Ethnicity and Wage Determination in Ghana

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WPS/2000-9

Abstract: This paper looks at earnings differentials between (1) members of different ethnic groups and (2) employers' relatives, unrelated co-ethnics, and other workers, in the Ghanaian manufacturing sector. We find that a significant proportion of the identified earnings differentials between ethnic groups can be explained with reference to a fairly standard set of observed workers' characteristics. Labour market segregation along ethnic lines combined with considerable variation in employer characteristics (possibly due to discrimination in other markets) accounts for most of the remaining differentials. There is no evidence of statistical discrimination between ethnic groups, although there is evidence of such discrimination in favour of inexperienced co-ethnic workers, who can be more easily assessed and matched to jobs than similar workers from other ethnic groups. Finally, workers who are related to their employers earn a considerable premium, possibly because they contribute more than their fellow workers to productivity.

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1. Introduction

Discussions about economic policy between international organisations and African governments rarely touch upon issues relating to ethnicity. And yet recent contributions to the literature on cross-country differences in economic performance indicate that ethnic diversity is associated with very high economic costs, in terms of lower rates of economic growth due to the adoption of dysfunctional macroeconomic policies (Easterly and Levine (1997)) and lower levels of trust and weak norms of civic cooperation (Knack and Keefer (1997)), and increased probabilities of civil war (Collier and Hoeffler (1998)).[1] Given these findings, surely the time has come to place the economics of ethnicity on the agenda for policy debate.

The two most commonly raised arguments against placing ethnic issues on this agenda are that ethnic diversity is pre-determined and cannot be manipulated by economic policy and that ethnic issues are politically sensitive.[2] With respect to the first of these, we suggest that, while levels of ethnic diversity cannot be changed, there may be ways of changing their effect on economic outcomes. A necessary prerequisite for identifying policy interventions that might achieve this objective is a deeper understanding of the role and effects of ethnic diversity at the micro-level. We need to know how and why ethnic identity and ethnic boundaries affect the economic decisions that people make during their everyday lives. Through such an investigation we may be able to identify the conditions under which the negative effects of ethnic diversity on economic outcomes might be minimised. In addition and with respect to the second argument, by increasing our understanding of why ethnicity matters and, wherever possible, linking it to rational choice, we may start to depoliticise the topic.

The following analysis contributes to this effort by investigating the effects of ethnic identity and ethnic boundaries on labour market outcomes in the Ghanaian manufacturing sector. The analysis draws from the literature on the economics of discrimination within labour markets. This literature, with its strong empirical component, provides us with a well developed conceptual framework and a set of tools for identifying, categorising, and quantifying the effects of Ghana's ethnic diversity on manufacturing workers' earnings. However, this literature focuses almost exclusively on discrimination against black relative to white workers and women relative to men in OECD labour markets. While most of the models proposed do not rule out the possibility that employers may come from 'disadvantaged' as well as 'advantaged' groups, throughout the literature and especially its empirical dimension, there is an

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[1] Easterly and Levine (1996) and Collier and Hoeffler (1998) use an index of ethnolinguistic fractionalization, defined as the probability of two randomly drawn individuals for the same country belonging to different ethnic groups, Knack and Keefer (1997) use a measure of ethnic homogeneity, defined as the proportion of the population belonging to the largest ethnic group.

[2] Ethnicity became an important political issue in Africa after independence, as pressure grew for the new leaders to create opportunities for indigenous capital, mediate between conflicting ethnic claims on public resources, and enable lagging groups to catch up to those that had secured early economic advantages (Apter (1965), Cohen (1969), Bates (1974), Rothchild and Oluonsola (1983)). Around this time a number of African countries including Ghana attempted to promote indigenous African business by introducing regulations that pressured Lebanese and Indian entrepreneurs to vacate trading and small-scale services (leaving these for African entrepreneurs) and move their capital into manufacturing. More recently democratisation has often been accompanied by an increase in the politicisation of ethnicity (Glickman (1995)).

implicit assumption that employers are predominantly white and male, i.e., from the advantaged group. In the Ghanaian context it would be entirely inappropriate to assume that employers come predominantly from one ethnic group. Indeed, our data from the manufacturing sector indicates that the distributions of employers and employees across ethnic groups are very similar. Thus, in our investigation we need to take account both of discrimination between different ethnic groups and of discrimination between own and other ethnic groups.[3] In each case our objective, wherever possible, is to identify and discern between taste-based discrimination, statistical discrimination, and discriminatory outcomes that are due to networking and other factors.

The paper has six sections. Following this introduction, Section 2 contains a brief review of the literature on labour market discrimination. Then, in Section 3 we set out our methodology for identifying and testing various hypotheses about the origins of ethnic earnings differentials in the Ghanaian manufacturing sector. In Section 4 we describe our data. We present our results in Section 5 and in Section 6 we draw our conclusions.

2. Review of the Literature on Labour Market Discrimination

Following Altonji and Blank (1999) we define labour market discrimination as 'a situation in which persons who provide labour market services and who are equally productive in a physical or material sense are treated unequally in a way that is related to ... ethnicity' (p. 3168). Further, we endeavour to distinguish between current labour market discrimination, given predetermined worker characteristics, and the effects of prior discrimination on those characteristics. Such pre-market discrimination can take two forms. First, discrimination may occur in other markets. So, for example, the quality of the schooling that is accessible to different groups may vary (O'Neill (1990), Maxwell (1994) and Neal and Johnson (1996)). Second, past labour market discrimination may affect current labour market outcomes to the extent that it affects how workers from different groups prepare for entry into the labour market. So, for example, it may affect their chosen level of investment in human capital (Loury (1977, 1981), Durlauf (1992), Benabou (1994, 1996), Lundberg and Startz (1998)).

Discrimination can be motivated in several ways. Becker (1971) focused on the effects of a taste for discrimination. In his model discriminating employers behave as if the price associated with hiring a worker from the less favoured group is their wage plus an additional amount which he calls the 'coefficient of discrimination'. As a result, workers are segregated with those from the less favoured group being hired by the less prejudiced employers and suffering a wage differential that is determined by the preferences of their most prejudiced employer. Further, discriminating employers earn lower profits, so with free entry the effects of discrimination on earnings disappear in the long run. In the US and Europe this has not happened. A similar and similarly problematic prediction derives from Becker's (1971) model in which the employers' disutility is associated with placing the less favoured group in a certain occupation with occupational segregation and a short run earnings differential as the outcome.[4] However, Coate and Loury (1993a) present an alternative model in which all

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[3] Collier and Garg (1999) find evidence of discrimination in favour of the dominant kin group in the Ghanaian public sector.
[4] Becker (1971) also presents models of employee and consumer discrimination.

employers have the same preferences, thereby removing the tendency for the earnings gap to disappear in the long run. This tendency can also be eliminated by the introducing imperfect information in the form of search costs and thereby rendering segregation costly (Borjas and Bronars (1989), Black (1995), Bowlus and Eckstein (1998)). These models do not predict segregation unless it is the employers and not the workers who are conducting the search (Bowlus and Eckstein (1998)).

In the Ghanaian context a taste for discrimination could lead to a premium for workers employed by members of their own ethnic group. However, given that no particular group dominates the role of employer, we do not expect discrimination motivated by taste to lead directly to a wage premium for any particular group.[5] This notwithstanding, to the extent that (1) a taste for discrimination in favour of co-ethnics leads to segregation and (2) discrimination in credit and other markets leads to variations in the labour demand curves of different types of employer, we may observe earnings differentials between groups.

Imperfect information also provides the foundations for models of statistical discrimination. Building on the pioneering work of Phelps (1972) and Arrow (1973) this literature explores the consequences of firms having limited information about the skills and reliability of job applicants, especially young and inexperienced ones, and therefore using correlated and easily observable characteristics such as ethnicity to discriminate between them. One particular finding in this literature is that, due to feedback via, for example, investments in human capital, biased stereotypes might be self confirming (Arrow (1973), Coate and Loury (1993b)). In the Ghanaian context statistical discrimination of this form could be leading to both current labour market discrimination and feedback effects and consequent earnings differentials between members of different ethnic groups.

Another form of statistical discrimination may affect the earnings of co-ethnic and related workers. Aigner and Cain (1977) and subsequently Lundberg and Startz (1983) and Lundberg (1991) have explored the effects of group differences in the precision of the information that employers have about individual productivity when that productivity depends on the quality of the match between worker skills and the requirements of the job. Those groups for which more precise information is available will earn a premium. However, if employers learn as workers gain more exposure to the market and if there is no underlying difference in productivity, the premium will be eroded by worker experience. In the literature this form of discrimination may also lead to *ex post* differences in productivity across groups. However, this does not apply in our context where the favoured workers are defined by their sameness to their employers rather than by some dimension of individual identity.

There is a close conceptual link between this work on statistical discrimination and Montgomery's (1991) work on the effect of social networks on labour market outcomes. In both cases some dimension of social structure is associated with a variation in the amount or accuracy of the information available to employers about prospective employees and vice versa. In the former, the agents have better information about others with whom they share a particular aspect of social identity which may be linked to language, culture, or some other determinant of cognition. In the latter, agents have better information about others with whom they share a social

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[5] To the extent that all employers, regardless of their own ethnicity prefer to employ any particular ethnic group it is more likely to be due to some form of statistical discrimination.

connection. Building on Granovetter (1973) and Rees and Schultz (1970), Montgomery (1991) shows that, if social networks are important for this reason, 'workers who are well connected might fare better than poorly connected workers (p. 1408)'. Arrow (1998) makes the connection between this literature and racial discrimination. He cites Kranton and Minehart (1997), who show that a sufficiently dense network will mimic a perfect market, and argues that evidence of statistical discrimination should be viewed as evidence that networks are both important and imperfect in the sense that they are not sufficiently dense.

3. Methodology

3.1 Investigating the variations in earnings between ethnic groups

Given a sample of workers, the extent of the variation in earnings between ethnic groups can be established by estimating the following equation:-

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \xi_{1i} \tag{1}$$

where $\ln w_i$ is the log of earnings for worker i, α_0 is a constant term e_i is a vector of dummies, one corresponding to each ethnic group represented in the sample, α_1 is the vector of coefficients associated with those ethnic dummies, and ξ_{1i} is the error term. The joint significance of α_1 tells us whether there is variation across the ethnic groups, the sign and significance of specific elements of α_1 tells us whether particular groups earn significantly more or less than the group chosen as a basis for comparison, and the signs and significance of differences between the elements of α_1 provide us with similar information about other pairwise comparisons.

In an effort to establish how much of the identified earnings differentials are due to variations in predetermined personal characteristics, we then add a vector of worker personal characteristics, x_i, to the function

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \xi_{2i}. \tag{2}$$

Further, to investigate whether the returns associated with various personal characteristics vary across ethnic groups, we introduce a series of interaction terms between e_i and x_i,

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_3 e_i x_i + \xi_{3i}. \tag{3}$$

Traditionally, the significance of α_1 and α_3 are interpreted as evidence of current labour market discrimination, while $\alpha_2 x_i$ is assumed to be absorbing the effects of variations in personal characteristics, some of which may be due to pre-market discrimination. However, we must be aware of potential omitted variable bias. Omissions of particular concern include controls for innate ability, school quality, worker preferences and comparative advantages.[6]

In accordance with the literature on labour market discrimination, we use equations (2) and (3) as a basis for our conclusions about whether discrimination is causing

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[6] Variations in preferences for particular job characteristics across ethnic groups could provide an alternative explanation for both earnings differentials and sorting. It is, however, encouraging to note that variations in preferences have been less the concern of those interested in black-white differentials than those focusing on male-female differentials. Similarly, the discussion about variations in comparative advantages between groups has primarily been limited to male-female comparisons (e.g. Becker (1991)).

ethnic earnings differentials in the Ghanaian manufacturing sector. We then build on equation (2) in our efforts to identify the form that this discrimination takes.

Recall that, while a taste for discrimination is unlikely to lead directly to earnings differentials between ethnic groups, a taste for employing co-ethnics combined with discrimination in other markets could lead to segregation and, as a consequence, to such earnings differentials.[7] To test whether this is indeed the case, and establish the extent to which ethnic earnings differentials are the result of such a mechanism, we introduce a vector of dummies, g_i, dummies corresponding to the ethnicity of the workers' employers into the earnings function:-

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_4 g_i + \xi_{4i} \tag{4}$$

A significant vector of coefficients, α_4, combined with declines in the magnitude and significance of elements of α_1 would indicate that ethnic segregation due primarily to the employment of co-ethnics is a source earnings differentials. We can take this line of analysis one step further by introducing another vector of employer's characteristics, h_i, that includes variables such as size and capital-labour ratio into the function,

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_4 g_i + \alpha_5 h_i + \xi_{5i} \tag{5}$$

To the extent that the inclusion of h_i reduces the significance of α_4 we gain some indication as to why employers from different ethnic groups pay differently. Further, workers may be segregated not only on the basis of co-ethnicity with their employer. Some ethnic groups may be preferentially employed by larger or more capital intensive enterprises, or by public or foreign owned enterprises. If this is the case the introduction of h_i will cause declines in the magnitude and significance of α_1.[8]

Our data set is unusual in that it contains both worker and employer characteristics. However, the range of employer characteristics is limited. Thus, in order to fully control for segregation we also estimate a version of (5) in which g_i and h_i are replaced with employer's fixed effects, d_i (fixed across workers not time),

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_6 d_i + \xi_{6i}. \tag{6}$$

Having fully controlled for segregation effects we can focus entirely on within-enterprise variations in earnings between ethnic groups. So, to this final with-fixed-effects specification we first, rather circumspectly, introduce a vector of occupational dummies, o_i,

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_6 d_i + \alpha_7 o_i + \xi_{7i} \tag{7}$$

and monitor the effect on α_1. Significant elements in α_7 combined with a reduction in the magnitude and significance of elements in α_1, could indicate that there is job crowding for some ethnic groups. However, it could also indicate that the observed personal characteristics previously entered into the earnings function are failing to pick up some important aspects of human capital which are correlated with job type.

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[7] Fafchamps (2000) shows that members of different ethnic groups have differential access to suppliers credit, although his analysis focuses on the distinction between African and non-African entrepreneurs rather than finer distinctions between African entrepreneurs from different ethnic groups.

[8] Even in the US, where we might expect labour markets to function better, employer characteristics such as sector and size are found to be important determinants of earnings (e.g., Krueger and Summers (1988) and Brown and Medoff (1989)).

We also endeavour to establish whether observed earnings differentials are due to statistical discrimination. Altonji and Pierrot (1997) test for statistical discrimination under the assumption that employers learn about workers as the latter's exposure to the labour market increases. As the employers learn, workers' pay becomes more dependent on actual productivity and less dependent on easily observable characteristics such as ethnicity. Thus, in a wage equation that contains interactions between experience and both ethnicity and a hard-to-observe variable that is correlated with productivity, the coefficient on the former will be such that ethnic earnings differentials decline with experience, while the coefficient on the latter will be such that the effect of the hard-to-observe characteristic increases with experience. Adopting this approach, taking mother's years of education as our hard-to-observe variable, and using (2) and (6) as alternative base functions, we arrive at the following two empirical formulations:-

$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_{8a} e_i f(k_i) + \alpha_{9a} m_i f(k_i) + \xi_{8ai}, \tag{8a}$$

and
$$\ln w_i = \alpha_0 + \alpha_1 e_i + \alpha_2 x_i + \alpha_6 d_i + \alpha_{8b} e_i f(k_i) + \alpha_{9b} m_i f(k_i) + \xi_{8bi} \tag{8b}$$

where k_i is years of experience, $f(k_i)$ is the experience profile of earnings, and m_i is mother's years of education.

3.2 Investigating the variations in earnings between employers' kin, co-ethnics and other workers

In order to establish whether employers' relatives and co-ethnics earn more than other workers we estimate the following:-

$$\ln w_i = \beta_0 + \beta_1 r_i + \beta_2 c_i + \beta_3 z_i + \beta_4 g_i + \beta_5 h_i + \xi_{9ai} \tag{9a}$$

and with employer fixed effects,

$$\ln w_i = \beta_0 + \beta_1 r_i + \beta_2 c_i + \beta_3 z_i + \beta_6 d_i + \xi_{9bi} \tag{9b}$$

where r_i is a dummy that takes the value one if the worker is related to the employer, c_i is a dummy that takes the value one if the worker is from the same ethnic group as the employer, and z_i is a vector of other worker characteristics, i.e., it is the combination of e_i and x_i, but excluding r_i and c_i. Significant and positive coefficients on r_i and c_i indicate that relatives and co-ethnics respectively receive a positive earnings premium relative to other workers.

Co-ethnicity is defined with respect to shared ethnic identity, while relatedness is defined with reference to an known social linkage. While co-ethnic and even non-co-ethnic workers may have a social linkage with their employer, its is only relatives that definitely have such a linkage. Thus, a significant positive coefficient on r_i should be taken as evidence of a network effect associated either with superior information relating to job matching or a more sustained productivity effect due perhaps to reduced moral hazard or greater *esprit de corps* (Clague (1993)). In contrast, a significant positive coefficient on c_i should be taken as evidence of either a taste for discrimination in favour of co-ethnics or statistical discrimination based on shared ethnic identity.

In an endeavour to establish whether any identified earnings premiums are due to statistical discrimination or a similar networking effect, we adapt Altonji and Pierrot's

(1997) approach. In this context, the growing importance of the hard-to-observe characteristic is confounded by the fact that it will be easier to observe for the related and co-ethnic employees. For this reason we introduce only the interaction between experience and the relationship dummies,

$$\ln w_i = \beta_0 + \beta_1 r_i + \beta_2 c_i + \beta_3 z_i + \beta_4 g_i + \beta_5 h_i + \beta_7 r_i f(k_i) + \beta_8 c_i f(k_i) + \xi_{10ai}, \qquad (10a)$$

and

$$\ln w_i = \beta_0 + \beta_1 r_i + \beta_2 c_i + \beta_3 z_i + \beta_6 d_i + \beta_7 r_i f(k_i) + \beta_8 c_i f(k_i) + \xi_{10bi}. \qquad (10b)$$

If β_7 and/or β_8 are such that the effects of being related or co-ethnic with one's employer decline with experience, then we may conclude that the source of any earnings premium afforded to these groups is due to statistical discrimination or a similar networking effect. If either or both premiums do not decline with experience, then we must look for other explanations such as a taste for discrimination or a productivity effect.

4. Data

Our data is drawn from the fifth wave of the Ghanaian Manufacturing Enterprise Survey (GMES).[9] The sample of enterprises is drawn from four cities in southern Ghana. Each of these cities could be described as potential melting pots, i.e., as environments within which Gluckman (1961) expected to see ethnicity decline in importance over time. Approximately one third of these enterprises are in Kumasi, a city to the north-west of the capital, Accra. Less than five percent of the sample are in either Cape Coast or Takoradi, on the coast to the west of Accra. All the remaining enterprises in the sample are situated in Accra. For each enterprise there is a corresponding sample of up to 10 waged workers and up to 10 apprentices. In the fifth wave of the GMES the questionnaires for the entrepreneurs, defined to include owner-managers and general managers or managing directors of corporate enterprises, and the workers and apprentices contained questions about ethnic identity and the incidence of blood relations between workers and apprentices and their employers.

The ethnic structure of the Ghanaian population is complex. There are over one hundred distinct ethnic groups some of which combine to make up larger groups. The Akan, for example, is made up of around twenty groups, including the Asante, the Fante, the Akyem, the Akuapem, the Kwahu, and the Brong. Many of the ethnic groups have distinct languages. Others, while sharing their languages consider themselves to be distinct for cultural or historical reasons. Our approach during the survey was to ask each entrepreneur, worker and apprentice which ethnic group they were from. Coding then took place after the fieldwork was complete. Thus, our data captures the ethnic identities that the individuals ascribe to themselves. It is worth noting that none of the respondents had any difficulty deciding on the ethnic group to which they belonged. In the case of corporate enterprises, if the general manager or managing director was not available, although the questions relating to the enterprises

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[9] The first three waves of this survey were conducted as part of the World Bank's Regional Program for Enterprise Development. The last two were conducted as part of a project on labour markets in sub-Saharan Africa. All five waves were funded by the Department for international Development and conducted by the Centre for the Study of African Economies in collaboration with the University of Ghana and the Ghana Statistical Service.

accounts and operations were asked of other managers, the ethnicity questions were not asked. As a results some observations had to be dropped from this analysis.

The data required for this analysis was collected from a sample of 1045 workers and 294 apprentices (see Table 1). A total of 35 Ghanaian ethnic groups are represented in this sample along with two other West African groups that have been present in Ghana for several generations (Hausa and Kokomba) and are described as Ghanaian throughout the analysis below. For the purposes of the analysis the workers and apprentices are allocated to six ethnic categorisations (see Table 2): the Asante, a sub-group of the Akan; the Fante, another sub-group of the Akan; Other Akan; the Ga and Adangbe, which are combined throughout and referred to as the Ga-Adangbe as a reminded; the Ewe; and Northern, which includes the two migrant groups as well as thirteen groups indigenous to Ghana. Tables 1 and 2 are constructed in such a way that it is easy for the reader to see how the allocations are done.[10]

The samples of workers and apprentices are spread across 189 employers. The distribution of these employers with respect to ethnicity is presented in disaggregated form in the final column of Table 1 and in the aggregated form to be used in the analysis in the final column of Table 2. Note that, while we have excluded non-Ghanaians from the sample of workers and apprentices, 12.7 percent of the employer sample are Middle Eastern, Asian or European.[11] Excluding these employers from the analysis would greatly reduce the proportion of larger enterprises in our sample. Note that, as we mentioned above, the distributions of workers, apprentices and employers across the six Ghanaian ethnic categorisations are very similar. In all cases the Asante make up the largest proportion (between 21 and 39 percent), with the Fante as second largest (between 17 and 23 percent). The Other Akan, Ga-Adangbe and Ewe groups assume quite similar proportions (between 11 and 17 percent), while only the Northern group accounts for less than 10 percent in each sample. In part, this ethnic distribution reflects the geographical focus of the survey. Kumasi is the capital of the Asante region, while Cape Coast and Takoradi are the two largest towns in the Fante region. A relatively small ethnic group, the Ga, are indigenous to the capital, Accra, while the Adangbe traditionally occupy the area to the east of Accra. The Other Akan groups come from the area to the north of Accra and surrounding Kumasi. The Ewe are from the south-eastern part of the country, but have been present in Accra and Kumasi for several generations. Being the largest and most industrialized, these cities have also been a focus for migrants from the North.

Our vector of personal characteristics includes years of education and its square, potential years of experience (age-education - 6) and its square.[12] We also include a gender dummy, a dummy indicating whether the worker is married, two location

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[10] The Guan, included under Other Akan, was the only sub-group that proved difficult to classify. The Guan is divided into several smaller groups some of which consider themselves to be Akan and some not. Of the groups represented in our sample, the Gonja are the only group to which this applies. They have been included in Other Akan, but might be more appropriately classified as Northern. As only two employees and one apprentice are Gonja, their classification is unlikely to affect the results of the analysis.

[11] Data was collected for 23 non-Ghanaian employees and apprentices. This is an insufficient number from which to draw conclusions. Thus, they have been excluded from the analysis.

[12] When testing for statistical discrimination by interacting experience with ethnicity, the most natural choice of experience variable would be tenure, i.e., the number of years during which the current employer has observed the employee. We rejected this measure for two reasons: first, it is highly likely to be endogenous and, second, we wish to be consistent with Altonji and Pierrot (1997). Potential experience does not seem such an unnatural choice, if one thinks of it as the years for which an employee is expected to account and provide references.

dummies, and mother's years of schooling as a control for family background.[13] The dummy indicating whether the worker or apprentice is a relative of his/her employer is constructed with reference to a direct question posed to the workers and apprentices. The dummy indicating whether the worker or apprentice is a member of the same ethnic group as his/her employer is based on a coincidence in the detailed ethnic classification. Thus, for example, if a Kwahu worker has an Akyem employer, even though they are both classified as 'Other Akan' the co-ethnic dummy will take a value of zero. This dummy has been defined to exclude relatives. So, in effect we have three groups of workers, relatives of the employers, unrelated co-ethnics, and others.

Our vector of employer characteristic includes the log of the total number of workers they employ, the log of their capital-labour ratio, eight sub-sector dummies, and two dummies indicating some public ownership and some foreign ownership. Three occupational dummies are introduced into (7), one for managerial positions, one for clerical and sales personnel, and one for unskilled production workers. The basis for comparison is skilled production workers. The classification of employees into occupations was conducted during the interviews with workers and, in many cases, may be quite arbitrary. The size of the enterprise may have affected the number and type of occupational categories used in the process and it is likely that some classifications were made at least partially with reference to the pay the worker receives. Thus, the estimated coefficients for (7) may be subject to endogeneity bias and must be treated with considerable caution.

Most of the analysis that follows will focus on workers only. Apprentices are excluded because their 'pocket money' is determined by a different process from the earnings of workers. To a large extent, they are paid or given what they need to subsist. In general, if they are related to their masters the latter support them. Otherwise, if their relatives can support them they are given no pocket money by their masters and, if not, they receive meals, clothing, accommodation and/or pocket money from their masters (see Appendix 1). Table 3 shows that on average apprentices are paid little more than one tenth of the amount paid to employees. It also shows that they tend to be younger, less educated and from less educated backgrounds (see mother's years of education) than workers. They tend to be found only in smaller, less capital intensive enterprises, and most commonly in traditional trades sub-sectors such as furniture, garments and metalworking.

All these differences notwithstanding, it is useful to note that a significant proportion, nearly 13 percent, of apprentices are serving under a relative, while a further 41 percent are serving under a non-related member of the same ethnic group. Table 4 contains a cross-tabulation of apprentices' and their masters' broad ethnic groups. This shows that the tendency to serve under a master from the same ethnic group varies significantly across the groups. Asante, Fante and Ewe are highly likely to serve co-ethnics, while Other Akan are more likely to be serving an Asante or Fante master than another Other Akan. According to a Chi-squared test the hypothesis that apprentices are distributed between masters without regard to ethnicity is rejected at the 0.1 percent significance level.

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[13] Mother's and father's education were found to be highly correlated and there were more missing observations in the latter. This may reflect the fact that the majority of the employees in our sample come from matrilineal groups and that in several of the groups, both matrilineal and patrilineal, the father does not traditionally live with the children and their mother.

Table 5 contains similar statistics for fully paid workers. Workers are only marginally less likely to be working for a relative (11 percent), but significantly less likely to be working for a non-related member of the same ethnic group (23 percent). This notwithstanding the cross-tabulation at the bottom of Table 5 indicates that employees from every ethnic group are more likely to be working for a member of their own ethnic group than for a member of another Ghanaian ethnic group. According to a Chi-squared test the hypothesis that employees are distributed between Ghanaian employers without regard for ethnicity is rejected at the 0.1 percent significance level. The pattern is disturbed if we introduce non-Ghanaian employers into the analysis, as Ga-Adangbe and Northerners are more likely to be working for them than for their co-ethnics.

Table 5 also contains the mean monthly earnings (in Cedi) and the means of several other variables for each ethnic group. There is considerable variation between groups. On average, the Other Akan (used as a basis for comparison throughout the analysis) earn more than all the other groups with the exception of the Ga-Adangbe with whom they are on a par. They earn 7 percent more than Fante, 28 percent more than Ewe, 30 percent more than Asante, and 67 percent more than Northerners. Turning to the mean years of education for each group, note that Ga-Adangbe are the most educated with the Other Akan a close second, while on average Northerners have far fewer years of education than any other group. This distinction between Northerners and the other groups is also evident in the frequency distributions for years of education contained in Figure 1. Here, we can see that the lower average years of education for Northerners is due to the high proportion who have no education.[14] This is the only strikingly obvious difference between Northerners' personal characteristics and those of other ethnic groups.

5. Results

5.1 Investigating the variations in earnings between ethnic groups

Specification (1) (first column, Table 6) indicates that Asante earn 0.28 less than Other Akan in terms of log earnings, Fante 0.21 less, Ewe 0.25 less, and Northerners 0.45 less. All of these differences are significant at the one percent level. Further, pairwise comparisons of coefficients indicate that the Ga-Adangbe earn significantly more than all other groups except the Other Akan (p-values of 0.001, 0.02, 0.005, 0.0000, when compared with the Asante, Fante, Ewe and Northerners respectively) and Northerners earn significantly less than all other groups (p-values of 0.06, 0.01, 0.04 when compared with Asante, Fante and Ewe respectively).

In specification (2) we control for a series of worker characteristics. Years of education and experience both enter the earnings function in quadratic form, with the education profile of earnings being convex and the experience profile being concave.[15] These relationships are quite stable across all the specifications presented in Table 6. In contrast, the significantly negative premium associated with being female and the positive effect of mothers' education disappear once we fully control for employer characteristics suggesting that there is sorting between employers on the basis of both

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[14] Years in Koranic school are not taken into account when coaculating years of education.
[15] This is consistent with the findings of Bigsten *et al* (1998), that higher levels of education are associated with increasingly higher returns in the manufacturing sectors of several sub-Saharan countries.

gender and family background. Finally, workers in Cape Coast and Takoradi earn significantly less than those in the capital city even after we control for several other employer characteristics, while those in Kumasi earn less primarily because of the smaller size of the enterprises sampled there. Introducing these worker characteristics into the earnings function considerably reduces both the magnitude and significance of the log earnings differentials. Most of the differentials have at least halved. The only remaining significant differentials are those between the Other Akan and the Asante, Fante and Ewe. All the rest are not statistically distinguishable from zero at the ten percent level.

In specification (3) (reported separately in Table 7) we introduce interaction terms between the five ethnic dummies and each of the worker characteristics. We then conduct an F-test for the set of interaction terms corresponding to each characteristic. Only the F-statistic relating to the interactions between ethnicity and being located in Kumasi was significant at the ten percent level. This result is driven by the earnings differential between Ewe and Other Akan in that location. However, both Ewe in Kumasi and Other Akan in Kumasi each account for under 3 percent of our sample. So, we should be wary of taking too much heed of this result. One other interaction term is significant even though the corresponding F-statistic is not " Northerners face a significantly lower return on experience than Other Akan. We shall return to this latter result again below. In the interim, based on these results, we conclude that there is little significant variation in the returns associated with personal characteristics between ethnic groups and favour specification (2) as a basis for our further investigations.

Specification (4) (Table 6) contains a set of six dummies corresponding to the ethnicity of the employers. These indicate that, in the absence of any other controls relating to the employers' characteristics, Fante and Non-Ghanaian employers pay significantly more than Other Akan, while Ewe employers pay significantly less. Pairwise comparisons of coefficients indicate that Fante also pay significantly more than Asante, Ga-Adangbe, and Ewe employers (p-values of 0.009, 0.01, and 0.0000 respectively) and Ewe also pay significantly less than Asante, Ga-Adangbe, and Northerners (p-values of 0.004, 0.02, and 0.006 respectively). Taking account of these employer effects eliminates the unexplained earnings differential between Other Akan and Ewe, but leaves those between Other Akan and Asante and Fante intact in terms of both magnitude and significance.

Controlling for other employer characteristics as in specification (5) tends to reduce the size and significance of the employers' ethnic dummies, but not those of the workers. Indeed, the differentials between Other Akan and Asante and Northerners have grown in both size and significance. The growing differential between Other Akan and Asante workers is probably due to omitted variable bias, as it declines and becomes insignificant once employer fixed effects are introduced (specification (6)). In contrast, the differential between Other Akan and Northerners remains large and significant. Fully controlling for employer characteristics brings out one other significant differential − Ewe also earn significantly more than Northerners (p-value of 0.03).

Introducing occupational dummies renders the differential between Northerners and all other ethnic groups except the Ewe insignificant. Northerners' lower earnings could be partially due to occupational segregation. The Ewe are further distinguished

once we introduce occupational dummies; Ewes now earn significantly more than Asante (p-value of 0.04) and Fante (p-value of 0.06) as well as Northerners (p-value of 0.02). We interpret this unusual result for Ewe workers as evidence that they are occupationally classified in a different way to other groups. In particular, we suspect that there are some who are performing managerial tasks and being paid accordingly, but who are nevertheless classified as skilled production workers. Note from Table 5 that very few Ewe are classified as management, while a relatively large proportion are classified as skilled production. This interpretation is also born out by the occupational multinomial logit presented in Appendix 2, which shows that, after controlling for both worker and employer characteristics, Ewe are significantly less likely to be in managerial positions and significantly more likely to be in skilled production worker positions than members of other ethnic groups.

Table 8 contains the results of estimating specifications (8a) and (8b). Few of the interaction terms between experience and its square and the ethnic dummies and mother's education are significant. Using a general to specific approach we arrived at two preferred specifications. When employers' characteristics are not controlled for preferred specification contains only the interaction between experience and the Northern dummy and this is significant only when the Northern dummy, which is not significant, is excluded (see (8a*)). When employers' characteristics are controlled for, once again it is the Northern-experience interaction term that survives (see (8b*)), although in this case it is not necessary to remove the Northern dummy in order for the interaction term to be significant. These results suggest that the identified earnings differentials are not due to statistical discrimination. However, as employers' knowledge of Northern workers grows, they are paid less than similar workers from other groups. This would be consistent with Northerners being inherently less productive perhaps because of language barriers (only 9 percent of Northerners state that Twi is their most proficient reading language) or the effect of school quality. Alternatively, the results are consistent with discrimination against Northerners by employers who choose not to increase their pay or promote them over time. Subsequent investigations have shown that the lower return on experience for Northern workers is not due to (1) their concentration in unskilled jobs, (2) them receiving less on-the-job training (31 percent of Northerners compared to 33 percent of others have received such training from their current employer), or (3) a complementarity between years of education and years of experience combined with their lower average years of education.[16]

5.2 Investigating the variations in earnings between employers' kin, co-ethnics and other workers

With respect to variations in earnings between employers' kin, co-ethnics and other workers, consider first the results presented in the fourth and fifth columns of Table 6 (correspond to specifications (9a) and (9b)). The greater the degree to which we control for employer characteristics, the more accurately the coefficient on the relatedness variable is determined. With reference to the specification that includes employer fixed effects, being related to the employer is associated with a 23 percent

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[16] In this investigation experience was interacted with years of education, with the occupational dummies, and with a dummy indicating that a worker has at some time received training from their current employer.

earnings premium.[17] Following the introduction of occupational dummies this premium declines to 18 percent (see final column of Table 6) suggesting either that relatives are allocated better jobs as well as being paid more for whatever job they do or that the relatedness dummy is correlated with unobserved human capital. In neither specification (9a) nor specification (9b) is there evidence that unrelated co-ethnics earn any more than other unrelated workers.

Results relating to specifications (10a) and (10b) are presented in Table 9. In neither of these specifications are the coefficients on the interaction terms between experience and its square and the relatedness variable significant at the ten percent level. The earnings premium for relatives does not vary with worker experience. For this reason we re-estimated the functions excluding the relatedness interaction terms. The coefficients on the interaction terms between experience and its square and the co-ethnicity variable reveal that inexperienced co-ethnics receive a positive premium, but that this premium declines as experience increases and eventually becomes negative (see Figure 2). For very experienced co-ethnic workers the premium may start to rise again. However, given the frequency distribution of the experience across our sample of workers, the upward sloping section of the graph could be merely an artefact.

6. Conclusions

Our analysis provides evidence of some quite large earnings differentials between ethnic groups within the manufacturing sector. A significant proportion of these differentials can be explained with reference to a fairly standard set of observed workers' characteristics. In particular, workers' educational attainments and family backgrounds are found to vary across ethnic groups, accounting for a significant proportion of the earnings differentials and suggesting that pre-market discrimination is important in the Ghanaian context. In particular, Northerners earn considerably less that other groups primarily because of their lower years of education. The differentials that remain after controlling for observed personal characteristics are between the relatively high earning Other Akan and the relatively low earning Asante, Fante, and Ewe.

The tendency for workers to be employed by a member of their own ethnic group is strong. When combined with the fact that entrepreneurs from different ethnic groups run very different types of enterprise this tendency explains some of the earnings differentials. In particular, there is evidence to suggest that Ewes earn less because Ewe employers pay significantly less, perhaps because of discrimination in other markets. Segregation, but not due to the favoured employment of co-ethnics, explains why Other Akan earn more than Asante and Fante, i.e., Other Akan work for better paying employers. Only Northerners appear to do less well, given their observed characteristics, after we control for employers' characteristics. Northerners earnings accord, on average, with their personal characteristics. However, underlying this is a tendency for them to earn less than their non-Northern colleagues and an offsetting tendency for them to work for higher paying employers.

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[17] Note that before we start controlling for employers' characteristics the relatedness variable has a significant negative coefficient. This is because relatives are more likely to be employed in small, less technologically advanced businesses. It is only after we have controlled for these other factors that the positive effect of relatedness can be observed.

Few of these differentials in labour market outcomes appears to be due to statistical discrimination on the part of employers. Indeed, there is some evidence that inexperienced Northerners are given the benefit of the doubt and are paid less only later in their careers. This could be due to language barriers or to issues relating to school quality, although we do not currently have the data to formally test these hypotheses. The superior performance of Other Akan, especially with respect to securing positions in well paying establishments, may due to superior networks facilitating more effective job search. However, once again, we do not have the data required to formally test this hypothesis.

Turning to the role of kinship and co-ethnicity in the determination of earnings, we present strong evidence that employers favour their relatives in terms of pay and possibly also in terms of job allocation. These findings suggest that kinship networks are playing an important role in Ghanaian labour markets. Further, this earnings premium does not decline as the relatives' exposure to the labour market increases, i.e., it is not due to some form of information asymmetry relating to youth and inexperience. Although only very preliminary results are currently available (see Appendix 3), there is some evidence that this earnings premium is associated with greater productivity, perhaps through an effect on *esprit de corps*. Unrelated co-ethnics, on the other hand, receive a premium that is positive when they are young and inexperienced, but that declines and may even become negative as their experience grows. This result is consistent with the existence of statistical discrimination relating to shared ethnic identity.

In summary, the role of ethnicity in determining wages in Ghana's manufacturing sector is complex, but does not defy analysis based on assumptions of rational behaviour. With additional data, especially relating to school quality, language, and networks, we may be able to better identify the source of some of the earnings differentials. However, even as they stand our results draw our attention to some quite startling differences in educational and labour market attainment between groups and make a strong case for such issues to be included in policy debate.

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Table 1: Ethnic Composition of Worker, Apprentice, and Employer Samples

	Workers		Apprentices		Employers	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
AKAN						
Asante	218	20.86	113	38.44	51	26.98
Fante	245	23.44	56	19.05	32	16.93
Akyem	50	4.78	7	2.38	6	3.17
Akuapem	33	3.16	4	1.36	4	2.12
Kwahu	29	2.78	5	1.70	9	4.76
Brong	15	1.44	11	3.74	5	2.65
Ahanta	12	1.15			1	0.53
Wassa	11	1.05	1	0.34	1	0.53
Nzema	10	0.96				
Assin	2	0.19				
Denkyira	1	0.10				
Banda			1	0.34		
Sefwi			1	0.34		
Guan, unspec.	13	1.24	2	0.68		
Guan, Efutu	3	0.29			1	0.53
Guan, Gonja	2	0.19	1	0.34		
Guan, Buem	1	0.10				
Guan, Larteh					1	0.53
GA-ADANGBE						
Ga	128	12.25	28	9.52	18	9.52
Krobo	15	1.44	4	1.36	2	1.06
Ada	14	1.34	2	0.68	1	0.53
EWE	182	17.42	36	12.24	28	14.81
NORTHERN						
Grussie	12	1.15	1	0.34		
Dagaaba	11	1.05	1	0.34	1	0.53
Dagomba	10	0.96	5	1.70	1	0.53
Busanga	5	0.48	3	1.02		
Frafra	5	0.48	1	0.34		
Kanjaga	2	0.19				
Kasena	2	0.19				
Kusasi	2	0.19	1	0.34		
Mamprusi	1	0.10	1	0.34		
Wala	1	0.10				
Sisala			1	0.34		
Builsa	3	0.29	2	0.68		
Kanyaga			2	0.68		
Hausa	7	0.67	3	1.02	3	1.59
Kokomba			1	0.34		
NON-GHANAIAN						
Middle Eastern					11	5.82
Asian					9	4.76
European					4	2.12
TOTAL	1045	100.00	294	100.00	189	100.00

Table 2: Ethnic Composition of Workers, Apprentices, and Employers to be used in the Analysis

	Workers		Apprentices		Employers	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Asante	218	20.86	113	38.44	51	26.98
Fante	245	23.44	56	19.05	32	16.93
Other Akan	182	17.42	33	11.22	28	14.81
Ga-Adangbe	157	15.02	34	11.56	21	11.11
Ewe	182	17.42	36	12.24	28	14.81
Northern	61	5.84	22	7.48	5	2.65
Non-Ghanaian					24	12.70
TOTAL	1045	100.00	294	100.00	189	100.00

Table 3: Worker and Apprentice Characteristics and Proportions

	Workers	Apprentices
Sample size	1045.00	294.00
Worker's characteristics		
Monthly earnings	232,724	27,268
Years of education	11.04	9.02
Years of potential experience	19.90	6.77
Female	17.80%	21.77%
Mother's years of ed.	4.00	6.16
Worker-employer relationship		
Related to employer	11.00%	12.93%
Same ethnic group	21.63%	40.82%
Sector		
Food	20.00%	1.70%
Feeds and Beverages	5.45%	0.00%
Furnature	16.08%	37.07%
Garments	9.19%	27.55%
Machinery	3.44%	11.22%
Other Metal	18.56%	19.39%
Plastics and Chemicals	6.89%	0.68%
Textiles	4.69%	0.34%
Wood Processing	15.69%	2.04%
Employer characteristics		
Capital labour ratio	3.00E+07	5.81E+06
Number of employees	120.26	29.84
Foreign ownership	30.14%	3.74%
State ownership	7.56%	0.00%
Location		
Accra	61.44%	43.54%
Kumasi	25.65%	47.62%
Coast	12.92%	8.84%
Ethnicity of Employer		
Other Akan	17.70%	9.86%
Asante	23.06%	39.12%
Fante	17.42%	21.09%
Ga-Adangbe	9.47%	9.52%
Ewe	11.39%	15.31%
Northern	2.58%	4.42%
Non-Ghanaian	18.37%	0.68%

Table 4: Distribution of Apprentices Across Masters by Ethnic Group

	Other Akan	Asante	Fante	Ga-Adangbe	Ewe	Northern	All
Sample size	33	113	56	34	36	22	294
Ethnicity of Master							
Other Akan	12.12%	9.73%	8.93%	11.76%	11.11%	4.55%	21.09%
Asante	36.36%	70.80%	21.43%	2.94%	11.11%	27.27%	9.86%
Fante	24.24%	14.16%	53.57%	20.59%		4.55%	39.12%
Ga-Adangbe	15.15%	1.77%	5.36%	41.18%	8.33%	4.55%	9.52%
Ewe	9.09%	3.54%	7.14%	20.59%	69.44%	9.09%	15.31%
Northern			1.79%	2.94%		50.00%	4.42%
Non-Ghanaian	3.03%		1.79%				0.68%

Table 5: Means and Proportions for Workers by Ethnic Group

	Other Akan	Asante	Fante	Ga-Adangbe	Ewe	Northern	All
Sample size	182	218	245	157	182	61	1045
Worker's characteristics							
Monthly earnings	265,064	204,610	248,159	268,364	207,416	158,491	232,724
Years of education	11.64	11.39	10.80	11.83	11.08	6.72	11.04
Y'rs potential experience	20.89	17.86	20.67	20.04	18.45	25.20	19.90
Female	18.13%	15.14%	16.73%	21.66%	17.58%	21.31%	17.80%
Married	68.68%	65.60%	65.31%	75.80%	65.93%	72.13%	68.04%
Mother's years of ed.	3.56	4.41	3.73	5.01	4.23	1.61	4.00
Occupation							
Management	15.93%	13.30%	11.48%	12.82%	5.49%	3.28%	11.32%
Services	19.23%	16.51%	20.49%	17.31%	16.48%	13.11%	17.84%
Skilled Production	53.30%	57.34%	54.10%	58.33%	64.29%	50.82%	56.85%
Unskilled	11.54%	12.84%	13.93%	11.54%	13.74%	32.79%	14.00%
Employee-employer relationship							
Related to employer	7.69%	14.22%	13.47%	7.64%	12.64%	3.28%	11.00%
Same ethnic group	7.69%	46.33%	20.41%	10.19%	21.98%	8.20%	21.63%
Sector							
Food	16.48%	14.22%	26.12%	29.30%	12.64%	24.59%	20.00%
Feeds and Beverages	6.59%	5.96%	1.63%	9.55%	6.04%	3.28%	5.45%
Furnature	12.64%	22.02%	15.51%	14.65%	18.68%	3.28%	16.08%
Garments	11.54%	8.72%	6.94%	8.28%	12.09%	6.56%	9.19%
Machinery	3.30%	0.46%	2.45%	1.27%	7.69%	11.48%	3.44%
Other Metal	23.63%	12.84%	18.78%	14.65%	23.08%	19.67%	18.56%
Plastics and Chemicals	4.95%	9.17%	5.31%	10.19%	6.04%	4.92%	6.89%
Textiles	6.59%	1.83%	2.45%	8.28%	7.14%	1.64%	4.69%
Wood Processing	14.29%	24.77%	20.82%	3.82%	6.59%	24.59%	15.69%
Employer characteristics							
Capital labour ratio	3.4E+07	2.3E+07	2.5E+07	4.2E+07	3.7E+07	2.0E+07	3.0E+07
Number of employees	136.66	89.49	132.20	153.97	99.57	108.34	120.26
Foreign ownership	32.97%	22.48%	30.20%	37.58%	30.22%	29.51%	30.14%
State ownership	9.34%	5.96%	5.31%	12.74%	5.49%	9.84%	7.56%
Location							
Accra	64.84%	28.44%	61.63%	88.54%	79.67%	44.26%	61.44%
Kumasi	13.19%	68.81%	11.84%	6.37%	15.38%	44.26%	25.65%
Coast	21.98%	2.75%	26.53%	5.10%	4.95%	11.48%	12.92%
Ethnicity of Employer							
Other Akan	32.97%	9.63%	19.18%	13.38%	14.84%	14.75%	17.7%
Asante	11.54%	59.63%	15.10%	13.38%	11.54%	18.03%	23.06%
Fante	17.03%	10.09%	33.06%	12.74%	10.99%	13.11%	17.42%
Ga-Adangbe	8.79%	3.21%	10.61%	19.75%	9.34%	3.28%	9.47%
Ewe	5.49%	1.38%	6.94%	15.29%	34.07%	4.92%	11.39%
Northern	0.55%	1.83%	1.63%	2.55%	0.55%	21.31%	2.58%
Non-Ghanaian	23.63%	14.22%	13.47%	22.93%	18.68%	24.59%	18.37%

Table 6: Earnings and Ethnic Identity (dependent variable = log of monthly earnings in Cedi, n = 1045)

	(1) Coef.	(1) s.e.	(2) Coef.	(2) s.e.	(4) Coef.	(4) s.e.	(5) and (9a) Coef.	(5) and (9a) s.e.	(6) and (9b) Coef.	(6) and (9b) s.e.	(7) Coef.	(7) s.e.
Constant	12.1932	0.0552 ***	10.9061	0.1265 ***	10.8376	0.1283 ***	10.3774	0.2264 ***	10.9751	0.1838 ***	11.2775	0.1504 ***
Asante	-0.2754	0.0748 ***	-0.1242	0.0694 *	-0.1398	0.0702 **	-0.1566	0.0635 **	-0.0822	0.0595	-0.0572	0.0512
Fante	-0.2088	0.0768 ***	-0.1140	0.0632 *	-0.1234	0.0632 *	-0.1117	0.0573 *	-0.0591	0.0493	-0.0384	0.0433
Ga-Adangbe	-0.0179	0.0838	-0.0914	0.0700	-0.0435	0.0660	-0.0479	0.0605	-0.0845	0.0608	-0.0361	0.0530
Ewe	-0.2513	0.0777 ***	-0.1560	0.0646 **	-0.0618	0.0665	-0.0706	0.0589	-0.0105	0.0528	0.0555	0.0475
Northern	-0.4528	0.0963 ***	-0.1149	0.0898	-0.1248	0.0919	-0.1821	0.0858 **	-0.1854	0.0820 **	-0.1071	0.0728
Related to employer			-0.1240	0.0663 *	-0.0401	0.0703	0.1370	0.0714 *	0.2319	0.0704 ***	0.1806	0.0625 ***
Same ethnic group			-0.0647	0.0483	0.0278	0.0543	0.0726	0.0522	0.0136	0.0567	0.0306	0.0492
Years of education			0.0123	0.0137	0.0140	0.0137	0.0038	0.0135	-0.0148	0.0132	-0.0108	0.0126
Years of ed. sq.			0.0043	0.0006 ***	0.0042	0.0006 ***	0.0037	0.0006 ***	0.0044	0.0006 ***	0.0025	0.0006 ***
Years of experience			0.0382	0.0063 ***	0.0371	0.0062 ***	0.0237	0.0060 ***	0.0380	0.0063 ***	0.0278	0.0058 ***
Yrs of experience sq.			-0.0005	0.0001 ***	-0.0005	0.0001 ***	-0.0002	0.0001 **	-0.0004	0.0001 ***	-0.0003	0.0001 ***
Female			-0.1274	0.0561 **	-0.1421	0.0553 ***	-0.0902	0.0506 *	-0.0196	0.0485	0.0193	0.0467
Married			0.0832	0.0536	0.0761	0.0528	0.0342	0.0497	0.0142	0.0414	0.0081	0.0373
Mother's years of ed.			0.0069	0.0044	0.0080	0.0043 *	0.0090	0.0040 **	0.0049	0.0034	0.0038	0.0031
Kumasi			-0.1523	0.0489 ***	-0.1556	0.0558 ***	-0.0447	0.0631				
Coast			-0.1515	0.0664 **	-0.1359	0.0625 **	-0.2787	0.0711 ***				
E-Asante					-0.0016	0.0741	-0.0789	0.0664				
E-Fante					0.1341	0.0631 **	0.0536	0.0596				
E-Ga-Adangbe					-0.0553	0.0763	0.0232	0.0777				
E-Ewe					-0.2917	0.0833 ***	-0.2038	0.0832 **				
E-Northern					0.1213	0.1504	-0.0501	0.1552				
E-Non-Ghanaian					0.2290	0.0598 ***	0.0029	0.0641				
Foreign owned							-0.0898	0.0507 *				
State owned							0.1057	0.0703				
Capital-labour ratio							0.0031	0.0135				
No. of employees							0.2134	0.0211 ***				
Management											0.6401	0.0637 ***
Unskilled											-0.3212	0.0424 ***
Clerical/Sales											-0.0320	0.0467
Rsq.		0.0282		0.3696		0.4017		0.4990		0.7111		0.7699

Notes: Standard errors corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level. Specification (5) includes eight sector dummies, specifications (6) and (7) include employer fixed effects.

Table 7: Earnings and Ethnic Identity, Specification (3) (dependent variable=log of monthly earnings in Cedi, n = 1045)

	Base group Other Akan		Interactions with Asante		Interactions with Fante		Interactions with Ga-Adangbe		Interactions with Ewe		Interactions with Northern		F-test on all interaction terms
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	P-value
Constant	10.8381	0.3152 ***	0.0599	0.4437	-0.1856	0.3913	0.1625	0.4920	-0.1178	0.4206	0.5238	0.5077	0.1804
Related to employer	-0.1845	0.1623	0.0002	0.2326	0.1795	0.2052	0.4650	0.2984	-0.0904	0.2028	0.4423	0.5524	0.3229
Same ethnic group	-0.0954	0.1402	0.0086	0.1693	0.1735	0.1761	0.1805	0.2486	-0.0103	0.1799	-0.0582	0.3141	0.7767
Years of education	0.0026	0.0450	0.0097	0.0559	0.0088	0.0527	0.0120	0.0639	0.0155	0.0519	-0.0006	0.0562	0.9992
Years of ed. sq.	0.0044	0.0017 ***	-0.0001	0.0022	0.0005	0.0021	-0.0008	0.0024	-0.0002	0.0020	-0.0004	0.0026	0.9957
Years of experience	0.0559	0.0157 ***	-0.0219	0.0212	-0.0244	0.0199	-0.0402	0.0263	-0.0093	0.0245	-0.0449	0.0272 *	0.5155
Yrs of experience sq.	-0.0008	0.0003 ***	0.0005	0.0004	0.0004	0.0003	0.0007	0.0005	0.0001	0.0004	0.0006	0.0004	0.5063
Female	-0.2389	0.1326 *	0.1519	0.1847	0.0233	0.1936	0.1057	0.2140	0.2934	0.1902	0.1356	0.2147	0.7026
Married	0.0178	0.1421	0.0876	0.1764	0.1299	0.1851	0.2499	0.1911	-0.0296	0.2139	-0.1135	0.2561	0.6167
Mother's years of ed.	0.0129	0.0105	-0.0082	0.0136	-0.0012	0.0152	-0.0163	0.0159	-0.0037	0.0152	-0.0233	0.0225	0.8358
Kumasi	-0.0211	0.1388	-0.2912	0.1797	0.1135	0.1763	-0.1650	0.2150	-0.3129	0.1780 *	-0.0263	0.2020	0.0507
Coast	-0.1101	0.1261	-0.1971	0.2395	0.0049	0.1710	-0.0865	0.2592	-0.0909	0.1789	0.1282	0.3208	0.9271

Notes: $R^2 = 0.3936$. In the row marked 'Constant' and the columns headed 'Interactions with Asante' etc. we present the coefficients on the ethnic dummies. In those columns and in later rows are the coefficients on the interactions between the ethnic dummies and each of the personal characteristics listed. Standard errors corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level.

Table 8: Testing for Statistical Discrimination on the basis of Ethnic Identity (dependent variable = log of monthly earnings in Cedi, n = 1045)

|	(8a)		(8a*)		(8b)		(8b*)	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Related to employer	-0.1307	0.0665 **	-0.1251	0.0661 *	0.2359	0.0700 ***	0.2409	0.0707 ***
Same ethnic group	-0.0620	0.0488	-0.0631	0.0482	0.0143	0.0575	0.0162	0.0567
Asante	-0.0132	0.1611	-0.1267	0.0674 *	0.0793	0.1441	-0.0833	0.0595
Fante	0.1018	0.1554	-0.1179	0.0622 *	0.1253	0.1248	-0.0604	0.0494
Ga-Adangbe	0.1194	0.2048	-0.0943	0.0687	0.1262	0.1704	-0.0862	0.0609
Ewe	0.0612	0.1629	-0.1587	0.0632 **	0.1774	0.1373	-0.0091	0.0527
Northern	0.3547	0.2250			0.2588	0.2047	0.1063	0.1215
Asante x experience	-0.0155	0.0157			-0.0127	0.0132		
Fante x experience	-0.0195	0.0134			-0.0147	0.0108		
Ga-Adangbe x experience	-0.0214	0.0197			-0.0218	0.0169		
Ewe x experience	-0.0171	0.0156			-0.0149	0.0126		
Northern x experience	-0.0377	0.0183 **	-0.0055	0.0029 *	-0.0256	0.0166	-0.0132	0.0043 ***
Asante x experience^2	0.0004	0.0003			0.0002	0.0003		
Fante x experience^2	0.0003	0.0003			0.0002	0.0002		
Ga-Adangbe x experience^2	0.0004	0.0004			0.0004	0.0003		
Ewe x experience^2	0.0002	0.0003			0.0002	0.0003		
Northern x experience^2	0.0006	0.0003 *			0.0002	0.0003		
mother's ed. x experience	-0.0004	0.0012			0.0005	0.0010		
mother's ed. x experience^2	0.0000	0.0000			0.0000	0.0000		
Worker characteristics	yes		yes		yes		yes	
Employer characterisitcs	no		no		no		no	
Employer fixed effects	no		no		yes		yes	
Rsq.	0.3742		0.3703		0.7149		0.7136	

Notes: Standard errors corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level.

Table 9: Testing for Statistical Discrimination on the basis of Relatedness and Co-ethnicity (dependent variable = log monthly earnings in Cedi, n = 1045)

	(10a)		(10a*)		(10b)		(10b*)	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Constant	10.2938	0.2278 ***	10.2801	0.2283 ***	10.9125	0.1848 ***	10.9324	0.1824 ***
Asante	-0.1541	0.0631 **	-0.1529	0.0632 **	-0.0795	0.0591	-0.0784	0.0593
Fante	-0.1145	0.0574 **	-0.1102	0.0575 *	-0.0591	0.0493	-0.0566	0.0493
Ga-Adangbe	-0.0513	0.0604	-0.0466	0.0606	-0.0825	0.0608	-0.0807	0.0609
Ewe	-0.0708	0.0589	-0.0687	0.0589	-0.0065	0.0531	-0.0072	0.0531
Northern	-0.1941	0.0860 **	-0.1828	0.0862 **	-0.1869	0.0830 **	-0.1830	0.0827 **
Related to employer	0.2193	0.1583	0.1475	0.0716 **	0.2561	0.1561	0.2374	0.0705 ***
related x experience	0.0084	0.0162			0.0071	0.0144		
rel x experience^2	-0.0005	0.0003			-0.0003	0.0003		
Same ethnic group	0.4329	0.1243 ***	0.4021	0.1226 ***	0.3136	0.1246 **	0.2951	0.1246 **
co-ethnic x experience	-0.0341	0.0116 ***	-0.0335	0.0114 ***	-0.0296	0.0107 ***	-0.0289	0.0107 ***
co-ethnic x experience^2	0.0006	0.0002 **	0.0006	0.0002 ***	0.0005	0.0002 ***	0.0005	0.0002 ***
Years of education	-0.0012	0.0134	0.0025	0.0135	-0.0155	0.0134	-0.0160	0.0131
Years of ed. sq.	0.0040	0.0006 ***	0.0038	0.0006 ***	0.0045	0.0006 ***	0.0045	0.0006 ***
Years of experience	0.0313	0.0065 ***	0.0293	0.0063 ***	0.0426	0.0069 ***	0.0424	0.0065 ***
Yrs of exper sq.	-0.0003	0.0001 ***	-0.0003	0.0001 ***	-0.0005	0.0001 ***	-0.0005	0.0001 ***
Female	-0.0905	0.0504 *	-0.0938	0.0507 *	-0.0234	0.0492	-0.0228	0.0489
Married	0.0251	0.0493	0.0338	0.0494	0.0129	0.0413	0.0136	0.0416
Mother's years of ed.	0.0082	0.0040 **	0.0087	0.0040 **	0.0045	0.0033	0.0047	0.0034
Kumasi	-0.0516	0.0628	-0.0386	0.0628				
Coast	-0.2959	0.0707 ***	-0.2824	0.0715 ***				
E-Asante	-0.0846	0.0663	-0.0842	0.0660				
E-Fante	0.0567	0.0589	0.0536	0.0594				
E-Ga-Adangbe	0.0211	0.0771	0.0249	0.0778				
E-Ewe	-0.2196	0.0829 ***	-0.2085	0.0832 **				
E-Northern	-0.0316	0.1532	-0.0686	0.1556				
E-Non-Ghanaian	-0.0090	0.0643	-0.0064	0.0641				
Foreign owned	-0.0970	0.0503 *	-0.0961	0.0506 *				
State owned	0.1030	0.0703	0.1101	0.0702				
Capital-labour ratio	0.0041	0.0135	0.0059	0.0134				
No. of employees	0.2158	0.0212 ***	0.2144	0.0211 ***				
Rsq.		0.5076		0.5023		0.7143		0.7130

Notes: Standard errors corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level. Specification (10a) and (10a*) include eight sector dummies, specifications (10b) and (10b*) include employer fixed effects.

Figure1: Employees' Years of Education by Ethnic Group
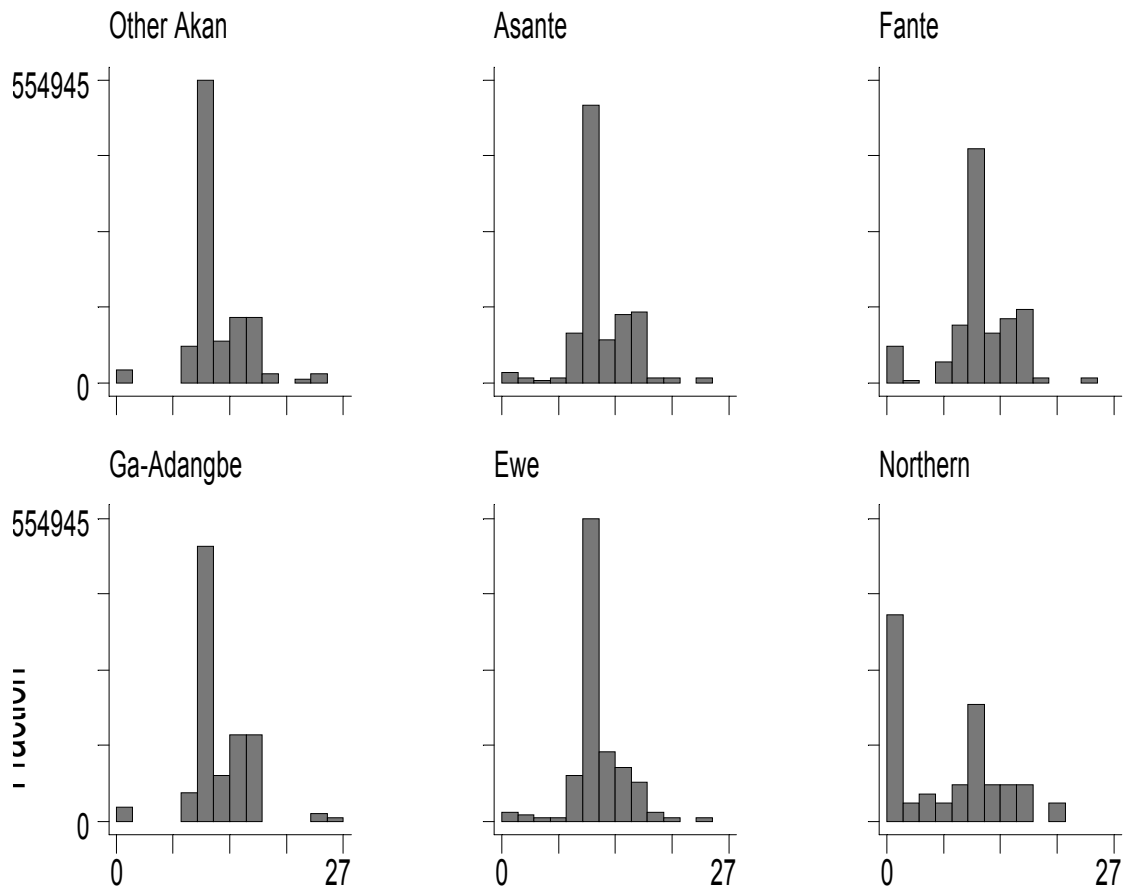
Figure 2: Erosion of Co-ethnic Wage Premium with Experience
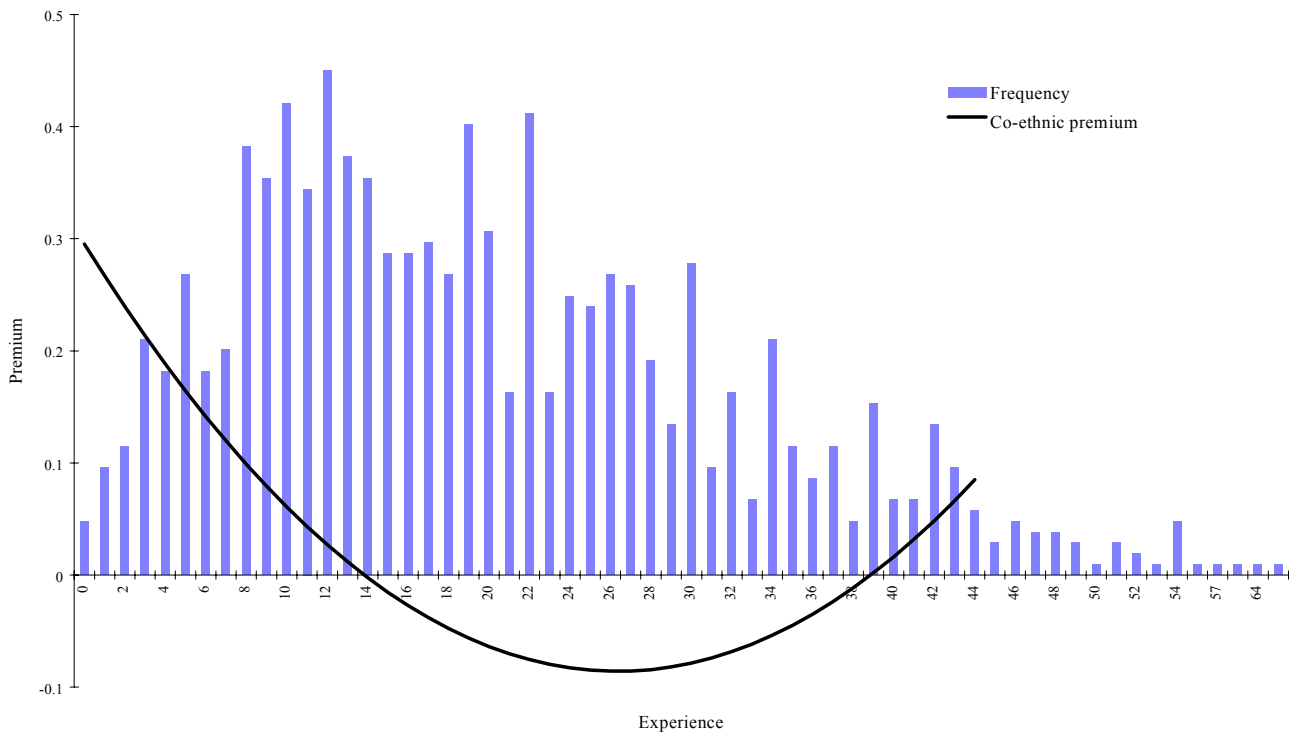
Appendix 1: Apprentices Earnings or Pocket Money

Table A1 contains a series of estimated earnings or pocket money functions for apprentices. The dependent variable, log of earnings, includes payments in kind in the form of food and clothing as well as money payments. In order that those who earn nothing from their masters can be included, one is added before taking logs.

Apprentices have been excluded from the sample of employees used in the main text because their earnings are determined by a different process from those of fully paid workers. The results in Table A1 illustrate this point. In none of the specifications are the human capital variables, education and experience significant. While this result might simply be reflecting a lack of variation in education and age across the sample, it might alternatively indicate that apprentices' existing human capital is not rewarded. Several other findings are consistent with the hypothesis that apprentices are given what they require to subsist, generally by parents or relatives. When the master is also a relative the subsistence allowance is captured by the survey, while when the master and the relatives are distinct it is not. Further, females, who are more likely than males to be living with relatives, tend to be paid less by their masters, and apprentices from more educated and so potentially wealthier family backgrounds are paid less by their masters (columns 4 and 5 only). Less consistent with this story is the finding that apprentices' earnings or pocket money are partially determined by their location and by the characteristics of their employers or masters. The results in column 3 indicate that foreign enterprises, larger enterprises, and enterprises with Ga-Adangbe rather than Other Akan entrepreneurs pay more, while enterprises with non-Ghanaian entrepreneurs pay less. Further, fully controlling for employer characteristics using ethnic dummies significantly increases the R-squared. This last result should be treated with some caution as the sample of 294 apprentices is distributed across 75 employers or masters so there is an average of only 4 observations per employer dummy.

The results in column one suggest that there are ethnic earnings differentials. Ewe's earn significantly more than Other Akan, Asante (p-value of 0.0005) and Ga-Adangbe (p-value of 0.09). Asante also earn less than Fante (p-value of 0.08) and Northerners (p-value of 0.02). However, once we take account of personal characteristics no significant, unexplained earnings differential remain. After controlling for specific employer characteristics Fante and Ga-Adangbe appear to be earning significantly less than Other Akan. However, these differentials disappear once we introduce employer fixed effects.

To sum up, we have two findings in relation apprentices' earnings and ethnicity. First, there is evidence that being related to ones master improves remunerations. However, this could simply be due to relatives paying apprentices pocket money and us only capturing that pocket money when the relatives are also the employers or masters. Second, while there is evidence of earnings or pocket money differential between ethnic groups, this appears to be entirely due to variations in personal characteristics and location.

Table A1: Earnings or Pocket Money Functions for Apprentices (Dependent variable: log of monthly earnings, n=294)

	1		2		3		4	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Constant	7.5098	0.8199 ***	10.6740	1.8190 ***	15.9791	2.6465 ***	10.7511	0.9271 ***
Asante	-0.6160	0.9367	-0.7531	0.7636	-0.3650	0.5285	0.1717	0.2593
Fante	0.6418	0.9889	-0.5417	0.9264	-1.1232	0.6472 *	-0.1242	0.2947
Ga-Adangbe	0.1764	1.1089	-1.3398	0.9978	-1.2727	0.6561 *	-0.3844	0.2964
Ewe	1.7049	0.9498 *	-1.1219	0.9352	-1.0649	0.6887	-0.5511	0.4458
Northern	1.4609	1.1324	-0.2114	0.9973	-0.6884	0.6175	-0.1938	0.4838
Related to employer			1.9978	0.6671 ***	1.9778	0.6733 ***	2.2516	0.9027 **
Same ethnic group			0.0357	0.4632	0.0065	0.3977	0.2655	0.2470
Years of education			-0.1202	0.2313	-0.1615	0.2412	0.0069	0.1748
Years of ed. sq.			0.0044	0.0158	0.0058	0.0141	-0.0006	0.0098
Years of experience			-0.0225	0.1674	-0.0110	0.1322	0.0597	0.1398
Yrs of exper sq.			0.0048	0.0061	-0.0013	0.0055	-0.0012	0.0054
Female			-6.6501	0.5533 ***	-4.1578	0.9881 ***	-0.5883	1.2325
Married			-0.0136	0.0386	-0.0535	0.0321 *	-0.0137	0.0219
Kumasi			-1.2822	0.5347 **	-1.5174	0.8655 *		
Coast			2.0591	0.9144 **	3.4577	0.9207 ***		
E-Asante					0.4193	1.2389		
E-Fante					0.2324	0.8420		
E-Ga-Adangbe					1.5886	0.8049 **		
E-Ewe					0.2606	0.8772		
E-Northern					1.9471	1.2007		
E-Non-Ghanaian					-3.0889	1.8330 *		
Foreign owned					2.2778	0.9150 **		
Capital-labour ratio					-0.2402	0.1621		
No. of employees					1.0273	0.3310 ***		
Sector dummies	n		n		y		n	
Employer dummies	n		n		n		y	
Rsq.	0.0362		0.4659		0.6601		0.8861	

Notes: Standard errors corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level. Ethnic dummies (p-value) - the p-value associated with an F-test for the null hypothesis that all the coefficients on the apprentice ethnic dummies are equal to zero.

Appendix 2: Occupational Attainment

Table A2: Multinomial Logit Model for Occupational Attainment (n=1045)

	1 Management		1 Clerical/Sales		1 Unskilled		2 Management		2 Clerical/Sales		2 Unskilled	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Years of education	0.949	0.419 **	0.478	0.310	-0.154	0.078 **	1.203	0.644 *	0.643	0.445	-0.223	0.134 *
Years of ed. sq.	-0.006	0.015	-0.003	0.012	0.005	0.005	-0.001	0.023	-0.007	0.017	0.003	0.007
Age	0.085	0.111	-0.074	0.067	-0.027	0.062	0.081	0.162	-0.087	0.089	-0.242	0.093 ***
Age sq.	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.001	0.001	0.003	0.001 ***
Female	0.615	0.476	1.672	0.261 ***	0.592	0.287 **	0.320	0.681	2.240	0.352 ***	1.249	0.416 ***
Married	0.360	0.485	-0.344	0.266	-0.396	0.272	0.815	0.702	-0.259	0.337	-0.386	0.385
Mothers years of ed.	0.005	0.031	-0.003	0.022	-0.035	0.024	-0.031	0.042	-0.020	0.027	-0.055	0.032 *
Related to employer	0.782	0.564	-0.142	0.422	-0.683	0.404 *	1.610	0.915 *	0.185	0.601	-1.447	0.668 **
Same ethnic group	0.245	0.416	0.119	0.284	-0.184	0.308	0.127	0.578	1.023	0.409 **	0.447	0.476
Asante	-0.124	0.487	-0.169	0.369	0.478	0.395	-0.389	0.658	-0.330	0.472	0.671	0.488
Fante	-0.270	0.430	0.284	0.308	0.082	0.340	-0.495	0.574	0.620	0.375 *	0.069	0.413
Ga-Adangbe	-1.191	0.501 **	-0.325	0.358	-0.267	0.390	-1.393	0.738 *	-0.015	0.442	0.116	0.476
Ewe	-1.535	0.558 ***	-0.185	0.344	0.203	0.368	-1.921	0.753 **	0.157	0.427	0.039	0.474
Northern	-0.651	0.908	0.126	0.549	0.602	0.472	-0.599	1.174	-0.195	0.675	1.099	0.604 *
Foreign owned	0.172	0.399	0.233	0.275	-0.070	0.316						
State owned	-0.718	0.571	0.339	0.401	-0.488	0.451						
Kumasi	0.294	0.507	0.366	0.356	0.061	0.342						
Coast	-0.974	0.544 *	0.081	0.385	0.097	0.372						
Capital-labour ratio	0.206	0.147	0.231	0.093 **	-0.060	0.090						
No. of employees	0.224	0.167	-0.040	0.120	0.208	0.130						
Constant included			yes						yes			
Employers ethnicity			yes						no			
Sector dummies			yes						no			
Employer dummies			no						yes			
Log likelihood			-860						-611			
Pseudo Rsq.			0.284						0.491			

*** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level.

Appendix 3: Productivity

The following preliminary results are for OLS regressions, with standard errors corrected using White's procedure, for a sample of enterprises pooled over six years. The dependent variable in each of the estimated equations is the log of real value added per employee. Value added is calculated using the survey data, then deflated to 1991 prices using the CPI and divided by the number of employees before natural logs are taken. All of the equations include the log of the real capital-labour ratio lagged one period, the log of the number of employees lagged one period, the log of the average years of education of the employees lagged one period, two location dummies, dummies indicating some foreign ownership and some state ownership, six sectoral dummies and five year dummies. The value of the capital stock is estimated by using data from the first year that an enterprise was surveyed and then adding reported investment in subsequent years to that stock. Once again the CPI is used to deflate the value of the capital stock and investments to 1991 prices. Lagging each of the explanatory variables ensures that they are predetermined. However, this is unlikely to fully solve all problems of endogeneity bias as, for each enterprise, all of these variables are correlated over time.

The coefficient on the capital-labour ratio is significant at the 1 percent level and is fairly stable across the two specifications. The magnitude of the estimated coefficients indicate that a one percent increase in the capital stock is associated with an increase in output of between 0.14 and 0.17 percent. The labour variable is insignificant in both specifications suggesting that returns to scale are constant. The coefficient on the human capital variable is significant in both the specifications, but varies in magnitude depending on whether the ethnicity variables are included. A one percent increase in the average level of education of the employees is associated with between a 0.27 and a 0.50 percent increase in output. Once we control for ethnicity, we find evidence that Kumasi-based enterprises are more productive than Accra-based ones, while enterprises with some foreign ownership are more productive.

To the basic model presented in column 1 we add a set of dummies capturing the ethnic identity of the entrepreneurs, the proportion of employees who are related to the entrepreneur, the proportion of employees who, although not related, come from the same ethnic group as the entrepreneur, and the proportion of his/her contacts who come from the same ethnic group. The proportion of employees that are related to the entrepreneur the corresponding coefficient is significant and positive. A ten percentage point increase in the proportion of relatives in the workforce increases output by 0.07 percent. This result is particularly striking given that the proportion of relatives is negatively correlated with value added, the number of employees, the capital-labour ratio, and the human capital variable, and uncorrelated with productivity. However, this result must be treated with considerable caution. The data for this variable was collected only in the fifth wave of the GMES. In the regressions we have assumed that for each enterprise the proportion of relatives in the workforce was constant over time and so applied the same proportion to each of the earlier waves.

Table A3: Enterprise Productivity (Dependent variable: log of value added per worker, n = 703)

	1		2	
	Coef.	s.e.	Coef.	s.e.
Constant	10.675	0.373 ***	9.786	0.468 ***
Capital-labour ratio	0.137	0.028 ***	0.169	0.028 ***
Number of employees	0.051	0.039	0.042	0.042
Human capital	0.274	0.147 *	0.503	0.144 ***
Kumasi	0.072	0.109	0.379	0.124 ***
Coast	-0.248	0.193	-0.263	0.203
Some foreign ownership	0.386	0.152 **	0.436	0.167 ***
Some state ownership	-0.020	0.310	-0.011	0.243
E-Asante			-0.307	0.149 **
E-Fante			0.045	0.143
E-Ga-Adangbe			0.144	0.176
E-Ewe			-0.530	0.176 ***
E-Northern			0.971	0.278 ***
E-Non-African			-0.228	0.257
Proportion of related employees			0.722	0.277 ***
Proportion of co-ethnic employees			-0.182	0.189
Proportion of co-ethnic contacts			-0.383	0.157 **
R-squared	0.290		0.351	

Notes: All standard errors reported are corrected for heteroskedasticity using White's (1980) procedure. *** - significant at the 1 percent level, ** - significant at the 5 percent level, * - significant at the 10 percent level. All regressions also include six sectoral dummies and five year dummies as explanatory variables.