management	222	80,599	14	44	10
Administrations	330	48,735	13	39	7
Sales Staff	389	29,167	14	36	7
Supervisors	375	36,641	11	40	12
Unskilled Occupations					
Technicians	333	25,063	10	37	8
Masters	359	21,019	9	32	7
Production and Support	1,668	20,888	10	33	6
Apprentices	1,029	5,494	9	21	2
All Workers and Paid Apprentices	4,705	24,537	11	32	6

Table 13 presents the earnings for apprentices fully. Several features of their earnings are important to note. First, on average, only 69 per cent are paid. There is a very marked difference between female and male apprentices. Only 25 per cent of female apprentices are paid as compared with 85 per cent of male ones. Further, for both female and male apprentices, the decline in real earnings has been much greater than for other classes of workers. This decline has been effected, in part by a fall in the percentage of apprentices which are paid, and in part by a decline of the wages if they are paid. Most of the fall has been effected by declines for paid work. Such earnings have halved over the period. Apprentices are the least skilled of the workers in the sample. These declines are consistent with the findings that the earnings of unskilled workers are declining relative to skilled ones over the period of the surveys.

Unionisation, size, skill and foreign ownership are closely connected characteristics of firms. Firms which are larger tend to be unionised and firms which are foreign owned are also larger and unionised. Skilled workers tend to work in larger firms. It is possible to control for these factors and ask how much the components contribute to earnings. This is done in Table 14 which summarises the results of Appendix Table 3.

Table 13 Apprentices s Earnings				
	Percentage of Apprentice Paid	Nominal Earnings Monthly cedis	Real Earnings	Real Earnings if Paid
			Monthly 1991 cedis	
Female Apprentices				
1992	38	3,130	2,864	7,491
1993	29	1,208	877	3,049
1994	18	1,367	789	4,458
1995	24	2,886	1,029	4,347
1996	24	3,249	754	3,183
Average 1992/96	25	2,289	1,196	4,726
Male Apprentices				
1992	91	8,221	7,522	8,253
1993	89	7,468	5,427	6,070
1994	90	6,392	3,691	4,118
1995	80	13,988	4,990	6,260
1996	80	15,138	3,512	4,406
Average 1992/96	85	10,960	4,750	5,604
All Apprentices				
1992	75	6,689	6,120	8,136
1993	71	5,564	4,043	5,697
1994	67	4,788	2,764	4,147
1995	68	11,657	4,159	6,120
1996	68	12,642	2,933	4,316
Average 1992/96	69	8,685	3,818	5,519
No. of observations	1,521	1,521	1,521	1,052

Table 14 shows that there are important differences between female and male workers. The effects of firm size, unionisation and foreign ownership are similar for both men and women. If a worker is employed in a firm of 100 employees earnings rise by 18 per cent compared with one in a firm of 10 employees. Unionisation increases earnings by just over 30 per cent. Some foreign ownership raises earnings by 14-16 per cent.

It is the pattern of skill differentials which differs between male and female workers. For male workers there has been a very substantial growth in the unskilled to skilled differential. For these workers, comparing 1992 to 1996, the regression analysis shows that skilled earnings had fallen by 13 per cent while unskilled earnings had fallen by 52 per cent. These falls are larger than those shown in Table 9. The individuals are not the same in each survey so the results in Table 14 are more reliable as they control for differences in the sample across the surveys. For both female and male unskilled workers there have been very substantial falls in real earnings over the period 1992 to 1996. Their average earnings for the period 1992-96 of 16,714 (1991 cedis) per month, Table 10, is similar to real starting wage for production workers in 1981-85 of 17,644 (1991 cedis) per month, Table 8.

In Tables 15 and 16 two extensions are made to the data. First, in Table 15, the wages are converted to US dollars. Second, in Table 16, wages in Ghana are compared with those for four other African countries. In both Tables a decomposition is given by educational attainment.

In Table 15 the first column shows Ghanaian wages in US dollars. The average, over the period 1992 to 1996, is US\$ 56 per month. Such a figure is misleading in making international comparisons because, as has been extensively documented, the nominal exchange rate understates the purchasing power of dollars in poor countries. The nominal exchange rate converts prices of goods which are internationally traded. Many goods are not imported, for example services, and the prices of these goods in poor countries tend to be much lower than in richer countries. So in making international comparisons it is preferable to use purchasing power parity (ppp) exchange rates. Such a calculation is performed in the final column of Table 15. In terms of internationally comparable dollar numbers the average monthly wage in Ghana was US\$ 175. This ranges from US\$ 545 for university completers to a low of US \$ 113 for primary non-completers. As the formal analysis in the Appendix Table 3 show the returns to education are highly non-linear. They initially fall with the level of education and then rise. Private returns to primary education are lower than the returns to post-primary.

In Table 16 a comparison is made between earnings in Ghana's manufacturing sector and that of four other African countries, the Cameroon, Kenya, Zambia and Zimbabwe. Ghana has the lowest average earnings of these five countries although only slightly below those of Zambia. The wage levels are approximately half those in Kenya and Zimbabwe and less than 40 per cent of those in the Cameroon. The gap between wages across countries is similar for each of the educational levels. Secondary completers in Ghana are paid less than primary non-completers in the Cameroon.

Table 14 The Determinants of Earnings (a)		
	Percentage Changes in Earnings All workers and apprentices who earn	Percentage Changes in Earnings All male workers and apprentices who earn
Large Firm(a move from a firm of 10 to one with 100 employees)	18	18
Union	34	32
Some Foreign Ownership	14	16
Skill	35	23
Education (a move from having 8 to 12 years of education)	2	3
Tenure in job (10 years in job)	4	4
Work Experience (being in work from aged 20 to 40)	82	123
Changes in Real Wages		
1992/93	0	0
1992/94	-17	-27
1992/95	-23	-30
1992/96	-45	-52
Changes in Skill Differentials		
1992/93	0	0
1992/94	0	25
1992/95	0	25
1992/96	25	39
(a) Based on Appendix Table 3.		

Table 15 Earnings by Education Completed (Monthly)		
	(US \$)	(US \$ ppp)
University Completed	177	545
Secondary Completed	79	245
Primary Completed	47	148
Primary not completed	36	113
All	56	175

Table 16 Comparative Earnings (Monthly earnings in US\$ ppp) (a)					
	Cameroon	Ghana (b)	Kenya	Zambia	Zimbabwe
University Completed	1,115	573	1,261	694	1,302
Secondary Completed	522	211	384	239	402
Primary Completed	326	155	276	104	267
Primary not completed	241	111	254	70	25
All	467	170	333	176	328

(a) Source: Arne Bigsten, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattillo, Mans Soderbom, Francis Teal and Albert Zeufack . Rates of Return on Physical and Human Capital in Africa's Manufacturing Sector , CSAE Working paper, WPS/98.12.

(b) The figures for Ghana in this Table relate only to the first three rounds of the survey to ensure the figures are as comparable as possible with the other countries.

Exchange Rates for Ghana (Cedis per US Dollar period averages)			
	Nominal	Purchasing Power Parity	
		Consumption	Investment
1991	367.83	147.6	371.4
1992	437.09	161.9	394.6
1993	649.06	201.6	491.99
1994	956.71	246.5	601.8
1995	1200.43	409.4	997.6
1996	1637.2	544.5	

6 Firm Productivity

Real earnings in Ghana are low, not simply by comparison with developed countries, but in the context of sub-Saharan Africa. They have also been falling over a sustained period of time. Real wages are related to the productivity of the workers. In this section information is presented on the factors that determine differences in productivity across the firms in the sample.

In Table 17 the labour productivity of firms by sector and by firm size is shown. Labour productivity is measured by value-added per employee in purchasing power parity (ppp) US dollars. The use of purchasing power parity dollars enables a comparison to be made between labour productivity in Ghana and in Mauritius later in this report. The differences in labour productivity across firms of differing size is substantial. For micro firms value-added per employee is US\$ (ppp) 3,350, that for large firms is nearly four times greater. There is also considerable variation across sectors. The sector with the highest labour productivity is sawmills with US\$ (ppp) 11,087; the lowest is in the textile and garment sector where it is US\$ (ppp) 1,939. In Table 17 four possible sources of differences in productivity across the firms in the sample are shown: The amount of physical capital per employee, the average level of education of the workforce, the average tenure of the workers and the size of the firms. The skill levels of the workforce are proxied by the education and tenure terms. Other possible factors that can explain differences in productivity are union status, foreign ownership and firm age, the data for which is presented in Table 18.

Table 17 shows that the range of physical capital per employee across firms of differing size is even larger than that for labour productivity. Micro firms have US\$ (ppp) 2,729 of capital for each employee while large firms have more than ten times as much at US\$ (ppp) 30,326. In comparison the differences in the human capital characteristics of the firms are small. The average years of education of workers in micro and small firms is ten year. For large firms the comparable number is 12, only 20 per cent higher. Tenure is longer in large and medium firms than the smaller ones, on average workers in large firms have 9 year of tenure while in micro firms they have only 5. Labour productivity essentially reflect differences in the physical capital endowments across the firms. The differences in human capital, measured by years of education and tenure, are relatively small.

Average firm size, as measured by employment, also differs greatly across sectors. By far the largest firms are to be found for sawmills where average employment is 183. The smallest firms are in the textile and garment sector with an average size of 17. It is possible to use the data to show if large firms have higher labour productivity, once the fact that they have more capital per employee is allowed for. There is no evidence that this is so, see Appendix Table 2 . For only one sector is firm size important and that is for textiles and garments. For that sector labour productivity declines with firm size.

As would be expected from the relationship between capital intensity and size Table 18 shows that unionised firms, and those with some foreign ownership, are much more highly capital intensive than non-unionised firms and those owned exclusively by private Ghanaians. Table 18 also presents a breakdown by the age of the firm. There is very little difference in labour productivity for firms aged less than twenty years. However there is some evidence that old firms (ie those greater than twenty years) have higher labour productivity which may be matched by greater overall efficiency.

In Table 19 the rates of return on capital (both physical and human) and other determinants of firm productivity, based on Appendix Table 2, are reported. The rates of return on capital are a measure of the increase in value-added that could be effected by increased investment. The rates of return on physical capital are higher than those on human capital. If the costs of investment were low then such high returns on physical capital would imply high investment rates. As is shown in section 8

investment rates in the firms are very low. The high rates of return on physical capital combined with low investment rates must imply that the costs of capital to the firm are extremely high.

Table 19 shows that older firms are more efficient than younger firms, a result suggested by the higher growth rates of younger firms documented in section 4. However, this effect is not large. Firms aged 10 are 12 per cent more efficient than they were at foundation. The most important, and rather surprising, finding is that unionised firms are 70 per cent more efficient than non-unionised firms. While there is some evidence that both foreign ownership and exporting are associated with higher levels of efficiency these effects are not, in statistical terms, significant ones. The effects are also much smaller than those associated with firms being unionised.

Table 17 Productivity by Firm Size and Sector					
	Value-added/ employee (In US\$ ppp)	Capital/ employee (In US\$ ppp)	Years of education	Tenure in current job (in years)	Number of Employees
by Firm Size					
Large	12,866	30,326	12	9	256
Medium	7,564	9,476	11	7	48
Small	3,553	2,747	10	4	14
Micro	3,350	2,729	10	5	4
by Sector					
Food	8,358	8,861	10	6	53
Furniture	3,214	2,278	10	4	55
Textile and Garments	1,939	1,785	10	6	17
Metal Working	7,813	9,238	11	6	61
Sawmills	11,087	47,426	12	6	183
Average across all firms	5,825	8,292	10	6	55
No. of observations	660	660	554	554	660

Table 18 Productivity by Union Status, by Foreign Ownership and Firm Age					
	Value-added/ employee (In US\$ ppp)	Capital/ employee (In US\$ ppp)	Years of education	Tenure in current job (in years)	Number of Employees
by Union Status					
Non-Unionised Firms	3,365	3,101	10	4	18
Unionised Firms	13,030	23,493	12	8	164
by Foreign Ownership					
No Foreign Ownership	4,214	4,018	10	5	34
Some Foreign Ownership	13,459	28,548	12	9	154
by Firm Age					
Old (>20 years)	9,714	8,768	10	9	88
Mature (<21 and >10)	4,129	5,832	10	6	59
Young (<11 and >5)	4,459	4,611	10	4	26
New (<6)	5,356	12,633	11	3	40
All Firms					
	5,825	8,292	10	6	55
No. of observations	660	660	554	554	660

7 Exporting

The pattern of exports from firms in Ghana's manufacturing sector is considered in this section. In Table 20 the pattern of exporting to all other countries is shown. In Table 21 exporting to countries outside of Africa is shown. In order to ensure comparability across the Tables the sample is confined to the rounds of the survey for which information on the origin of exports was collected.

The amount of exporting is very low. Table 20 shows that only 11 per cent of the firms in the sample export any of their output. Exporting is largely confined to large firms in the wood processing sector. No other sector exports more than 14 per cent of its output. For those firms that do export, on average, they only export 33 per cent of their output. Thus for the whole sample only 4.2 per cent of output is exported. As the sample greatly over-represents the proportion of large firms this figure is a considerable over-statement of the extent of exporting from Ghana's manufacturing sector

Table 19 The Determinants of Productivity (a)	
Rate of Return on Physical Capital (Per cent) Median V/K =2.3	$= (0.17 \times 2.3) \times 100$ = 40
Rate of Return on Education (per cent) Median years of education=10.6	$= (0.49/10.6) \times 100$ = 5
Rate of Return on Tenure (per cent) Median years of tenure =4	$= (0.14/4) \times 100$ = 4
Percentage Increase in Labour Productivity for	
Some Foreign ownership	15(b)
Unionisation	70
Exporting	26 (b)
Firm Aging from Foundation to Ten Years	12
Percentage Increase in Underlying Efficiency from 1993 to 1995	0
(a) Based on Appendix Table 2. (b) These are point estimates from the production function. They are not, at the 5 per cent significance level, different from zero.	

A formal analysis of the decision to export is presented in Appendix Table 4. The analysis confirms that large firms are much more likely to export as are those in the wood processing sector. While large firms are more likely to export there is no evidence that, once in the export market, they export a larger percentage of their output. A lack of specialisation in firms that are exporting seems to be a characteristic of all sizes of firms. There is no evidence that more efficient firms are more likely to export where efficiency refers to the underlying efficiency with which the firm operates (see Appendix Table 4). Older firms are less likely to export and more capital intensive firms more likely to export. The firm age findings is consistent with the lack of any efficiency effect on exporting and the capital intensity finding reflects the fact that the wood processing sector is more capital intensive than other sectors. There is some evidence that increased skills, in terms of tenure, increases the probability of exporting.

In Appendix Table 5 a similar analysis is conducted for the decision to export to the world. Here the only factor that predicts such exporting is whether the firm is in the wood processing sector. In Table 21 the figures for exports outside of Africa are given. It is Table 21 that reflects the international competitiveness of Ghana's manufacturing sector. Many of the exports within Africa reflect regional

trade, the determinants of which are similar to domestic trade. It is clear that exporting is of negligible importance for the sector. Only 6 per cent of firms in the sample export to the world. As on average they export 47 per cent of their output the total exported is less than 3 per cent. Once the focus is on exports outside of Africa the fact that exporting is almost entirely confined to the wood processing sector, in which firms are relatively large, is apparent. These firms are, as was noted in section 6 above, relatively capital intensive. Increasing wood processing exports is an expensive way of generating jobs in the manufacturing sector. In fact it is the most expensive possible way in terms of the amounts of capital required.

The sector which has the second most firms exporting outside of Africa is the furniture sector; although at 9 per cent this is very small. As, on average, only 28 per cent of output is exported, from those firms that do export the total amount exported is only 2 per cent. Furniture firms are both much less capital intensive and much smaller than those in the sawmills sector. However, at present, they are not geared to exports of any but a minor scale.

Table 20 All Exports by Firm Size and Sector (a)			
	Percentage of firms exporting	Percentage exported if firm exports	Percentage exported
by Firm Size			
Large	38	33	13
Medium	10	44	4
Small	9	40	4
Micro	0	.	.
by Sector			
Food	4	7	0.3
Garments and Textiles	8	54	5
Furniture	10	25	3
Sawmills	78	80	62
Metals	14	25	4
Average across all firms	11	33	4.2
No. of Observations	359	40	359
(a) Data is confined to rounds 3 to 5 to ensure comparability between Tables 20 and 21. However there are only slight differences across the rounds in the characteristics of exporting firms.			

Table 21 Exports Outside of Africa by Firm Size and Sector (a)			
	Percentage of Firms Exporting	Percentage Exported	Percentage Exported
by Firm Size			
Large	17	59	10
Medium	8	46	3
Small	4	33	1
Micro	0	.	0
by Sector			
Food	2	5	0.1
Garments and Textiles	6	42	3
Furniture	9	28	2
Sawmills	78	79	61
Metals	0	.	0
Average across all firms			
	6	47	2.6
No. of Observations	359	20	359
(a) Data Rounds 3-5. It is only for these rounds that the data by source of export was collected.			

Two findings from the survey are important for an understanding of the factors that limit the growth of exports from firms in Ghana's manufacturing sector. The first is that only the wood processing sector exports any sizable fraction of its output. If this sector is to expand its profitability needs to be assessed. The second is the failure of the textile and garment sector to orient itself to exports to any significant extent. In other countries it is this sector which has provided the basis for export growth.

What factors limit the ability of the textile and garment sector to export from Ghana? There are two possible answers to that question. The first is that Ghana's exports of primary processed goods are more profitable than the exports of textiles and garments. The second is that firms in the sector are too small and inefficient to be able to export. A comparison is possible between the firms in Ghana's textile and garment sector with those in Mauritius, Table 22. Mauritius is the only country within the sub-Saharan Africa region which has been able to grow through exporting labour intensive manufactures. The wood sector is excluded from the comparison as there is not a wood processing sector in Mauritius. Two features of the data are striking. First, while on average the Mauritian manufacturing sector has 3.7 times the capital per employee of Ghana, it produces 6.7 times the

amount of value-added per employee. In the textile and garment sector this differential is even greater. The Mauritian sector has twice the capital per employee of Ghana but it produces over seven times as much value-added per employee. The differences in productivity appear to be largely the result of the efficiency with which the firms are operated, rather than the amounts of physical capital. Such an inference needs to be treated with caution. The capital stock in Mauritius is undoubtedly much younger than that in Ghana. The valuation figures may fail to reflect the higher quality, that comes from more recent investments, of the capital stock in Mauritius. Even allowing for that reservation it appears that relatively small investment in firms that are efficiently managed can provide the basis for a successful export sector.

Table 22 Firm Characteristics Compared between Ghana and Mauritius by Sector Employee is number of Employees, Value-added and Capital are measured in purchasing power parity US\$, Education and Tenure are in Years					
	Food	Textile and Garments	Furniture	Metal Working and Machines	All Sectors
Ghana N	155	152	138	175	620
Employment	53	17	55	61	47
Value-added/ Employee	8,358	1,939	3,214	7,813	5,485
Capital/ Employee	8,861	1,785	1,785	9,238	5,767
Education	10	10	10	11	10
Tenure	6	6	4	6	6
Mauritius N	2	12	3	18	35
Employment	136	181	200	96	136
Value-added/ Employee	41,405	14,174	94,955	43,264	37,615
Capital/ Employee	55,984	3,555	7,573	30,784	20,900
Education	10.3	10.0	6.8	10.5	10.0
Tenure	na	na	na	na	na

The other striking difference between Mauritius and Ghana is in the size of firms in the textile and garment sector. The average size of firms in Mauritius is 181 employees, as compared with 17 in Ghana. It is clear that Mauritius has achieved far more labour intensive large firms than has been possible in Ghana. Such large, labour intensive, firms may be the key to export success.

8 Investment and Finance

The pattern of investment and its financing in Ghana's manufacturing sector is set out in this section. The figures for investment in plant and equipment and investment in land and buildings are presented separately.

In Table 23 the investment to capital ratios are shown by the size and sector of the firm. For the whole sample the average rate of investment in plant and equipment, ie the ratio of such investment to the value of the capital stock of the firm, is 10 per cent. In an internationally comparative context this is a very low rate of investment. The rate of investment in building and land is 3 per cent. There is no evidence of rises over the period of the surveys. The levels of investment are low and static.

The data in Table 23 shows that about half of the firms in the sample, in any year, do not invest. This may be due either to risk and uncertainty affecting the timing of investment or that, for small firms, many investment are relatively large so there is a problem of items being indivisible. That indivisibility possibly plays a role is suggested by the strong association between firm size and the percentage of firms in any one year which are investing. When smaller firms do invest they tend to invest a higher proportion of their value of capital than larger firms. The result is that there is little correlation between firm size and overall investment rates.

The sector which has the lowest rate of investment is the textile and garment sector. This is the sector in which rapid growth has occurred in countries which have been able to successfully export their manufacturing goods. An example, to which reference has already been made, is Mauritius. In any year only one-third of firms carry out any investment in plant and equipment and the investment ratio is only 8 per cent. The similar figure for investments in land and buildings is 1 per cent.

In Tables 24 and 25 the sources of financing for the investments are given. On average, across all the firms, 72 per cent of investment in plant and equipment is financed by the firm's retained earnings. This percentage differs very little by the size of firm (Table 24); the importance of retained earnings is the same for micro and large firms. For investment in plant and equipment the next most important sources of funding are personal savings (8 per cent) and bank loans (7 per cent), Table 2. Here, as would be expected, most bank loans go to larger firms. The survey did find some loans to micro enterprises but very few.

In the financing of investment in building and land, recalling that there are very few such investments in the surveyed firms, the pattern of financing is similar to that for plant and equipment. The firm's retained earnings finance 62 per cent of the investments, personal savings 17 per cent and bank loans and overdrafts 7 per cent. It is possibly important that the proportion of finance coming from banks is the same for investments in plant and equipment as for land and buildings. It is often argued that bank finance is difficult to obtain because of the need for collateral for loans. It would be anticipated that such collateral would be easier for investment in building and land. The fact that bank loans are no more important for this type of investment than for plant and equipment suggest the problems lies elsewhere than in collateral.

Table 23 Investment/Capital Ratios by Size and Sector (1991-95)						
	Percentage of Firms Investing in Plant and Equipment	Ipe/Kpe Ratio if Firm Invests	Ipe/Kpe Ratio for All Firms	Percentage of Firms Investing in Land and Buildings	Ilb/Klb Ratio if firm Invests in Land and Buildings	Ilb/Klb Ratio for All Firm
by Firm Size						
Large	71	0.16	0.12	17	0.17	0.03
Medium	56	0.17	0.09	14	0.41	0.06
Small	44	0.23	0.10	7	0.37	0.02
Micro	32	0.25	0.08	2	1.00	0.02
By Sector						
Food	51	0.23	0.12	14	0.42	0.06
Garments, Textiles	32	0.21	0.07	8	0.15	0.01
Furniture	56	0.24	0.14	8	0.41	0.03
Sawmills	56	0.18	0.10	8	0.14	0.01
Metals	56	0.14	0.08	12	0.28	0.03
All Firms	49	0.20	0.10	10	0.32	0.03
No. of obs.	805	395	805	381	39	381

Ipe/Kpe = Investment in Plant & Equipment/ Replacement Value of Capital Stock of Plant & Equipment;
Ilb/Klb = Investment in Land & Buildings/ Replacement Value of Capital Stock of Land & Buildings

**Table 24 Sources of Financing for Investment in Plant & Equipment 1991-95
by Size and Sector**

	Company Retained Earnings	Personal Savings	Borrowed from Friend or Relative	Bank Loan or Overdraft	Supplier Credit	borrowed from Money lender	Other
by Size							
Large	65	3	0	11	10	0	10
Medium	67	10	2	10	1	0	10
Small	81	6	6	5	1	0	1
Micro	63	21	9	3	4	0	0
by Sector							
Food	53	16	5	16	3	0	8
Garment, Textiles	78	3	5	9	2	0	3
Furniture	84	5	4	2	1	0	4
Sawmills	62	10	0	8	16	0	3
Metals	75	7	2	6	3	0	6
All	71	8	4	8	3	0	5
N=366							

**Table 25 Sources of Financing for Investment in Land and buildings 1991-95
by Size and Sector**

	Company Retained Earnings	Personal Savings	Borrowed from Friend or Relative	Bank Loan or Overdraft	Supplier Credit	borrowed from Money lender	Other
by size							
Large	81	8	0	6	0	0	6
Medium	47	19	0	14	4	0	15
Small	67	18	4	0	0	0	11
Micro	62	17	1	7	2	0	11
by Sector							
Food	52	25	0	14	5	0	5
Garment, Textiles	75	25	0	0	0	0	0
Furniture	56	22	0	11	0	0	11
Sawmills	60	0	0	20	0	0	20
Metals	70	5	3	3	0	0	19
All	62	16	1	9	2	0	11
N=65							

Appendix Table 1 Growth Rates of the Firms

Dependent Variable	Growth Rate from foundation to 1993 (% per annum)	Growth Rate from 1991 to 1995 (% per annum)		
		Employment	Capital	Value-added
Mean of Dependent Variable	0.10	0.01	0.06	0.01
Constant	0.28 [9.0]**	0.24 [3.1]**	0.24 [2.6]**	2.4 [5.4]**
Employment in Initial Period	-0.07 [6.2]**	-0.08 [3.3]**		
Capital in Initial Period			-0.01 [1.8]	
Value-added in Initial Period				-0.24 [5.8]**
Firm Age in 1991	-0.006 [5.1]**	-0.004 [1.6]	-0.0007 [0.6]	0.01 [0.9]
Foods	-0.03 [1.2]	0.05 [0.8]	0.05 [1.9]	0.19 [1.3]
Textile and Garments	0.0002 [0.01]	0.16 [2.3]*	-0.01 [0.4]	0.09 [0.6]
Sawmills	0.06 [0.8]	0.19 [1.5]	0.07 [1.2]	0.01 [0.03]
Some Foreign Ownership	0.04 [1.0]	0.02 [0.4]	0.07 [2.2]	0.05 [0.3]
Some State Ownership	-0.01 [0.2]	-0.11 [1.2]	-0.04 [0.9]	0.09 [0.4]
Union	0.14** [3.8]	0.27 [3.8]**	0.03 [0.7]	0.70 [3.9]**
Adjusted R ²	0.36	0.05	0.02	0.14
N	115	254	254	254
White χ^2 (df)	26 (35)	50 (61)	31 (59)	64 (59)

The figures in [] parentheses are t statistics. * is significant at the 5 per cent level, ** at the 1 per cent

Appendix Table 2 Productivity

Dependent Variable Ln(Value-Added in US\$ppp/Labour)

	All Firms	Food	Furniture	Textiles and Garments	Metal Working
Mean of Dependent Variable	7.94	8.55	7.4	5.33	8.2
Constant	4.6 [8.7]**	4.8 [4.7]**	4.6 [3.7]**	5.3 [3.1]**	4.7 [4.1]**
Ln(Capital in US\$ppp/ Labour) _(t-1)	0.17 [5.5]**	0.24 [3.6]**	0.18 [2.7]*	0.29 [3.0]**	0.11 [1.7]
Ln (Education) _(t-1)	0.49 [2.7]**	0.06 [0.2]	0.84 [1.8]	0.34 [0.5]	0.80 [2.4]*
Ln (Tenure) _(t-1)	0.14 [1.8]	0.15 [1.3]	0.34 [1.5]	0.14 [1.0]	0.08 [0.4]
Ln (Employment) _(t-1)	-0.09 [1.6]	0.18 [1.3]	-0.18 [1.2]*	-0.35 [2.4]	0.03 [0.2]
Some Foreign Ownership	0.14 [0.9]	-0.36 [1.2]	0.49 [1.0]	-0.23 [0.5]	-0.11 [0.3]
Some State Ownership	-0.43 [1.7]	-1.34 [3.5]**	-0.24 [0.2]	0.49 [1.0]	-0.28 [0.6]
Union	0.53 [2.9]**	-0.01 [0.03]	0.27 [0.5]	1.35 [2.1]*	1.26 [2.9]**
Exports	0.23 [1.3]	0.09 [0.2]	0.09 [0.2]	0.57 [1.4]	0.11 [0.3]
Firm Age	0.01 [2.1]*	0.02 [1.97]	0.01 [0.3]	-0.02 [1.5]	-0.001 [0.04]
Round 3	-0.06 [0.4]	-0.31 [1.2]	0.03 [0.1]	-0.15 [0.5]	-0.24 [0.7]
Round 4	0.15 [1.0]	-0.26 [0.9]	0.14 [0.5]	0.42 [1.5]	0.09 [0.3]
Round 5	-0.15 [1.0]	-0.52 [1.9]	-0.11 [0.3]	-0.12 [0.4]	-0.06 [0.2]
Adjusted R ²	0.45	0.41	0.26	0.57	0.32
No. of observations	377	88	91	65	117
White χ^2 (df)	176 (172)	70 (89)	65 (77)	65 (70)	87 (100)
The figures in [] parentheses are t statistics.* is significant at the 5 per cent level, ** at the 1 per cent					

Appendix Table 3 Earnings Regression:

Dependent Variable Ln (Real Earnings)

	All workers and Apprentices who earn		Male workers and apprentices who earn
Constant	5.7 [44.4]**	5.7 [43.7]**	5.8 [43.2]
Male	0.11 [3.2]**	0.11 [3.3]**	
Age	0.15 [23.8]**	0.15 [24.2]**	0.16 [25.3]
Age ²	-0.002 [19.8]**	-0.002 [19.9]**	-0.002 [19.9]**
Years of Education	-0.028 [3.6]**	-0.027 [3.4]**	-0.038 [4.6]**
Years of Education ²	0.003 [7.9]**	0.003 [7.4]**	0.004 [9.6]**
Tenure	0.003 [1.95]	0.004 [2.3]*	0.004 [2.2]*
Skill	0.41 [17.7]**	0.30 [5.2]**	0.21 [3.6]**
Union	0.29 [10.2]**	0.29 [10.3]**	0.28 [9.3]**
Some Foreign Ownership	0.13 [6.1]**	0.13 [5.9]**	0.15 [6.2]**
Some State Ownership	-0.03 [1.2]	-0.03 [0.9]	-0.05 [1.3]
Ln (Average Employment)	0.07 [5.4]**	0.07 [4.8]**	0.07 [4.3]**

Appendix Table 3 (continued) Earnings Regression:

Dependent Variable Ln (Real Earnings)

	All workers and Apprentices who earn		Male workers and apprentices who earn
Round 2	0.02 [0.5]	0.02 [0.4]	-0.003 [0.1]
Round 3	-0.13 [3.4]**	-0.16 [3.3]**	-0.24 [5.4]
Round 4	-0.18 [4.5]**	-0.21 [4.0]**	-0.26 [5.4]**
Round 5	-0.31 [7.8]**	-0.37 [7.2]**	-0.42 [8.8]**
Skill*Round 2		0.03 [0.4]	0.15 [1.9]
Skill*Round 3		0.10 [1.4]	0.22 [2.9]*
Skill*Round 4		0.12 [1.63]	0.22 [2.9]*
Skill*Round 5		0.22 [3.0]**	0.33 [4.3]**
Adjusted R ²	0.54	0.54	0.56
N	4705	4705	3959
White χ^2	712 (251)**	765 (322)**	672 (295)**

The figures in [] are t statistics which have been corrected for heteroscedasticity. * is significant at the 5 per cent level, ** at the 1 per cent

Appendix Table 4 The Decision to Export (To All Countries)

	Probit on the decision to export	Percentage of Output Exported		Tobit
		No selectivity correction	Selectivity Correction	
Constant	-6.3 [3.8]**	20.9 [0.3]	46.7 [0.5]	-292.7 [3.9]**
Ln (Employment) _(t-1)	0.31 [3.1]**	0.70 [0.2]		13.2 [2.9]**
Ln (Capital/Labour) _(t-1)	0.16 [2.3]*	1.25 [0.4]	0.9 [0.3]	8.5 [2.7]**
Ln (Education) _(t-1)	0.60 [0.9]	-31.5 [1.6]	-34.1 [2.0]*	16.3 [0.5]
Ln (Tenure) _(t-1)	0.38 [2.2]*	10.2 [1.5]	9.0 [1.4]	19.4 [2.6]*
Firm Efficiency(a)	0.08 [0.9]	-2.5 [0.5]	-2.9 [0.7]	4.2 [0.9]
Firm Age	-0.04 [3.4]**	-1.5 [2.3]*	-1.4 [1.9]	-1.8 [3.5]**
Foods	-0.78 [2.5]*	17.4 [0.8]	19.9 [1.3]	-37.5 [2.5]*
Textile and Garments	0.42 [1.4]	43.5 [3.5]**	42.2 [4.3]**	26.5 [2.0]*
Sawmills	2.3 [4.1]**	79.2 [4.0]**	72.2 [2.6]*	117.7 [5.7]**
Furniture	0.17 [0.6]	15.6 [1.2]	15.2 [1.4]	10.3 [0.8]
Some Foreign Ownership	-0.05 [0.2]	2.9 [0.2]	2.6 [0.2]	-6.4 [0.5]
λ			-4.9 [0.4]	
σ				47.7 [8.4]
Adjusted R ²		0.64	0.64	
White χ^2 (df)		42 (50)		
N	459	47	47	459
Log Likelihood	-106.0			-269.4

The figures in [] parentheses are t statistics. * is significant at the 5 per cent level, ** at the 1 per cent level.
(a) Firm efficiency is measured by the residuals from the production function.

Appendix Table 5 The Decision to Export (Countries Outside of Africa)

	Probit on the decision to export	Percentage of Output Exported
		No selectivity correction
Constant	-2.5 [1.8]	--141.7 [2.4]
Ln (Employment) _(t-1)	0.14 [1.0]	17.4 [3.6]**
Ln (Capital/ Labour) _(t-1)	0.06 [0.7]	11.7 [2.9]*
Ln (Education) _(t-1)	-0.31 [0.6]	7.4 [0.6]
Ln (Tenure) _(t-1)	0.19 [0.8]	-12.4 [0.9]
Firm Efficiency	-0.01 [0.1]	-5.8 [1.1]
Firm Age	-0.02 [1.4]	-1.2 [2.4]*
Foods	-0.20 [0.5]	-74.1 [5.7]**
Textile and Garments		
Sawmills	2.9 [4.5]**	0.8 [0.1]
Furniture	0.6 [1.9]	14.4 [0.9]
Some Foreign Ownership	0.3 [0.8]	-73.1 [3.5]**
λ		
σ		
Adjusted R ²		0.90
White χ^2 (df)		19 (25)
N	350	20
Log Likelihood	-53.4	
The figures in [] parentheses are t statistics.* is significant at the 5 per cent level, ** at the 1 per cent		

Appendix Table 6 The Investment Decisions of the Firms

	Probit on the decision to invest	Investment/Capital _(t-1)		Tobit	Panel Tobit
		No selectivity correction	Selectivity Correction		
Constant	-1.52 [4.0]**	0.2 [1.1]	0.5 [2.1]*	-0.62 [3.7]**	
Value-added/ Capital	0.02 [1.4]	0.03 [4.4]**	0.03 [4.2]**	0.02 [3.8]**	0.02 [0.8]
Cash Flow ($\pi/K_{(t-1)}$)	-0.01 [0.7]	-0.02 [2.9]**	-0.02 [2.9]**	-0.01 [1.98]*	-0.01 [0.5]
Δ Value-added/ Capital _(t-1)	0.01 [1.1]	0.01 [2.4]*	0.01 [2.2]**	0.01 [2.8]**	0.02 [0.9]
Negative Profits	-0.65 [2.1]*	0.16 [0.9]		-0.16 [1.1]	0.002 [0.01]
Ln (Employment)	0.36 [4.3]**	0.05 [1.3]		0.14 [3.9]**	-0.04 [0.4]
Firm Age	-0.005 [0.1]	-0.003 [1.0]	-0.003 [0.9]	-0.003 [1.1]	
Foods	-0.1 [0.4]	0.33 [4.1]**	0.31 [4.0]**	0.22 [2.8]**	
Textile and Garments	-0.4 [2.2]*	0.22 [2.3]*	0.25 [2.5]	-0.02 [0.2]	
Sawmills	0.6 [1.4]	-0.01 [0.1]	-0.05 [0.3]	0.13 [0.7]	
Some Foreign Ownership	0.16 [0.7]	0.04 [0.4]	0.04 [0.4]	0.09 [0.9]	
Some State Ownership	-0.54 [1.7]	-0.21 [1.2]	-0.12 [0.8]	-0.28 [1.8]	
λ			0.12 [0.8]		
σ				0.52 [19.6]	
Adjusted R ²		0.15	0.14		
White χ^2 (df)		174 (136)*			
N	421	216	216	421	421
Log Likelihood	-261.9			-282.1	

The figures in [] parentheses are t statistics. * is significant at the 5 per cent level, ** at the 1 per cent.