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Aradhna Aggarwal, Ricardo Freguglia, Geraint Johnes and
Gisele Spricigo

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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EDUCATION AND LABOUR MARKET OUTCOMES: EVIDENCE FROM INDIA

Aradhna Aggarwal¹
Ricardo Freguglia²
Geraint Johnes³
Gisele Spricigo⁴

1.University of Delhi, Delhi, India; aradhna.aggarwal@gmail.com

2.Federal University of Juiz de Fora, Juiz de Fora, Minas Gerais, Brazil;
ricardo.freguglia@ufjf.edu.br

3.Lancaster University Management School, Lancaster, UK; G.Johnes@lancs.ac.uk

4.Universidade do Vale do Rio dos Sinos, Porto Alegre, Rio Grande do Sul, Brazil;
giseles@unisinis.br

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ABSTRACT

The impact of education on labour market outcomes is analysed using data from various rounds of the National Sample Survey of India. Occupational destination is examined using both multinomial logit analyses and structural dynamic discrete choice modelling. The latter approach involves the use of a novel approach to constructing a pseudo-panel from repeated cross-section data, and is particularly useful as a means of evaluating policy impacts over time. We find that policy to expand educational provision leads initially to an increased take-up of education, and in the longer term leads to an increased propensity for workers to enter non-manual employment.

Keywords: occupation, education, development

JEL Classification: I20, J62, O20

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1. Introduction

Increased global competition has resulted in rapid changes in the nature of the labour market in many countries. In developed economies, governments have promoted education as a means of securing a comparative advantage in the production of goods and services whose production is knowledge-intensive. Elsewhere, experience has varied, with some developing countries likewise heading toward an industry mix that places a premium on human capital. In some measure this is due to the growth in demand for education – an income elastic product – as incomes rise. It is particularly instructive to examine these issues in the context of the BRIC countries – Brazil, Russia, India and China – since these are developing rapidly and offer some contrasting stories.

In India, educational provision, particularly at tertiary level, has expanded rapidly over the last decade and a half. The tertiary sector gross enrollment ratio has increased by almost 8 percent points from 5.59 per cent in 1995 to 13.5 per cent in 2007 as compared with a mere 0.62 per cent point increase between 1980 and 1995. The attainment rate for tertiary education¹ has also improved considerably from 6.3 percent in 1993 to 8.7 percent in 2004 (Azam and Blom 2008). The transition rate from higher secondary to tertiary, which was 67.4 percent in 1993, increased to 71.2 percent by 2004. It was as high as 79.8 percent in urban areas. The enhanced skills with which many young people now enter the labour force are likely to impact upon their trajectory through the labour market. In particular, we might expect an increasing proportion of workers to find employment in higher status (typically non-manual) occupations. Yet at this stage little is known about precisely how educational policy affects occupational outcomes in this large country, where the pace of development has been uneven across sectors (Johnes, 2010).

This paper proposes to assess the impact of education policy on labour market outcomes by estimating both static and dynamic models of occupational choice using educational attainment and other individual characteristics as explanatory variables. It does so using the National Sample Surveys' data spanning over the period from 1993-94 to 2005-06.

The rest of the paper is structured as follows. We begin with a brief discussion of changes in India's education policy since 1990, in Section 2. Section 3 briefly reviews the pertinent literature on the subject matter. Section 4 discusses the statistical models, both static and dynamic. Section 5 is a short methodological section. Section 6 describes the dataset, and descriptive are provided in Section 7. This is followed by a presentation of the results of our estimation exercises in Section 8. The paper ends with a discussion and conclusion provided in Section 9.

2. Education Policy in India: A brief overview of changes since 1990

Since independence, education has been in prime focus in India. Efforts to expand access and quality of education have characterised successive Five Year Plans. In the period from 1951-52, when the country launched its first five year plan, until 1990, the number of schools increased more than three-fold, outpacing the growth of the school age population (Dougherty and Herd 2008). At the tertiary level, the number of universities rose 7-fold,

¹ EAR for tertiary education is defined as the ratio of number of persons in age group 25-34 years who have completed a tertiary education degree to total population in the same age group.

while the number of undergraduate and professional colleges rose 10-fold. During this period, the public expenditure on education also registered a phenomenal growth. It rose several folds from mere INR 14493.0 million to INR 400198.6 million at constant prices and its share in GDP increased from 0.6% of GDP in 1950-51 to 3.9% of GDP in 1989-90

In 1991, India embarked on a comprehensive economic reforms programme aiming to achieve rapid economic growth by integrating the economy with the global economy. This process created multiple opportunities but it also posed many challenges. The government of India recognised that one of the most crucial prerequisites to take advantage of the emerging opportunities is human development and that it was directly linked to expansion in education. This period also witnessed, following the Jomtien World Declaration (1990) on Education for All (EFA), heightened international pressures to achieve universal access to education within the shortest possible time frame. In 1992, the government updated the National Policy on Education to include several key strategies to achieve the goal of universal access to education and improved school environment. Under this policy, a District Primary Education Programme was launched as a major initiative to expand people's participation in education. In 2000, the government signed Dakar and UN Millennium declarations and reaffirmed its commitment to education for all. Following this, in 2002, the government unveiled its national flagship program, the Sarva Shiksha Abhiyan (SSA), to enrol all 6–14 year-olds in school by 2010. In the same year, free and compulsory education was made a Fundamental Right for all the children in the age-group of 6-14 years through the 86th Amendment of the Constitution. While the focus had been on achieving universal education, sweeping reforms were introduced to broaden access to higher education as well. This led to a proliferation of private institutions, and also of distance education programmes and self financing programmes by public institutions. In 2000, 100% FDI was allowed in higher education under the automatic route. As a result, foreign institutions started offering programmes either by themselves or in partnership with Indian institutions. This period also witnessed the growth of the non-university sector. There was rapid expansion of polytechnics and industrial training institutes, largely in the private sector (Agarwal, 2006).

Table 1 shows that the country has made significant strides in quantitative terms. The expansion of the tertiary sector seems to be the most impressive though. Nonetheless, there are concerns that the performance of the educational system was not as good as might be expected, due to resource constraints. Despite higher allocations to education by the centre as part of implementing the programme with external assistance the public expenditure on education as a percentage of GNP declined steeply in the early 1990s and touched 3.53 per cent in 1997-98. In the late 1990s, it started rising again and gained momentum to reach as high as 4.38 per cent in 2000-01 but this momentum could not be sustained further and the public expenditure as per cent of GNP plummeted to 3.56 per cent in 2003-04 to rise slowly once again thereafter. The trends in the share of public expenditure on education as a percentage of total budget expenditure display a similar pattern. The share of public expenditure on education in the total budget was 14.0 per cent in 1990-91. But it declined to 13.1 per cent in 1991-92 and was hovering a little over 13 per cent till 1997-98. Though it increased to 14 per cent in 1998-99 and further to 16.1 per cent in 2000-01, it swiftly declined to 12.0 per cent in 2003-04 with a slow rise since then.

The 11th Plan placed education, particularly vocational and science education, at the centre of development and is termed “Education Plan (2007-2010)”. In nominal terms, it proposed a five-fold increase in spending on education and pledged to raise public expenditure on

education to 6 percent of total GDP. This is an unprecedented increase in financial support for education in India. We analyse here how increased public expenditure can influence the labour market outcome in terms of occupational choice.

3. Literature review

In many respects, an obvious antecedent of the work undertaken in the present paper is a contribution by Duflo (2004) who examines the impact of a policy decision rapidly to expand the education sector in Indonesia. Duflo's work focuses on the wage and labour market participation impacts of the policy on various demographic groups. By way of contrast, our work drills down to the experience of the individual, and focuses on the choice that individuals make about their activity in each period – whether that activity be schooling, work in one occupation or another, or something else.

The relationship between schooling and wage (Mincer, 1974) has been the primary focus in the labour market outcome literature. However, Heckman *et al.* (2003) show that Mincer's model of wage determination is a misspecification. It requires that wages fully adjust to compensate for differences in the characteristics of labour. But the ability of wages to adjust may be restricted by various institutional, structural and sociological factors (see Ham *et al.*, 2009a for discussion). Occupational choice, which addresses this problem, is used as an alternative measure of labour market outcome.

Early work in the analysis of occupational choice stems from the seminal contribution of Roy (1951) who provides an admirably lucid exposition of the way in which destination depends upon skills and upon the distribution of returns to skills in each occupation. The empirical implementation of Roy's ideas had to await the development of appropriate econometric tools, however. The multinomial logit model, first set out by Theil (1969) and benefited by important contributions from McFadden (1973) and Nerlove and Press (1973), proved to be useful for analysing this type of problem. According to Ham *et al.* (2009a) the first systematic examination of occupational choice using discrete choice econometrics was Boskin (1974). This was closely followed by Schmidt and Strauss (1975) who applied the multiple logit model to the prediction of occupation of individuals, based on certain personal characteristics. Variants of the static model have also been employed (Ham *et al.* 2009a, 2009b Cobb-Clark and Tan 2009, Nieken and Störmer 2010 for literature survey) by, *inter alia*, Ham (1982); Bradley (1991); Orazem and Mattila (1991); Mwabu and Evenson (1997); Makepeace (1996); Johnes (1999); Pal and Kynch (2000); Harper and Haq (2001); Le and Miller (2001); Yuhong and Johnes (2003); Constant and Zimmermann (2003); Botticini and Eckstein (2005); Nasir (2005); Bjerk (2007); Hennessy and Rehman (2007); Croll (2008); Borooah and Mangan (2002) and Borooah and Iyer (2005).

The essentially dynamic nature of occupational choice was first addressed by Willis and Rosen (1979) who model the decision of when to leave education as an optimal stopping problem. In their model, there is only one post-school outcome, rather than a multiplicity of destinations (including various occupations and life outside the labour force). A solution to this type of problem is offered also by Rust (1987) who developed the nested fixed point algorithm as a means of solving such dynamic stopping models. The extension of this type of model to the case in which, at each point in time, agents make decisions across a multiplicity of options, and where these decisions are conditioned upon decisions made in the past (and determine the nature of options available in the future) is due to Keane and Wolpin (1994,

1997). In effect, the Keane and Wolpin method provides a means of empirically estimating models that combine the salient features of the contributions of Roy, on the one hand, and Willis and Rosen, on the other. Other important papers include Stinebrickner (2000, 2001a, 2001b), and Sullivan (2010).

Both static and dynamic models of occupational choice have been widely applied to the analysis of occupational choice in developed economies. But nonetheless there is a dearth of analysis in the published literature on occupational choice in developing countries, in particular in India where there are (understandably perhaps, in view of data limitations) no dynamic studies, and static analyses are also hard to come by. Khandker (1992) uses survey data from Bombay to evaluate earnings and, using multinomial logit methods, occupational destination of men and women. This study uncovers evidence of labour market segmentation. More recently, Howard and Prakash (2010) have likewise used multinomial logit methods, and find, using data from the National Sample Survey, that the imposition of quota policies on the employment of scheduled caste and scheduled tribes in public sector jobs has had a positive effect on the occupational outcomes for these socially backward groups. In a recent study, Singh (2010) used the India Human Development Survey, 2005 data and found that the individuals with higher education and better ability are more likely to be government (and permanent) employees. There is thus no comprehensive analysis of how educational attainment impacts on occupational outcomes of young workers entering the labour market in India and how this link is influenced by public expenditure on education.

4. Theoretical framework and statistical modelling

There are various explanations offered in the literature for heterogeneity in individuals' occupational outcomes (Levine 1976, Ham *et al.* 2009a, 2009b). One explanation that is most predominantly used in labour economics is human capital theory (Becker 1964, Benewitz and Albert Zucker, 1968, Boskin 1974). The human capital theory is focused on the effects of education, experience and an individual's innate ability in determining their productivity in various tasks and returns from their labour (Becker, 1964). It has been extended to develop a model of occupational choice centered on the preferences of individuals for particular time shapes of their income streams (Benewitz and Albert Zucker, 1968, and Boskin, 1974). The occupational choice in this framework is the result of a process taking place over a period of many years in a sequence of investment activities undertaken for entry into an occupation. This sequence, described by Benewitz and Albert Zucker (1968), is an ordered chain each part of which has a rate of return associated with it. An individual must decide at each step of this chain whether to stop further investment in human capital or to go on. If she stops then she is likely to enter a lower investment occupation than if she continues. Thus educational attainment and occupation choice are endogenously determined. A worker chooses that career path for which the present value of her discounted income stream is a maximum. The discount rate is determined by the time preference function which in turn depends on the quality of education, direct and opportunity cost of education, age, sex and other socio-economic characteristics. Public investment impinges on the individual's time preference function by influencing both direct cost and quality of education.

Boskin (1974) showed that decisions on occupational choice are governed by the returns-primarily expected potential (full-time) earnings-and costs of training and foregone potential earnings and that individuals' preference for one occupation over the others may be estimated

using the conditional logit decision model. Using the static framework we estimate a reduced-form Mincer type specification for occupational choice:

$$Y_i = f(S_i, X_i) + u_i \quad (1)$$

where Y_i is a measure of labour market outcome, S_i is the schooling of the i th individual, and X_i contains other individual characteristics; u_i is a random error. This equation is estimated by an appropriate technology - where Y is a limited dependent variable indicating occupational destination. In static terms, logit or probit methods are commonly used to estimate this relationship while the dynamic analysis is based on dynamic discrete choice models. Note that this is then a reduced form approach – we do not explicitly model earnings, but the vector of characteristics on the right hand side of the equation themselves are deemed to influence earnings as well as the outcome of interest.

In the literature, there are various attempts to classify occupations. These include and are not limited to: social status based ranking systems (Jones and McMillan 2001; Lee and Miller 2001); Holland's six occupational types (Larson *et al.* 2002; Porter and Umbach 2006; Rosenbloom *et al.* 2008); the ranking of occupations by skill – unskilled, semi-skilled, skilled, etc. (Darden 2005); good jobs and bad jobs (Mahuteau and Junankar 2008); and blue and white collared jobs (Ham *et al.*, 2009a).

We consider six labour market outcomes for our dependent variable: (i) not in work or schooling; (ii) in education; (iii) manual employees; (iv) manual self-employed workers; (v) non-manual employees; and (vi) non-manual self-employed workers.

Turning to the explanatory variables we use schooling years for educational attainment. In the Mincerian type version, S_i is simply years of education, representing a linear relationship between years of education and occupational choice. We include, in a further specification, also a quadratic term in years of education to capture variations in the relationship between education and earnings. Most studies in the Indian context have found returns to schooling heterogeneous (Duraiswamy 2002, Dutta 2006). In general, heterogeneous returns to education for wage workers have been found by, for instance Heckman *et al.* (2006) and Iversen *et al.* (2010)

As additional controls, we use a range of socio-demographic variables: age, age squared, religion (Islamic, Christian, other), gender, social group, household land holdings (in hectares), and household literacy rate. Age proxies potential years of experience, since we do not have data on actual years of experience. Social background Social group is a dummy for people belonging to scheduled tribe and scheduled caste and are considered socially backward. Religion is represented by dummy variables for three categories of minorities namely, Islam, Christianity and other religions (where Hindus, the majority group, form the excluded category). A large body of literature has investigated parental influence on occupational choice using the available information (Nieken and Störmer, 2010). Parental factors affect outcomes by affecting both, the productive capabilities and the preferences of an individual. We have incorporated here land ownership and family literacy rate as proxies for family wealth and education. Differences by gender are captured by a dummy for males. Finally, aggregate effects mask vast regional variations. These are captured by incorporating regional dummies. Long run factors such as government policies can systematically change labour markets and hence also the occupational choices of all individuals. These are controlled by estimating the static model for three different years. The models are estimated

for the 15-35 age; we have also run the models on the 23-35 age group as a robustness check, but since the results are generally similar to those obtained for the 15-35 group, we do not report them here.

5. Methodology

(i) *Static model*

The static model involves the use of maximum likelihood methods to choose the appropriate parameter estimates in the expressions

$$P(Y=j) = \frac{e^{\delta_j' z_i}}{1 + \sum_{k=1}^J e^{\delta_k' z_i}}, j=1,2,\dots,J$$

$$P(Y=0) = \frac{1}{1 + \sum_{k=1}^J e^{\delta_k' z_i}}$$

(2)

where the δ terms are parameters and the z are the explanatory variables.

The multinomial logit method, while instructive, does suffer some drawbacks. The first, well documented in the literature, is that it makes an assumption of the independence of irrelevant alternatives. That is, it is assumed that the relative odds between two alternative outcomes are unaffected by augmenting the set of possible outcomes. In some contexts – particularly where the qualitative characteristics of the added regime are close to one but not the other of the two alternatives under study – this assumption is clearly absurd. Several partial fixes for this problem have been suggested in the literature, including nested logit and mixed logit methods.² In the present paper we adopt a different approach – that of dynamic discrete choice modelling. The dynamic model links theory to empirical application by adopting a structural approach in which all possible regime choices are included, and, at each date, experience in each regime determines the instantaneous returns to each regime.

A second, rather obvious, feature of the static multinomial logit analysis that is unappealing in the present context is that it is poorly equipped to investigate the impact of policy changes. In particular, the long term impact of an instantaneous change in education policy – where education is usefully regarded as an investment in an individual's future labour market performance – is not readily captured in a static analysis. For this reason too, use of a dynamic approach is appealing.

(ii) *Dynamic discrete choice model*

The dynamic analysis is based on Keane and Wolpin (1997). The essence of the problem identified by Keane and Wolpin is very simple. In each period, individuals choose between activities. The instantaneous return to each activity depends upon past experience which is

² Soopramanien and Johnes (2001) offer an example of the use of such methods in the context of occupational choice.

made up of the schooling and labour market choices that the individual has made in the past. In each period the choice made by the individual therefore impacts on the returns that she can make not only in that period but in every subsequent period. For an individual seeking to maximise her lifetime returns, the state space is therefore huge. Empirical evaluation of such a model requires the adoption of approximation methods. Keane and Wolpin propose the evaluation of expected future returns at a sample of points in the state space, fitting a regression line on the basis of this sample, and using this line to estimate expected future returns for points outwith the sample. Using these estimates allows us then to proceed to estimate the parameters of the model in the usual way, using maximum likelihood. We use the variant of the Keane and Wolpin model that allows for regime-specific shocks to be serially correlated.

A feature of the structural modelling approach used here is the close relationship between the theoretical model and the empirical implementation. The analyst begins with an assumed specification of the model, and estimates this model.³ For this reason, empirical applications of this kind are often referred to as structural models.

In this section we evaluate the dynamic model, taking seriously the starting point provided by Keane and Wolpin. The data allowed us a crude occupational classification to be made. We classify employers and regular salaried or waged employees as ‘high status occupations’, and own account workers, casual wage labour in public works, and other types of work as ‘low status occupations’. The usual primary status variable also has a code for respondents who are ‘in education’, which defines our schooling indicator.⁴ Other codes for the usual primary status variable are taken to represent activity other than work or education.

We thus begin with the following instantaneous reward functions:

$$\begin{aligned}
 R_{1t} &= \alpha_{10} + \alpha_{11}S_t + \alpha_{12}x_{1t} + \alpha_{13}x_{2t} + \varepsilon_{1t} \\
 R_{2t} &= \alpha_{20} + \alpha_{21}S_t + \alpha_{22}x_{1t} + \alpha_{23}x_{2t} + \varepsilon_{2t} \\
 R_{3t} &= \beta_0 + \beta_1 I(s_t \geq 12) + \beta_2 \text{educpol} + \varepsilon_{3t} \\
 R_{4t} &= \gamma_0 + \varepsilon_{4t}
 \end{aligned} \tag{3}$$

Here s refers to years of schooling received prior to the current period t , x_1 is years of experience in occupation 1, and x_2 is years of experience in occupation 2. The terms R_1 through R_4 denote respectively the instantaneous returns to working in occupation 1 (high status occupations), occupation 2 (low status occupations), or schooling, or other activity (which may include other work, unemployment, or absence from the labour force). We do not observe individual specific wages in the data, and this is a point of contrast between the present exercise and the model estimated by Keane and Wolpin. Nevertheless, the parameters of the model can be estimated, albeit with a restriction that we introduce later. The ε terms represent alternative-specific, period-specific, random shocks. These are crucial in determining why some workers take certain paths through their career while others take others. The first term in the instantaneous reward for schooling equation indicates that we expect the one-period ‘reward’ associated with schooling at tertiary level, β_1 , to be negative

³ This contrasts with more usual practice, which is to develop some theory and then use regression analysis to test whether or not a particular variable influences another in a particular direction consistent with that theory.

⁴ Since we need our panel to follow individuals through the point at which they enter the labour market, and since the statutory school leaving age is 14, we assume that individuals aged 14 and under are in education, regardless of whether or not the usual primary status variable indicates that they are otherwise occupied.

owing to the payment of tuition fees. The second term in that equation is intended to capture the effect of education policy (*educpol*) on the decision to stay on at school, and the sign and magnitude of the coefficient attached to that variable, β_2 , is therefore of primary interest in the present study. To ensure identification of the model, we impose $\gamma_0 = \varepsilon_{4t} = 0$. Education policy is measured as the percentage of GDP that comprises public spending on education. These data are available from the Ministry of Human Resource Development Figure 1.

While attractive in the sense that this approach involves the estimation of the parameters of the theoretical model itself, there are some disadvantages. First, a reader might wish to quibble with the precise specification being assumed in the theoretical model; since the empirical implementation is so closely linked to that particular specification, such a quibble assumes empirical importance. Secondly, the close link between theory and estimation means that generic software cannot be developed to estimate models of this kind. In effect, the whole program must be rewritten from scratch each time the specification of the model is subject to a minor modification. These issues have been widely discussed in the literature. Keane (2010), for example, has noted that ‘structural econometric work is just very hard to do’ – and so is not fashionable. We recognise this; we invite the reader therefore to go along with our story while appreciating that no small aspect of the story can be easily tweaked.

In one important respect, our task has been easier than that of earlier researchers in this area. A recent survey of structural dynamic discrete choice models by Aguirregabiria and Mira (2010) is accompanied by a website⁵ that offers software that has been used by earlier researchers to estimate these models.⁶ The software is written in high level languages (the Keane and Wolpin program, for example, is in fortran), and requires considerable adaptation before being used to estimate even models that are very similar to those evaluated in the original applications. It nevertheless provides a useful starting point.

6. Data

Multinomial logit models

The national level data on employment and unemployment has been generated by National Sample Survey Organisation (NSSO) through quinquennial household surveys conducted on a regular basis since 1972-73. The data gap between the quinquennial rounds is filled by ‘annual consumer expenditure cum employment unemployment’ surveys, which are based on thin samples. In essence, these surveys are conducted to provide information on consumer expenditure but they also provide information on the activity status, age, gender, and educational attainment of individuals.

The parameters of the static models in the present study are estimated using quinquennial rounds (although this description is rather imprecise) of National Sample Surveys on employment and unemployment at three points in time spanning more than a decade: 1993-94, 1999-2000 and 2005-06. The analysis permits us to compare the relationship between educational attainment and occupational choice across three points in time. NSS surveys on employment contain particularly rich data on occupation and educational attainment at the

⁵ http://individual.utoronto.ca/vaguirre/wpapers/program_code_survey_joe_2008.html

⁶ Another useful recent survey is provided by Keane and Wolpin (2009).

level of the individual. These surveys also collect a wide array of data on the socio-economic characteristics of individuals including, religion, age, caste, and land possessed. Occupations are defined from an individual's primary labor market status and are available at three-digit NCO classification⁷. The 1993-94 Survey consists of 115,409 households containing 564,740 individuals, while 1999-2000 and the 2005-06 rounds have 165,052 households representing 819,013 individuals and 78,879 households with 413,657 individuals, respectively.

Dynamic models

For dynamic models we use data from the *annual NSS consumer expenditure cum employment unemployment surveys* over the period 1995-2006⁸. The NSS is a large *cross-section* data set, repeated each year but with a different sample of individuals.⁹ In order to use these data in the context of a dynamic analysis, it is therefore necessary first to construct a synthetic panel.

Deaton (1985) showed that, under reasonable assumptions, it is possible to construct a pseudo-panel from repeated cross sections. This simply involves constructing cohorts of individuals in each year, based on their age and other characteristics, and then using the cohort average values of all variables across the repeated cross sections. This collapses a large number of observations into a pseudo-panel comprising a smaller number of synthetic observations. Moffitt (1993) showed that this method is tantamount to the adoption of an instrumental variables approach in which the instruments comprise a full set of cohort dummies. Earlier attempts at constructing pseudo-panels using NSS data include Imai and Sato (2008).

In the present context, the traditional approach to constructing a pseudo-panel is not available to us. This is because using the cohort mean values of characteristics such as occupation or attendance at school would result in non-integer values that do not make sense in the dynamic discrete choice framework.¹⁰ We therefore construct a synthetic panel by matching individuals from the last sweep of the survey with individuals from the previous sweep, then matching individuals from the latter sweep with individuals from the sweep before, and so on until a complete panel is constructed. The matching is done using the nearest neighbour, based on propensity score, without replacement. Matching is on age and region.¹¹ Region is

⁷ Till date six such surveys have been conducted, the first, the 27 th round survey (1972-73) followed by the 32nd round (1977-78), 38th round (1983), 43rd round (1987-88), 50th round (1997-98) and the 55th round (1999-2000) survey.

⁸ These are rounds 51 through 62.

⁹ While there do exist panel data sets for India, these are not suitable for the present analysis since they do not provide individuals' work histories in the form of regularly collected data over a lengthy period. The Rural Economic and Demographic Survey (REDS) data followed on from the Additional Rural Income Survey of the late 1960s. REDS comprises four sweeps, taken in 1970-71, 1982, 1999 and 2006. The sweeps clearly do not take place frequently enough to provide complete work histories. Further panel data are offered by the India Human Development Survey (IHDS), but again the sweeps are limited in number and are more than a decade apart (1993-4 and 2005-6). An early study that uses the IHDS is that of Singh (2010).

¹⁰ Collado (1997, 1998) and Verbeek (2008) have considered the issue of pseudo-panels in the context of limited dependent variable models that are static in nature, but unfortunately their approach cannot be used in the dynamic context.

¹¹ We considered including other variables. In particular, educational attainment was considered, but proved to be problematic, since many in our sample are at an age where their educational attainment is changing; an individual aged, say, 26 in 2006 may have completed higher education, but in 1995 such an individual can only have completed compulsory education and is therefore indistinguishable from other respondents of the same

defined by six broad regions plus a miscellaneous category – the regions are: North West (Himanchal Pradesh, Jammu and Kashmir, Uttaranchal); North Central (Bihar, Haryana, Madhya Pradesh, Punjab, Uttar Pradesh, Delhi); West (Goa, Gujarat, Maharashtra, Rajasthan); East (Chhattisgarh, Jharkhand, Orissa, Sikkim, West Bengal); South (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu); and North East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura). The use of matching methods to produce a synthetic panel in this way likely produces more switching (from year to year) of destination status than would be observed in a true panel; any bias that this introduces into the estimation is unavoidable.

In view of the large size of this data set, and of the computer intensive nature of the estimation procedure being used, we have taken a random sample of 5000 male workers, all of whom pass through the school leaving age of 14 at some point during the 1995-2006 window. To operationalise the selection of observations, 5000 males were chosen at random out of the 2006 data, and these were matched with males drawn from the full set of observations for the earlier years. We do not include females in our dynamic analysis because the richer array of outcomes that is characteristic of women would add considerable complexity to a modelling exercise that is already challenging.

7. Education and occupational choice: descriptive statistics

Table 2 contains summary statistics for those variables which are used in the analysis, including the dummy variables. The average of the dummy variable is essentially the proportion of the population in that category. The table also provides the frequency and relative frequency counts for occupational status categories used in the analysis. The preponderance of non-workers in this age group appears puzzling. But given the fact that almost 90 per cent of this population is constituted by females, it essentially reflects the non-participation of women in economic activity in the country. An analysis of the average educational attainment across the selected occupational categories over time reveals two key findings. First, the average educational attainment of the young population has increased in all the categories including that of non-workers. Two, non-manual jobs attract people with the highest educational attainment followed by non-manual self employment. Manual work intensive occupations are taken up by the individuals with the lowest educational attainment. Apparently, there is a systematic relationship between education and occupational choice. Further, men are more likely to be workers than women. The gender divide is most prominent in non-manual self employment. It could be that women choose self-employment as a balancing act between career and family (Wellington 2006 and references therein). Interestingly there is no considerable gender divide in the ‘student’ category. Occupational choices also seem to differ by social group, religion, and family literacy and wealth.

8. Empirical results

We report the results of our statistical models by considering, first, the static multinomial logit specification, and, later, the dynamic discrete choice model.

Multinomial logit models

age. Clearly results from the analysis that follows may be sensitive to the choice of both matching technology and the variables (and, for that matter, the level of aggregation used in defining variables such as region) used for matching.

In Tables 3-5, we report the marginal effects of the years of schooling variables, separately for each year, and separately for males, females, and all respondents along with the results of an analysis in which data from all three rounds are pooled, but the schooling variables are interacted with a round index so that we can investigate how the impact of schooling has changed over time. Model 1 is our benchmark version with a linear term for schooling years while Model II includes a quadratic term for the schooling variable. For reasons of space, we do not report the marginal effects of the other variables in full; we do, however, report the results, pooled across men and women, for a typical year in the appendix.

It is clear from our linear version of the model that in all years, schooling raises the probability with which an individual enters non-manual work, and reduces the probability with which an individual enters manual work. Schooling also raises the probability of continuing in education and – more surprisingly, perhaps – of being in neither work nor schooling. These results hold across both genders, but the marginal effects associated with the impact of schooling on occupational choice are greater for males than for females (Tables 4 and 5).

Men are more likely to be in work or schooling than are women. Workers in scheduled tribe and scheduled castes are more likely to be employed, and less likely to be self-employed, than other workers. They are also more likely to be in education. Clearly, the imposition of quota policies has had a positive impact not only on job selection among socially backward classes as shown by Howard and Prakash (2010) but also on education. There seems to be a systematic relationship between religion and occupational choice. While Muslims are more likely to be in non-manual self-employment, Christians exhibit greater probability of entering into manual self-employment than Hindus. Our findings are in line with those of Audretsch *et al.* (2007) who found Islam and Christianity to be conducive to entrepreneurship, while Hinduism appears to inhibit entrepreneurship. Parental variables emerge as significant in nearly all specifications. Individuals resident in households with substantial holdings of land are relatively likely to be engaged in self-employed manual work; presumably this often takes the form of farming while those from educated families are more likely to attain higher education and take up non-manual occupations.

Unsurprisingly, the propensity to be in education increases over time after controlling for unobserved time varying effects (through time specific dummy variables. There is thus evidence of changes in individuals' preferences over time with more time allocated to education.

We estimated a non-linear relationship to further probe this relationship. In model II, both linear and quadratic terms for schooling years become highly significant while all other parameter estimates remain largely unaffected. This provides strong evidence of non-linear effects of education on occupational choice. In the linear model each extra year of schooling increases the probability of being a non-worker. But Model II indicates that the probability of being neither in education nor in employment first declines with education but then increases after a threshold level of education. Interestingly these job market patterns seem to have been reinforced over time through the 1990s and early 2000s but weakly. In 2005-06, the incremental effect of higher education on the probability of being a non-worker or non-student was negative when compared with 1999-00. Reforms in higher education during this period appear to have paid off in terms of more employment opportunities for individuals with higher education. Further, the probability of continuing education also increases at lower levels of income but is reversed at higher levels of education. Over time, these patterns also became more pronounced. In all the specifications, the probability of taking up manual jobs

or manual self-employment is negatively associated with higher education and is positive for non manual jobs and self-employment. However, we observe some interesting changes in these patterns, in particular in the 2005-06 survey results. While manual jobs are increasingly disliked by the people with higher education, it does not necessarily translate into preference for non-manual jobs. Rather, we observe increasing preference for self-employment both manual and non-manual. The present system of higher education has been criticized for being too academic and biased toward literary subjects thus encouraging passive receptivity (GOI, 1972). These incremental changes signal positive developments in the labour market outcomes of education reforms. Interestingly, these changes are more obvious for males than females (Tables 4-5). An important caveat to bear in mind when interpreting these results is that marginal effects of the observed variables are constrained to equality across occupation groups; it is not possible therefore simply to differentiate these marginal effects with respect to schooling in order to find the turning points.

In order to check the robustness of the above results, however, we estimated the model with a different *age group 23-35*. The results presented above are found to be robust to a different choice of the age group. Further, the results are also robust to the model specification; the inclusion of a quadratic term yields more information without affecting the main employment patterns predicted by the model.

The results reported above make clear that an increased incidence of education raises the probability with which individuals remain in education (unsurprisingly), and the probability with which they enter employment as non-manual workers. The expansion in the education sector seems to have had a significant impact on occupational outcomes, leading to greater educational attainment and more workers entering non-manual jobs. It is readily observed that, almost without exception, these marginal effects are highly significant, and that they affect outcomes in the expected direction. We investigate this further as we turn to consider the dynamic modelling of destination.

Dynamic models

As with any approximation method, a number of parameters need to be set by the analyst in order to proceed. For the simulation used to evaluate the regime that yields the greatest expected future return, we use 500 draws; we evaluate the expected return at 300 randomly chosen points in the state space and use the interpolation method for all other points. The discount parameter is set at 0.95.¹² The convergence toward the maximum likelihood solution is deemed to be complete when further iterations fail to achieve an improvement in the log likelihood that exceeds 0.001%.

Parameter estimates are reported in Table 6, and are broadly in line with our prior expectations. The key finding is that educpol raises the propensity of respondents to stay in education. Moreover, educational attainment increases the propensity to be in high status occupations relative to lower status occupations; it also increases the propensity to be in work relative to being neither in work nor in schooling. The high value of the ρ_{33} parameter indicates that there is a considerable amount of unobserved heterogeneity across individuals, and that this impacts on the returns that are available to education; it may be the case that this

¹² These correspond to default values in the program provided by Keane and Wolpin.

could be modelled by separately evaluating coefficients for respondents that come from different family backgrounds, but this is an exercise that we leave for further work.

Following Keane and Wolpin (1994, 1997) we evaluate standard errors using the outer product of numerical first derivatives. Keane and Wolpin note that there may be a downward bias associated with these standard errors. The *t* statistics reported in Table 6 are high for many of the coefficients, this being typical of results achieved elsewhere in analyses of this kind. Moreover, we note that the *educpol* variable is clustered across all observations in a given year. We are not aware of any literature that allows correction for such clustering in this context, but note that this too will likely bias the standard error downwards. Hence our central result concerning the impact of educational policy needs to be interpreted with some measure of caution.

It is possible to use the estimates reported in Table 6 as a starting point in an exercise which aims to evaluate how future changes in educational policy are likely to affect occupational outcomes. The software provided by Keane and Wolpin includes a program that, given the estimated parameter values, enables us to compute the within period probabilities with which a randomly selected observation is expected to appear in each regime in each period of the time frame under consideration; we can thus calculate these probabilities for an assumed time series of the educational policy variable. This is, once again, a rather computationally intensive exercise: for each individual in each period it is necessary to evaluate the expected lifetime returns at each point in a large state space. We do so using Keane and Wolpin's default values. Raising the educational policy variable from 3% to 4% has the effect of raising the unconditional mean value of years spent in non-manual formal sector work from 1.0900 to 1.0906. The value of these means is small (since many individuals in the sample are of an age still to be in compulsory education), and the change itself is small, but the direction of change is very much in line with intuition.

9 Conclusions

An increase in spending on education leads, not surprisingly, to an increase in the propensity for young people to undertake education. Later in the life cycle, the human capital that they have acquired equips these young people to undertake jobs that are qualitatively different from those in which they would otherwise have become employed. Put simply, more people get better jobs. This should be expected to tilt the economy's comparative advantage toward the production of goods and services that are more skill intensive and hence more remunerative.

Our results are plausible, but should be treated with a measure of caution. The matching procedure used to construct the synthetic panel is, we think, interesting; but it is an untested tool. Clearly the results are, to a greater or lesser extent, likely to be sensitive to changes in the way in which the matching exercise is conducted – matching on a different set of variables or using a different matching technology may not be innocuous. The need to construct a pseudo-panel has also driven our decision to limit the time frame under consideration to just 12 years; a longer panel would introduce greater potential for suspect matches. Unfortunately the only true panel data sets for India are unsuitable for this type of analysis. The problem considered in this paper shows just how valuable a dataset comprised of longitudinal data on the labour market experience of individuals in India (whether collected in real time or by recall) could be.

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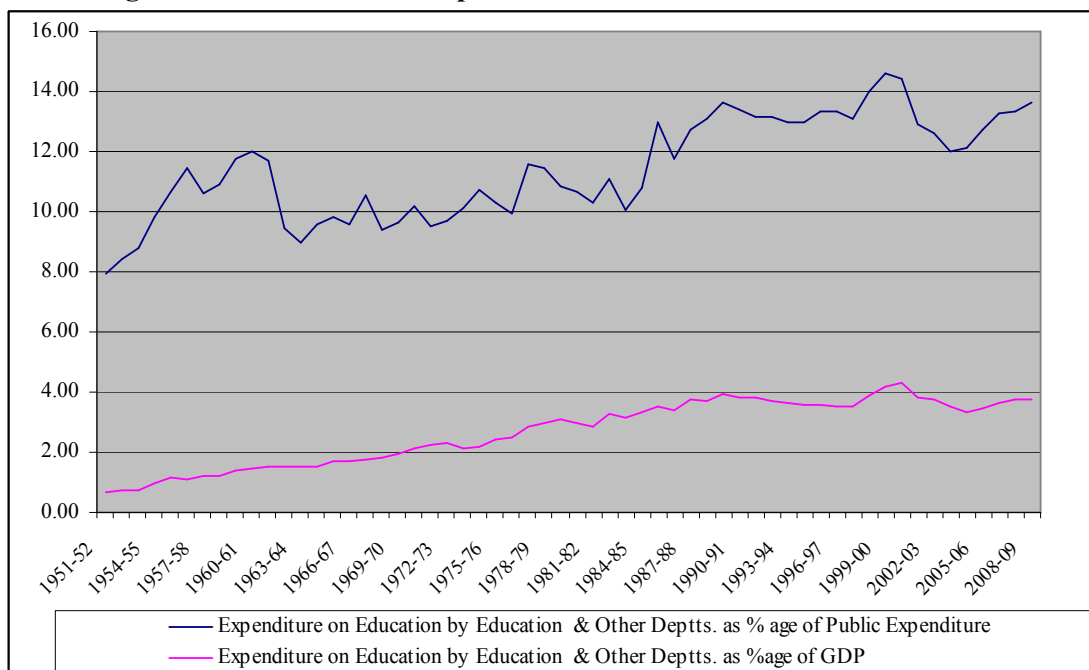
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Figure 1: Share of Public expenditure on education in India : 1951-2009



Source: MHRD, GOI

Table 1: Growth in institutions, enrolment and literacy rates: 1950-2005 (%)

	Average annual growth rate in institutions				Average annual growth rate in enrolment		% point change in literacy rate
	Schools	Colleges	Professional	Universities	Schools	Higher education	
1950-61	6.26	13.35	29.56	6.00	7.54		7.35
1961-71	3.28	10.76	1.92	7.03	6.47		5.43
1971-81	2.27	5.38	na	3.21	3.27		6.78
1981-91	1.84	3.84	na	6.06	3.91	5.1	6.61
1991-96	1.82	6.21	8.90	4.21	2.26	5.6	5.83
1996-01	2.31	3.85	10.99	2.37	1.99	8.4	5.83
2001-05	4.71	8.15	20.71	6.74	4.18	5.2	9.09

Source: MHRD, GOI; UGC, 2008. na: not available

Table 2: Descriptive statistics

Year	Variable	Non workers	Students	Manual workers	Manual self employed	Non manual workers	Non manual self employed
1993-94	Av. No. of schooling years	4.711	9.311	3.060	4.339	9.866	7.522
	S.D.	4.800	2.672	3.813	4.272	4.832	4.823
	NOB	71630	34150	37003	43276	13463	12743
	Share in total NOB	0.337	0.161	0.174	0.204	0.063	0.060
1999-00	Av. No. of schooling years	5.654	9.450	3.726	4.952	9.955	8.038
	S.D.	4.952	2.731	4.066	4.438	4.714	4.765
	NOB	91766	49689	52791	56061	18958	20396
	Share in total NOB	0.317	0.172	0.182	0.194	0.065	0.070

2005-06	Av. No. of schooling years	6.832	9.920	5.243	6.241	10.415	9.082
	S.D.	4.883	2.485	4.142	4.326	4.385	4.381
	NOB	52035	33872	31326	25500	11817	14317
	Share in total NOB	0.308	0.201	0.186	0.151	0.070	0.085
Descriptive statistics based on pooled data: 1993-94 to 2004-05							
	age	24.982	17.779	25.788	25.871	27.478	27.067
	S.D.	5.676	2.726	5.875	5.804	5.296	5.419
	sex	0.107	0.604	0.761	0.716	0.762	0.878
	S.D.	0.310	0.489	0.426	0.451	0.426	0.328
		0.254	0.255	0.433	0.302	0.250	0.165
		0.435	0.436	0.495	0.459	0.433	0.371
	Hindu	0.700	0.703	0.747	0.698	0.718	0.700
	S.D.	0.458	0.457	0.435	0.459	0.450	0.458
	Islam	0.148	0.102	0.102	0.099	0.091	0.153
	S.D.	0.355	0.303	0.303	0.298	0.288	0.360
	Christian	0.034	0.072	0.031	0.065	0.071	0.028
	S.D.	0.182	0.259	0.174	0.247	0.256	0.164
	Other	0.006	0.011	0.003	0.016	0.005	0.004
	S.D.	0.076	0.103	0.059	0.126	0.073	0.063
	Land size	0.892	0.966	0.305	2.108	0.405	0.449
	S.D.	2.654	4.166	0.946	3.871	1.907	2.189
	Family literacy rate	63.865	84.473	48.472	53.892	77.869	71.311
	S.D.	29.920	19.335	33.551	30.193	24.578	27.514

Table 3: Multinomial logit marginal effects of years of schooling, men and women aged 15-35

Model	Education	Non workers	Students	Manual workers	Manual self employed	Non manual workers	Non manual self employed
1993-94							
I	Schooling years	0.0186	0.0042	-0.0165	-0.0193	0.0103	0.0028
		36.1	27.87	-57.85	-41.39	53.56	16.57
	NOB	193129	LL -193432.95	Pseudo R2 .3829			
II	Schooling years	-0.005461	0.005756	-0.006090	0.011925	-0.003575	-0.002555
		-4.03	26.73	-7.83	9.55	-7.02	-5.55
	Schooling years squared	0.002004	-0.000080	-0.000837	-0.002387	0.000913	0.000387
		20.51	-11.92	-13.44	-25.35	27.51	13.02
	NOB	193129	LL -192379.34	Pseudo R2 .3863			
1999-00							
I	Schooling years	0.0163345	0.004855	-0.018706	-0.016571	0.0111108	0.0029774
		35.98	30.5	-68.54	-42.39	56.63	15.83
	NOB	212426	LL -223564.05	Pseudo R2 .3657			
II	Schooling years	-0.004526	0.005871	-0.002592	0.010644	-0.005923	-0.003474
		-3.71	27.26	-3.48	9.96	-10.69	-6.56
	Schooling years squared	0.001736	-0.000043	-0.001249	-0.002000	0.001090	0.000467
		20.4	-6.3	-21.72	-25.6	31.37	13.95
	NOB	212426	LL -222351.47	Pseudo R2 .3691			
2005-06							
I	Schooling years	0.0125	0.0033	-0.0109	-0.0101	0.0048	0.0005
		19.62	17.54	-32.58	-20.55	23.44	2.38
	NOB	106294	LL -116915.85	Pseudo R2 .337			
II	Schooling years	0.00486	0.00372	-0.00126	-0.00003	-0.00580	-0.00149
		2.67	15.9	-1.29	-0.02	-9.53	-2.57
	Schooling years squared	0.0008	0.0000	-0.0008	-0.0008	0.0007	0.0002
		6.06	-3.3	-10.03	-7.05	17.03	3.87
	NOB	106294	LL -116209.25	Pseudo R2 .341			
Pooled 1994-94 to 2005-06							
I	Dummy for round 55* schooling years	0.000587	0.000013	0.001822	-0.000087	-0.001692	-0.000643
		1.28	0.27	5.83	-0.21	-8.36	-3.24
	Dummy for round 62* schooling years	-0.003378	0.000249	0.004647	0.002423	-0.002437	-0.001503
		-5.87	4.2	12.99	4.58	-9.41	-5.98
	NOB	511849	LL -536173.15	Pseudo R2 .3645			
Pooled 1994-94 to 2005-06							
II	Dummy for round 55* schooling years	0.003643	-0.000681	0.004765	-0.005051	-0.001195	-0.001481
		2.51	-3.58	4.89	-3.79	-1.8	-2.37
	Dummy for round 55* schooling years ²	-0.000308	0.000044	-0.000258	0.000514	-0.000042	0.000050
		-2.67	4.14	-2.92	4.59	-1.01	1.18
	Dummy for round 62* schooling years	-0.010036	-0.000902	0.015140	0.000124	-0.002032	-0.002296
		-5.59	-3.5	13.44	0.07	-2.45	-2.96
	Dummy for round 62* schooling years ²	0.000505	0.000069	-0.000891	0.000343	-0.000057	0.000032
		3.57	5.01	-8.97	2.52	-1.1	0.6
	NOB	511849	LL -533150.53	Pseudo R2 .3681			

Note: Numbers below coefficients represent t-statistics

Table 4: Multinomial logit marginal effects of years of schooling, men aged 15-35

Model	Education	Non workers	Students	Manual workers	Manual self employed	Non manual workers	Non manual self employed
1993-94							
I	Schooling years	0.011681	0.007154	-0.023377	-0.016764	0.014128	0.007178
		35.76	24.37	-50.57	-27.18	45.69	20.77
		NOB 98869	LL -113236.06	Pseudo R2 .3029			
II	Schooling years	-0.013272	0.009041	-0.007628	0.026488	-0.009859	-0.004770
		-15.17	21.27	-5.85	15.61	-10.88	-4.76
		NOB 98869	LL -112106.34	Pseudo R2 .3099			
1999-00							
I	Schooling years	0.01069	0.00609	-0.02482	-0.01430	0.01437	0.00798
		32.16	24.04	-56.41	-26.14	46.69	21.91
		NOB 111449	LL -133052.49	Pseudo R2 .2876			
II	Schooling years	-0.01592	0.00665	0.00345	0.02052	-0.00987	-0.00483
		-18.33	19.47	2.81	13.57	-10.74	-4.54
		NOB 111449	LL -131755.94	Pseudo R2 .2945			
2005-06							
I	Schooling years	0.0126483	0.0148852	-0.0374632	-0.0112435	0.0144714	0.006702
		28.82	30.5	-50.81	-16.55	33.17	14.08
		NOB 56839	LL -68792.91	Pseudo R2 .2651			
II	Schooling years	-0.0147095	0.0174569	0.0054718	0.0110167	-0.0124928	-0.0067431
		-12.07	21.1	2.48	5.43	-9.16	-4.71
		NOB 56839	LL -68130.23	Pseudo R2 .2723			
Pooled 1994-94 to 2005-06							
I	Round 55* schooling years	-0.00395	0.00007	0.00411	0.00245	-0.00213	-0.00055
		-10.7	0.86	7.76	4.03	-6.07	-1.38
		NOB 267157	LL -316342.75	Pseudo R2 .2875			
II	round 62* schooling years	-0.00215	0.00039	0.00578	0.00229	-0.00326	-0.00305
		-4.41	3.52	9.14	2.92	-7.12	-5.88
		NOB 267157	LL -316342.75	Pseudo R2 .2875			
Pooled 1994-94 to 2005-06							
II	round 55* schooling years	-0.00396	-0.00073	0.01112	-0.00565	0.00069	-0.00147
		-3.73	-1.96	6.76	-2.94	0.6	-1.14
		NOB 267157	LL -316342.75	Pseudo R2 .2875			
II	round 55* schooling years2	0.00001	0.00005	-0.00062	0.00075	-0.00020	0.00002
		0.1	2.36	-4.4	4.92	-2.86	0.25
		NOB 267157	LL -316342.75	Pseudo R2 .2875			
II	round 62* schooling years	-0.00577	-0.00107	0.02069	-0.00500	-0.00185	-0.00700
		-4.17	-2.15	10.52	-2.03	-1.25	-4.29
		NOB 267157	LL -316342.75	Pseudo R2 .2875			
II	round 62* schooling years2	0.00013	0.00008	-0.00113	0.00085	-0.00015	0.00021
		1.53	3.07	-6.98	4.57	-1.7	1.99
		NOB 267157	LL -313230.03	Pseudo R2 .2945			

Note: Numbers below coefficients represent t-statistics

Table 5: Multinomial logit marginal effects of years of schooling, women aged 15-35

Model	Education	Non workers	Students	Manual workers	Manual self employed	Non manual workers	Non manual self employed
1993-94							
I	Schooling years	0.013463	0.000907	-0.005358	-0.012985	0.003782	0.000192
		31.87	15	-31.07	-35.64	29.7	2.09
		NOB 94260	LL -76853.71	Pseudo R2 .3102			
II	Schooling years	0.003453	0.001220	-0.001570	0.000423	-0.002033	-0.001492
		2.79	15.12	-3.17	0.38	-6.46	-5.84
		NOB 94260	LL -76434.04	Pseudo R2 .3139			
	Schooling years squared	0.001088	-0.000020	-0.000358	-0.001225	0.000386	0.000129
		10.14	-8.63	-7.75	-12.49	17.74	7.25
		NOB 94260	LL -76434.04	Pseudo R2 .3139			
1999-00							
I	Schooling years	0.01286	0.00169	-0.00686	-0.01210	0.00453	-0.00012
		32.93	18.71	-39.92	-38.59	33.62	-1.05
		NOB 100977	LL -86906.88	Pseudo R2 .3094			
II	Schooling years	0.00250	0.00209	-0.00231	0.00382	-0.00413	-0.00198
		2.21	17.69	-4.7	4.07	-11.1	-6.16
		NOB 10977	LL -86345.51	Pseudo R2 .3139			
	Schooling years squared	0.00110	-0.00002	-0.00040	-0.00137	0.00055	0.00014
		12.13	-5.79	-9.4	-17.42	22.33	6.51
		NOB 10977	LL -86345.51	Pseudo R2 .3139			
2005-06							
I	Schooling years	0.0125	0.0033	-0.0109	-0.0101	0.0048	0.0005
		19.62	17.54	-32.58	-20.55	23.44	2.38
		NOB 49455	LL -46032.07	Pseudo R2 .2914			
II	Schooling years	0.00486	0.00372	-0.00126	-0.00003	-0.00580	-0.00149
		2.67	15.9	-1.29	-0.02	-9.53	-2.57
		NOB 49455	LL -45760.93	Pseudo R2 .2956			
	Schooling years squared	0.0008	0.0000	-0.0008	-0.0008	0.0007	0.0002
		6.06	-3.3	-10.03	-7.05	17.03	3.87
		NOB 49455	LL -45760.93	Pseudo R2 .2956			
Pooled 1994-94 to 2005-06							
	Round 55* schooling years	0.00140	-0.00004	0.00007	-0.00027	-0.00086	-0.00030
		2.95	-1.84	0.31	-0.66	-6.93	-2.43
		NOB 244692	LL -210821.82	Pseudo R2 .3037			
	Round 62* schooling years	-0.00631	0.00005	0.00205	0.00548	-0.00124	-0.00003
		-11.65	1.7	8.79	11.83	-7.99	-0.2
		NOB 244692	LL -210821.82	Pseudo R2 .3037			
Pooled 1994-94 to 2005-06							
II	Round 55* schooling years	-0.00051	-0.00029	0.00050	0.00125	-0.00108	0.00013
		-0.35	-3.35	0.76	0.98	-2.55	0.35
		NOB 244692	LL -210821.82	Pseudo R2 .3037			
	Round 55* schooling years ²	0.00014	0.00002	-0.00003	-0.00009	0.00001	-0.00004
		0.99	3.28	-0.47	-0.73	0.33	-1.31
		NOB 244692	LL -210821.82	Pseudo R2 .3037			
	Round 62* schooling years	-0.00795	-0.00034	0.00513	0.00400	-0.00169	0.00086
		-4.73	-2.94	7.07	2.8	-3.34	1.97
		NOB 244692	LL -210821.82	Pseudo R2 .3037			

Round 62*	0.00008	0.0000	-0.00031	0.00025	0.00003	-0.00007
schooling years2		2				
	0.51	3.68	-3.96	1.85	0.83	-2.27
	NOB 244692	LL -209554.33		Pseudo R2 .3079		

Note: Numbers below coefficients represent t-statistics

Table 6: Dynamic discrete choice model: parameter estimates

variable	estimated coefficient	t statistic
α_{10}	3.9102	24.33
α_{11}	0.1578	14.87
α_{12}	0.0096	0.19
α_{13}	-0.6974	14.72
α_{20}	-0.3888	0.37
α_{21}	0.0740	0.04
α_{22}	-0.2124	0.08
α_{23}	-0.0003	0.00
$\beta_0/1000$	0.0257	0.19
$\beta_1/1000$	-0.5508	4.98
$\beta_2/1000$	0.0413	2.99
$\gamma_0/1000$	0	restricted
ρ_{11}	0.0163	0.04
ρ_{22}	-0.0335	0.01
ρ_{33}	10.4422	10.42
ρ_{44}	0	restricted
Log likelihood		-39472.43

Note: The ρ terms are the correlations of the error terms such that:

$$\varepsilon_{1t} = \rho_{11}\eta_{1t}$$

$$\varepsilon_{2t} = \rho_{22}\eta_{2t}$$

$$\varepsilon_{3t} = \rho_{33}\eta_{3t}$$

$$\varepsilon_{4t} = \rho_{44}\eta_{4t}$$

$$\eta_{kt} \sim N(0,1), k=1,\dots,4.$$

APPENDIX

Table A1: Multinomial logit marginal effects, men and women aged 15-35, full results for 1993-94

	Linear model						Non Linear model					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.0186	0.0042	-0.0165	-0.0193	0.0103	0.0028	-0.0054605	0.0057561	-0.0060902	0.0119246	-0.0035747	-0.0025553
	36.1	27.87	-57.85	-41.39	53.56	16.57	-4.03	26.73	-7.83	9.55	-7.02	-5.55
Schooling2							0.0020036	-0.0000803	-0.0008365	-0.0023869	0.0009129	0.0003873
							20.51	-11.92	-13.44	-25.35	27.51	13.02
Age	0.01418	-0.01052	0.00179	-0.01294	0.00010	0.00739	0.011611	-0.0114619	0.0032103	-0.0082142	-0.0022255	0.0070803
	5.45	-18.35	1.36	-5.54	0.1	7.51	4.44	-20.11	2.49	-3.53	-1.95	7.11
Age2	-0.00047	0.00011	0.00002	0.00035	0.00007	-0.00008	-0.000435	0.0001378	-8.19E-06	0.0002702	0.0001139	-0.0000786
	-9.14	12.14	0.61	7.63	3.62	-4.39	-8.51	14.41	-0.32	5.95	5.27	-4.13
Male	-0.73675	0.00263	0.20915	0.38219	0.04124	0.10154	-0.7321693	0.002643	0.2016682	0.3688018	0.0509978	0.1080585
	-383.04	16.38	101.52	145.71	39.99	66.18	-374.36	16.35	94.61	137.08	42.06	66.2
Islam	0.16882	-0.00088	-0.05379	-0.11695	-0.00916	0.01196	0.1707943	-0.001002	-0.053847	-0.1176049	-0.0097414	0.0114011
	29.82	-3.04	-25.05	-26.18	-5.17	6.14	30.19		-25.77	-26.68	-4.99	5.83
Christian	-0.16881	0.00014	-0.03690	0.20952	0.00804	-0.01200	-0.1646119	0.0002268	-0.0367358	0.1995732	0.0128317	-0.0112841
	-26.56	0.35	-10.47	28.31	3.27	-4.73	-25.6	0.54	-10.68	26.73	4.47	-4.33
Other minorities	-0.21523	0.00771	-0.05952	0.28857	-0.00010	-0.02143	-0.2203754	0.0092093	-0.0578662	0.2960681	-0.0044306	-0.0226052
	-19.88	4.54	-8.83	21.41	-0.01	-3.98	-20.6	4.86	-8.73	22	-0.62	-4.25
SC/ST	-0.05251	0.00015	0.09434	-0.02787	0.00967	-0.02378	-0.0513576	0.0000637	0.0917132	-0.0279487	0.0112073	-0.0236779
	-13.09	0.58	36.96	-7.7	5.85	-16.72	-12.74	0.24	36.45	-7.75	6.12	-16.4
HH land holdings (hectares)	0.02881	0.00092	-0.06400	0.05856	-0.00990	-0.01439	0.0292668	0.0009052	-0.0627515	0.0578086	-0.0108306	-0.0143985
	40.89	19.59	-80.59	91.87	-23.68	-30.7	41.31	19.83	-79.58	91.29	-24.01	-30.57
HH literacy rate	0.00215	0.00019	-0.00114	-0.00169	0.00026	0.00024	0.0025249	0.0001823	-0.0012868	-0.0022318	0.00049	0.0003214
	30.85	22.6	-31.87	-27.1	9.99	9.62	34.34	23.23	-35.03	-34.24	16.57	12.11
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	193129						193129					
LL	-193432.9						-192379.3					
Pseudo R2	0.3829						0.3863					

Table A2: Multinomial logit marginal effects, men and women aged 15-35, full results for 1999-2000

	Linear model						Non Linear model					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.0163345	0.004855	-0.018706	-0.016571	0.0111108	0.0029774	-0.004526	0.0058707	-0.002592	0.0106441	-0.005922	-0.0034737
	35.98	30.5	-68.54	-42.39	56.63	15.83	-3.71	27.26	-3.48	9.96	-10.69	-6.56
Schooling2							0.0017355	-0.000042	-0.001249	-0.002000	0.00109	0.000467
							20.4	-6.3	-21.72	-25.6	31.37	13.95
Age	-0.0157051	-0.013053	0.0090249	0.0094878	-0.000107	0.0103525	-0.018104	-0.013866	0.0106493	0.0134481	-0.002361	0.0102354
	-6.21	-20.74	6.52	4.42	-0.09	8.89	-7.11	-21.9	7.91	6.29	-1.9	8.68
Age2	0.0000569	0.0001512	-0.000122	-0.0000611	0.0000861	-0.000110	0.0000831	0.000169	-0.000145	-0.000119	0.0001233	-0.0001114
	1.16	14.7	-4.54	-1.47	3.95	-4.99	1.68	16.07	-5.54	-2.87	5.25	-4.96
Male	-0.7154092	0.0012304	0.2306803	0.3004207	0.0543867	0.128691	-0.711740	0.0012582	0.2192529	0.2909194	0.064338	0.1359724
	-380.53	8.65	115.59	128.07	48.06	81.76	-372.96	8.57	107.33	121.53	50.55	82.11
Islam	0.1629095	-0.000831	-0.070696	-0.0838176	-0.008874	0.0013107	0.1652852	-0.000999	-0.070617	-0.086961	-0.007767	0.0010611
	33.69	-3.08	-34.68	-22.75	-4.87	0.69	34.15	.	-36	-24	-3.91	0.55
Christian	-0.1249995	0.0017586	-0.028818	0.1560865	0.0139381	-0.017965	-0.122956	0.0019048	-0.028755	0.1492024	0.0181067	-0.0175023
	-18.89	3.49	-7.15	21.39	4.7	-5.62	-18.44	3.65	-7.36	20.45	5.48	-5.36
Other minorities	0.0010308	0.0072872	-0.072463	0.0825821	-0.020385	0.0019492	-0.000812	0.0074371	-0.069265	0.084759	-0.023056	0.00094
	0.06	4.66	-10.63	5.64	-4.01	0.24	-0.05	4.65	-10.36	5.78	-4.27	0.11
SC/ST	-0.0673751	0.0005169	0.0925969	-0.0024997	0.0129757	-0.036214	-0.065522	0.000526	0.0885809	-0.002925	0.0152356	-0.0358946
	-18.38	2.06	38.03	-0.78	7.54	-22.86	-17.76	2.03	37.17	-0.92	8.14	-22.32
HH land holdings (hectares)	0.0377082	0.001481	-0.089296	0.0725994	-0.012296	-0.010197	0.0378471	0.0014755	-0.087351	0.071136	-0.012849	-0.0102575
	39.81	21.87	-79.62	94.69	-20.04	-17.11	39.87	22.09	-79.29	94.05	-19.9	-17.16
HH literacy rate	0.0019308	0.0002274	-0.001157	-0.0015244	0.0002864	0.0002377	0.002278	0.0002281	-0.001387	-0.001996	0.0005511	0.000327
	28.76	24.68	-31.67	-27.08	9.65	7.97	32.15	25.2	-37.17	-34.11	16.67	10.42
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	212426						212426					
LL	-223564.05						-222351.5					
Pseudo R2	212426						212426					

Table A3: Multinomial logit marginal effects, men and women aged 15-35, full results for 2005-06

	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.01429 82	0.010 2771	0.027772 8	-0.0115238	0.0111814	0.0035399	0.01056 78	0.0121 756	0.000356 6	0.0098983	-0.0082463	-0.0029032
	24.49	33.78	-58.52	-22.88	40.18	13.05	-6.63	27.69	-0.26	6.84	-9.85	-3.72
Schooling2							0.00203 7	0.0001 065	-0.002092	-0.0015325	0.0012298	0.0004643
							18.13	-5.61	-20.09	-14.68	23.73	9.38
Age	0.00357 75	0.033 076	0.013786 1	0.0090901	-0.000927	0.0075503	0.00103 7	0.0324 19	0.016883 3	0.0123701	-0.0033508	0.0075538
	1.08	-24.7	5.22	3.1	-0.56	4.5	-0.31	-24.98	6.52	4.24	-1.87	4.45
Age2	0.00023 73	0.000 4859	-0.000212	-0.000056	0.0000759	-0.000055	0.00017 7	0.0004 847	-0.000255	-0.000103	0.0001106	-0.0000586
	-3.68	20.72	-4.15	-1	2.38	-1.73	-2.73	21.46	-5.1	-1.83	3.24	-1.81
Male	0.66625 69	0.002 4505	0.328102 8	0.183781	0.0477252	0.1041974	0.66362 7	0.0020 792	0.314051 6	0.180462	0.0565819	0.1104532
	-239.74	6.35	111.01	61.14	30.04	51.88	-236.03	5.53	103.54	58.85	32.07	52.38
Islam	0.12335 12	0.001 854	-0.095028	-0.025035	-0.009208	0.0077746	0.12626 12	0.0018 47	-0.095739	-0.027561	-0.0082814	0.0071683
	16.06	-2.28	-20.66	-4.1	-3.06	2.46	16.36	-2.35	-21.48	-4.56	-2.53	2.26
Christian	0.14428 43	0.004 3285	-0.024836	0.1565948	0.0114667	-0.003268	0.14377 2	0.0041 76	-0.025059	0.1533162	0.0141276	-0.0027876
	-19.92	3.4	-3.16	17.07	2.69	-0.7	-19.57	3.39	-3.24	16.73	3.02	-0.59
Other minorities	0.07989 48	0.031 7444	-0.119309	0.2305124	-0.018501	-0.044551	0.08239 6	0.0309 874	-0.114259	0.2336519	-0.0223974	-0.045586
	-4.44	5.34	-8.35	11.64	-1.93	-5.61	-4.56	5.35	-8.07	11.72	-2.28	-5.75
SC/ST	0.02972 1	0.002 0439	0.086162	-0.027544	0.0119129	-0.042853	0.02821 5	0.0019 402	0.083662 4	-0.026808	0.0125043	-0.0430828
	-6.78	3.59	23.84	-7.08	5.82	-20	-6.39	3.52	23.46	-6.91	5.68	-19.89
HH land holdings (hectares)	0.03082 29	0.004 4999	-0.112910	0.1197597	-0.02503	-0.017142	0.03104 79	0.0041 807	-0.110317	0.11899	-0.0265937	-0.0173075
	13.09	15.84	-39.16	65.42	-15.32	-11.37	13.12	15.38	-38.76	65.47	-15.48	-11.42

HH literacy rate	0.0007756	0.0003235	-0.000870	-0.000687	0.0002582	0.0002005	0.0012615	0.0003095	-0.001326	-0.001085	0.0005384	0.0003026
	8.79	19.67	-12.8	-9.11	5.92	4.71	13.5	19.28	-18.83	-13.7	11.23	6.77
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	106294						106294					
LL	-116915.85						-116209.3					
Pseudo R2	0.3371						0.3411					

Table A4: Multinomial logit marginal effects, men aged 15-35, full results for 1993-94

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.011681	0.007154	-0.023377	-0.016764	0.014128	0.007178	-0.013272	0.009041	-0.007628	0.026488	-0.009859	-0.004770
	35.76	24.37	-50.57	-27.18	45.69	20.77	-15.17	21.27	-5.85	15.61	-10.88	-4.76
Schooling2							0.001703	-0.000056	-0.001153	-0.003019	0.001586	0.000939
							30.4	-3.84	-11.49	-24.57	27.3	14.5
Age	-0.005190	-0.016601	0.010516	-0.009244	0.002713	0.017807	-0.005662	-0.019237	0.010924	-0.005985	0.001823	0.018137
	-2.71	-14.91	4.51	-2.83	1.52	8.64	-2.92	-16.32	4.78	-1.81	0.94	8.58
Age2	-0.000124	0.000166	-0.000132	0.000277	0.000055	-0.000242	-0.000142	0.000215	-0.000134	0.000238	0.000071	-0.000249
	-3.22	9.07	-2.89	4.35	1.64	-6.13	-3.62	10.81	-3	3.72	1.93	-6.16
Islam	0.022305	0.000715	-0.030661	-0.056227	-0.000461	0.064330	0.021315	0.000605	-0.031198	-0.054384	-0.000993	0.064654
	5.69	1.05	-7.03	-8.57	-0.14	14.04	5.44	0.83	-7.35	-8.3		13.91
Christian	-0.012805	0.000564	-0.072602	0.141523	0.000084	-0.056764	-0.011756	0.000771	-0.070843	0.136528	0.002867	-0.057567
	-2.92	0.6	-11.91	14.97	0.02	-12.12	-2.62	0.75	-11.87	14.13	0.62	-11.87
Other minorities	0.021755	0.016928	-0.106605	0.119022	0.002193	-0.053293	0.015677	0.019645	-0.103388	0.128553	-0.003653	-0.056834
	1.59	4.19	-9.22	5.89	0.18	-5	1.2	4.33	-9.12	6.42	-0.3	-5.33
SC/ST	0.005405	0.001529	0.128635	-0.081364	0.011256	-0.065461	0.009675	0.001659	0.122878	-0.082379	0.014648	-0.066481
	1.84	2.76	30.56	-15.99	4.07	-22.71	3.18	2.76	29.61	-16.13	4.8	-22.42
HH land holdings (hectares)	0.004850	0.002700	-0.091782	0.116649	-0.010699	-0.021717	0.004886	0.002882	-0.090108	0.115827	-0.011461	-0.022026

	8.24	19.43	-66.39	83.58	-15.22	-22.96	8.38	20.29	-66.18	83.18	-15.24	-22.85
HH literacy rate	0.000707	0.000283	-0.000933	-0.001615	0.000679	0.000879	0.001071	0.000304	-0.001173	-0.002369	0.001085	0.001082
	14.84	18.86	-14.9	-18.68	15.46	16.65	21.35	19.63	-18.23	-26.04	21.58	19.06
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	98869						98869					
LL	-113236.06						-112106.34					
Pseudo R2	0.3029						0.3099					

Table A5: Multinomial logit marginal effects, men aged 15-35, full results for 1999-00

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.01069	0.00609	-0.02482	-0.01430	0.01437	0.00798	-	0.00665	0.00345	0.02052	-0.00987	-0.00483
	32.16	24.04	-56.41	-26.14	46.69	21.91	-18.33	19.47	2.81	13.57	-10.74	-4.54
Schooling2							0.00181	0.00000	-0.00207	-0.00232	0.00157	0.00100
							33.35	0.39	-22.66	-21.85	27.8	14.86
Age	-	-	0.01506	0.01407	-0.00473	0.01729	-	-	0.01483	0.01605	-0.00560	0.01804
	0.02660	0.01510					0.02696	0.01636				
	-13.8	-15.6	6.32	4.56	-2.54	7.6	-13.98	-	6.4	5.17	-2.83	7.74
							16.16					
Age2	0.00026	0.00016	-0.00026	-0.00016	0.00019	-0.00020	0.00024	0.00018	-0.00024	-0.00018	0.00020	-0.00021
	6.8	10.34	-5.52	-2.73	5.41	-4.53	6.31	10.95	-5.26	-2.93	5.34	-4.8
Islam	0.02514	0.00058	-0.04902	-0.02581	0.00211	0.04699	0.02713	0.00046	-0.05045	-0.02938	0.00397	0.04827
	7.03	1.24	-12.4	-4.66	0.67	11.37	7.5	0.93	-13.27	-5.31	1.18	11.44
Christian	0.00799	0.00250	-0.06192	0.11369	-0.00048	-0.06178	0.00630	0.00271	-0.05956	0.11228	0.00109	-0.06282
	1.47	2.91	-9.12	11.59	-0.11	-10.61	1.18	2.95	-8.98	11.35	0.22	-10.46
Other minorities	0.10187	0.01131	-0.11346	0.01699	-0.02288	0.00616	0.09436	0.01169	-0.10671	0.02087	-0.02529	0.00508
	6.1	3.93	-9.05	0.83	-2.53	0.37	5.79	3.87	-8.62	1.01	-2.63	0.3
SC/ST	0.00822	0.001	0.11445	-0.04420	0.00667	-0.08703	0.01353	0.002	0.10724	-0.04500	0.00984	-0.08778

		89						18				
	2.95	4.56	29.5	-9.79	2.53	-29.15	4.73	4.92	28.13	-9.93	3.44	-28.57
HH land holdings (hectares)	0.00496	0.00334	-0.13287	0.14231	-0.01422	-0.00352	0.00540	0.00348	-0.13107	0.14061	-0.01465	-0.00377
	5.41	19.89	-68.14	84.23	-13.53	-3	6.06	20.38	-68.76	83.41	-13.29	-3.16
HH literacy rate	0.00054	0.00026	-0.00105	-0.00140	0.00072	0.00093	0.00095	0.00027	-0.00147	-0.00200	0.00110	0.00114
	11.11	19.22	-16.88	-17.53	15.26	16.13	18.75	19.71	-23.35	-23.86	21.09	18.53
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	111449						111449					
LL	-133052.5						-131755.9					
Pseudo R2	0.2876						0.2945					

Table A6: Multinomial logit marginal effects, men aged 15-35, full results for 2005-06

	Linear						Non ;linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.01265	0.01489	-0.03746	-0.01124	0.01447	0.00670	-0.01471	0.01746	0.00547	0.01102	-0.01249	-0.00674
	28.82	30.5	-50.81	-16.55	33.17	14.08	-12.07	21.1	2.48	5.43	-9.16	-4.71
Schooling2							0.00177	-0.00009	-0.00301	-0.00137	0.00170	0.00101
							23.69	-2.45	-19.19	-9.88	20.72	11.22
Age	-0.02037	-0.04618	0.04073	0.01508	-0.00397	0.01470	-0.02070	-0.04750	0.04099	0.01635	-0.00452	0.01539
	-7.81	-21.06	9.72	3.75	-1.53	4.99	-7.88	-21.81	9.92	4.06	-1.65	5.12
Age2	0.00017	0.00067	-0.00072	-0.00013	0.00014	-0.00013	0.00015	0.00070	-0.00070	-0.00014	0.00014	-0.00015
	3.19	17.18	-8.83	-1.63	2.88	-2.39	2.78	18.06	-8.75	-1.74	2.71	-2.63
Islam	0.02944	0.00098	-0.07105	-0.00833	0.00306	0.04591	0.02774	0.00083	-0.07096	-0.00707	0.00361	0.04585
	5.21	0.59	-8.95	-1.03	0.61	7.65	4.94	0.5	-9.08	-0.87	0.68	7.53
Christian	-0.01927	0.00417	-0.05573	0.11757	-0.00589	-0.04085	-0.02100	0.00424	-0.05362	0.11864	-0.00651	-0.04175

	-3.81	1.82	-4.63	9.53	-0.96	-5.6	-4.2	1.82	-4.48	9.57	-1	-5.59
Other minorities	0.05583	0.04905	-0.16481	0.18371	-0.04435	-0.07943	0.04713	0.04989	-0.15525	0.19014	-0.04951	-0.08241
	2.9	4.34	-6.5	6.6	-3.34	-5.54	2.57	4.35	-6.13	6.76	-3.7	-5.71
SC/ST	0.01824	0.00435	0.11463	-0.06106	0.00654	-0.08269	0.02039	0.00457	0.11155	-0.06023	0.00750	-0.08378
	5.92	4.2	21.07	-11.84	2.11	-22.76	6.52	4.34	20.56	-11.62	2.28	-22.6
HH land holdings (hectares)	0.00107	0.01077	-0.14619	0.17486	-0.02947	-0.01105	0.00184	0.01070	-0.14582	0.17496	-0.03049	-0.01119
	0.52	17.28	-31.95	54.07	-11.22	-4.11	0.91	17.26	-31.97	54.28	-11.14	-4.11
HH literacy rate	0.00018	0.00035	-0.00078	-0.00070	0.00040	0.00055	0.00055	0.00037	-0.00144	-0.00105	0.00078	0.00079
	2.82	13.79	-7.36	-6.9	6.08	7.38	8.52	14.08	-13.1	-9.82	10.83	10.12
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	106294						106294					
LL	-116915.8						-116209.2					
Pseudo R2	0.34						0.34					

Table A7: Multinomial logit marginal effects, women aged 15-35, full results for 1993-94

	Linear						Non linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.013463	0.000907	-0.005358	-0.012985	0.003782	0.000192	0.003453	0.001220	-0.001570	0.000423	-0.002033	-0.001492
	31.87	15	-31.07	-35.64	29.7	2.09	2.79	15.12	-3.17	0.38	-6.46	-5.84
Schooling2							0.001088	-0.000020	-0.000358	-0.001225	0.000386	0.000129
							10.14	-8.63	-7.75	-12.49	17.74	7.25
Age	0.022762	-0.002584	-0.004743	-0.013569	-0.001141	-0.000725	0.022345	-0.002563	-0.004274	-0.012149	-0.002503	-0.000856
	11.39	-10.75	-7.45	-7.91	-1.88	-1.36	11.44	-11.59	-7.21	-7.41	-3.53	-1.59
Age2	-0.000481	0.000031	0.000102	0.000281	0.000041	0.000027	-0.000478	0.000033	0.000093	0.000259	0.000065	0.000028
	-12.3	7.88	8.11	8.33	3.55	2.58	-12.52	9	7.99	8.03	4.86	2.7
Islam	0.108108	-0.000431	-0.024966	-0.074537	-0.004197	-0.003976	0.103479	-0.000444	-0.023406	-0.072036	-0.003803	-0.003790
	35.33	-4.32	-26.34	-28.1	-4	-4.78	34.21	-4.66	-25.36	-28.47	-3.03	-4.46

Christian	-0.192242	0.000526	-0.002595	0.178446	0.007243	0.008621	-0.188122	0.000518	-0.002385	0.168949	0.011488	0.009552
	-21.01	3.1	-1.22	19.95	4.6	4.65	-20.93	3.17	-1.2	19.32	5.64	4.94
Other minorities	-0.316061	0.002077	-0.010587	0.327842	-0.001522	-0.001750	-0.313116	0.002411	-0.009420	0.325303	-0.003304	-0.001874
	-15.79	2.96	-2.57	16.55	-0.35	-0.5	-15.65	3.18	-2.42	16.48	-0.75	-0.54
SC/ST	-0.056381	-0.000254	0.032142	0.016382	0.005256	0.002855	-0.054072	-0.000269	0.029804	0.015190	0.006299	0.003048
	-16.41	-2.73	21.49	5.77	4.82	3.16	-16.01	-3	20.64	5.58	5	3.33
HH land holdings (hectares)	0.012911	0.000047	-0.016694	0.010995	-0.002796	-0.004463	0.012385	0.000037	-0.015501	0.010342	-0.002844	-0.004420
	21.52	4.19	-37.81	36.36	-10.46	-14.54	20	3.49	-33.96	35.03	-9.54	-14.32
HH literacy rate	0.001009	0.000058	-0.000486	-0.000558	-0.000005	-0.000018	0.001036	0.000054	-0.000496	-0.000738	0.000129	0.000016
	18.41	13.33	-24.01	-11.9	-0.31	-1.3	18.48	13.73	-24.94	-15.74	6.53	1.14
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	94260						94260					
LL	-76853.708						-76434.04					
Pseudo R2	0.3102						0.3139					

Table A8: Multinomial logit marginal effects, women aged 15-35 full results for 1999-00

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.01286	0.00169	-0.00686	-0.01210	0.00453	-0.00012	0.00250	0.00209	-0.00231	0.00382	-0.00413	-0.00198
	32.93	18.71	-39.92	-38.59	33.62	-1.05	2.21	17.69	-4.7	4.07	-11.1	-6.16
Schooling2							0.00110	-0.00002	-0.00040	-0.00137	0.00055	0.00014
							12.13	-5.79	-9.4	-17.42	22.33	6.51
Age	0.01625	-0.00527	-0.00446	-0.00704	0.00123	-0.00071	0.01609	-0.00538	-0.00391	-0.00560	-0.00032	-0.00088
	7.71	-13.61	-6.14	-4.18	1.57	-1.02	7.87	-14.31	-5.85	-3.56	-0.37	-1.23
Age2	-0.00037	0.00007	0.00010	0.00017	0.00001	0.00003	-0.00037	0.00007	0.00009	0.00015	0.00003	0.00003

	-9.07	10.51	7.04	5.03	0.55	2.22	-9.39	11.39	6.93	4.73	1.99	2.32
Islam	0.11098	- 0.00082	-0.03554	-0.05956	-0.00531	-0.00975	0.10497	- 0.00088	-0.03301	-0.05722	-0.00414	-0.00972
	37.06	-5.63	-33.94	-24.09	-4.31	-10.72	35.77	-6.03	-31.75	-24.91	-2.94	-10.46
Christian	- 0.15515	0.00159	0.00125	0.13283	0.01349	0.00598	- 0.15055	0.00167	0.00134	0.12281	0.01810	0.00662
	-18.1	4.82	0.5	16.54	6.3	2.76	-18.04	4.98	0.57	15.95	7.11	2.96
Other minorities	- 0.07520	0.00337	-0.01842	0.09634	-0.00890	0.00280	- 0.07274	0.00341	-0.01663	0.09349	-0.01006	0.00253
	-4.9	3.57	-5.47	6.82	-3.26	0.6	-4.88	3.61	-5.27	6.86	-3.47	0.54
SC/ST	- 0.07322	- 0.00017	0.03696	0.02478	0.01267	-0.00102	- 0.07058	- 0.00017	0.03386	0.02229	0.01537	-0.00077
	-21.41	-1.17	23.72	9.21	9.49	-1.01	-21.1	-1.19	22.62	8.83	10.21	-0.76
HH land holdings (hectares)	0.01434	0.00008	-0.02105	0.01508	-0.00203	-0.00643	0.01368	0.00006	-0.01939	0.01394	-0.00186	-0.00643
	17.21	3.43	-33.89	40.34	-6.19	-12.77	16.29	2.79	-31.33	38.69	-5.43	-12.62
HH literacy rate	0.00097	0.00010	-0.00048	-0.00053	-0.00002	-0.00004	0.00099	0.00010	-0.00050	-0.00076	0.00017	-0.00001
	17.12	15.69	-22.69	-11.79	-0.82	-2.35	17.38	15.97	-24.46	-17.15	7.02	-0.32
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	100977						100977					
LL	- 86906.881						- 86345.506					
Pseudo R2	0.3094						0.3139					

Table A9: Multinomial logit marginal effects, women aged 15-35, full results for 2005-06

	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Schooling years	0.01250	0.00325	-0.01090	-0.01014	0.00480	0.00048	0.00486	0.00372	-0.00126	-0.00003	-0.00580	-0.00149
	19.62	17.54	-32.58	-20.55	23.44	2.38	2.67	15.9	-1.29	-0.02	-9.53	-2.57
Schooling2							0.00085	-0.00003	-0.00083	-0.00081	0.00068	0.00015
							6.06	-3.3	-10.03	-7.05	17.03	3.87

Age	0.03360	-0.01132	-0.01498	-0.00491	0.00008	-0.00246	0.03273	-0.01090	-0.01303	-0.00353	-0.00249	-0.00279
	9.32	-13.65	-8.92	-1.75	0.06	-1.92	9.14	-13.43	-8.35	-1.28	-1.77	-2.14
Age2	-0.00069	0.00017	0.00030	0.00012	0.00003	0.00007	-0.00068	0.00017	0.00027	0.00010	0.00007	0.00007
	-9.83	11.87	9.22	2.23	1.11	2.77	-9.77	11.97	8.85	1.92	2.49	2.91
Islam	0.10793	-0.00171	-0.06202	-0.01695	-0.01123	-0.01602	0.10403	-0.00167	-0.05789	-0.01856	-0.00987	-0.01605
	16.11	-4.57	-26.96	-2.82	-5.43	-9.04	15.69	-4.66	-26.37	-3.17	-4.15	-8.86
Christian	-0.19046	0.00347	0.00158	0.15069	0.01841	0.01631	-0.19065	0.00334	0.00150	0.14725	0.02165	0.01690
	-15.52	4.38	0.27	13.42	4.76	3.95	-15.6	4.38	0.28	13.22	4.98	4.02
Other minorities	-0.17749	0.01347	-0.04208	0.20643	0.00945	-0.00979	-0.17790	0.01295	-0.03853	0.20569	0.00783	-0.01003
	-6.64	3.66	-5.26	8.25	0.97	-1.63	-6.66	3.66	-5.14	8.23	0.8	-1.67
SC/ST	-0.05243	0.00059	0.03236	0.01208	0.01310	-0.00570	-0.05089	0.00057	0.02954	0.01163	0.01475	-0.00559
	-10.77	1.97	13.4	3.08	7.79	-3.48	-10.54	1.98	13.04	3.01	8.09	-3.37
HH land holdings (hectares)	0.00246	0.00039	-0.03233	0.04458	-0.00642	-0.00869	0.00107	0.00033	-0.02980	0.04371	-0.00655	-0.00877
	1.01	3.2	-17.62	35.55	-5.67	-6.87	0.44	2.81	-17.2	35.2	-5.57	-6.88
HH literacy rate	0.00047	0.00015	-0.00048	-0.00014	0.00006	-0.00005	0.00055	0.00014	-0.00059	-0.00035	0.00026	-0.00001
	4.88	12.77	-10.65	-1.91	1.56	-1.51	5.44	12.31	-13.54	-4.38	6.62	-0.3
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NOB	49455						49455					
LL	-46032.072						-45760.935					
Pseudo R2	0.2914						0.2956					

Table A10: Multinomial logit marginal effects, men and women aged 15-35, pooled results for 1993-94, 1999-00 and 2005-06 (With regional dummies)

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Dummy for 1999-00	-0.037	0.001	0.008	0.008	0.012	0.011	-0.039	0.001	0.004	0.010	0.011	0.013
	-11.68	-2.01	4.27	2.79	5.44	5.93	-11.04	1.45	2.26	3.12	4.23	5.99
Dummy for 2005-06	-0.047	0.004	0.027	-0.003	0.008	0.019	-0.036	0.001	0.011	-0.008	0.011	0.024
	-11.44	-8.89	10.95	-0.84	2.86	7.34	-7.81	-0.87	4.17	-1.97	3.14	7.63
Schooling years	0.017	0.006	-0.021	-0.017	0.012	0.004	-0.006	0.008	-0.009	0.013	-0.004	-0.002
	41.99	51.08	-78.85	-46.90	70.14	21.58	-4.78	40.64	-11.55	12.67	-8.18	-3.76
Schooling years2							0.002	0.000	-0.001	-0.002	0.001	0.000
							21.35	13.40	-13.35	-27.61	31.95	12.14
1999-00 X schooling yrs	0.001	0.000	0.002	0.000	-0.002	-0.001	0.004	0.001	0.005	-0.005	-0.001	-0.001
	1.28	0.27	5.83	-0.21	-8.36	-3.24	2.51	-3.58	4.89	-3.79	-1.80	-2.37
1999-00 X schooling yrs2							0.000	0.000	0.000	0.001	0.000	0.000
							-2.67	4.14	-2.92	4.59	-1.01	1.18
2005-06 X schooling yrs	-0.003	0.000	0.005	0.002	-0.002	-0.002	-0.010	0.001	0.015	0.000	-0.002	-0.002
	-5.87	4.20	12.99	4.58	-9.41	-5.98	-5.59	-3.50	13.44	0.07	-2.45	-2.96
2005-06 X schooling year2							0.001	0.000	-0.001	0.000	0.000	0.000
							3.57	5.01	-8.97	2.52	-1.10	0.60
Age	0.000	0.016	0.007	0.000	0.000	0.009	-0.002	0.017	0.009	0.004	-0.003	0.009
	0.31	36.50	7.43	0.20	-0.54	12.42	-1.49	38.64	9.69	3.16	-3.56	12.05
Age2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	-7.03	27.11	-4.42	3.93	6.18	-6.72	-5.92	29.78	-6.13	1.60	8.42	-6.62
Male	-0.713	0.002	0.241	0.306	0.049	0.115	-0.710	0.002	0.231	0.297	0.059	0.121
	-589.89	20.51	185.33	198.90	70.16	117.85	-575.79	19.77	172.40	188.85	73.85	118.21
Islam	0.161	0.001	-0.069	-0.089	-0.009	0.006	0.163	0.001	-0.069	-0.091	-0.008	0.006
	48.56		-47.67	-34.57	-7.61	5.12	49.22	-5.32	-49.39	-35.92	-6.58	4.78
Christian	-0.154	0.001	-0.033	0.189	0.009	-0.012	-0.151	0.001	-0.033	0.181	0.013	-0.011
	-40.11	3.36	-12.71	41.77	5.26	-6.37	-39.03	3.59	-12.99	40.01	6.66	-5.91
Other minorities	-0.113	0.011	-0.077	0.211	-0.015	-0.017	-0.117	0.011	-0.074	0.216	-0.018	-0.018
	-13.35	8.17	-17.05	23.36	-4.11	-4.04	-13.85	8.35	-16.64	23.82	-4.78	-4.32
SC/ST	-0.048	0.001	0.090	-0.021	0.011	-0.032	-0.046	0.000	0.086	-0.021	0.013	-0.032
	-20.77	2.94	57.87	-10.51	11.11	-34.35	-19.88	2.57	56.74	-10.55	11.53	-33.85
HH land holdings	0.037	0.002	-0.083	0.070	-0.012	-0.014	0.037	0.002	-0.081	0.069	-0.013	-0.014

	65.15	35.39	-119.52	144.16	-33.32	-35.80	65.35	35.38	-118.77	143.16	-33.51	-35.77
HH literacy rate	0.002	0.000	-0.001	-0.001	0.0003	0.0002	0.002	0.0002	-0.001	-0.002	0.001	0.000
	42.92	40.33	-46.31	-39.33	14.81	13.55	49.21	40.68	-54.65	-50.35	25.78	17.58
NOB	511849		LL -536173.15			Pseudo R2.3645		511849		LL : -533150.53		Pseudo R2 .3681

Table A11: Multinomial logit marginal effects, men aged 15-35, pooled results for 1993-94, 1999-00 and 2005-06

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Dummy for 1999-00	0.03140	- 0.00315	-0.01135	-0.03225	0.00945	0.00591	0.02985	- 0.00077	-0.01809	-0.02333	0.00241	0.00993
	8.72	-3.82	-3.19	-6.98	2.6	1.63	7.61	-0.48	-4.65	-4.38	0.54	2.22
Dummy for 2005-06	0.00098	- 0.00783	0.03338	-0.05022	0.00135	0.02234	0.02396	- 0.00377	-0.00173	-0.05869	0.00332	0.03691
	0.21	-9.18	6.79	-8.19	0.29	4.4	4.03	-1.86	-0.33	-8	0.55	5.64
Schooling years	0.01378	0.00825	-0.03007	-0.01627	0.01607	0.00824	-0.01181	0.01035	-0.00970	0.02437	-0.01006	-0.00314
	45.68	42.93	-67.39	-32.01	55.95	24.85	-14.06	30.31	-7.36	16.23	-11.16	-3.08
Schooling years2							0.00174	- 0.00008	-0.00141	-0.00289	0.00172	0.00092
							32.23	-5	-12.9	-25.02	30.47	13.53
1999-00 X schooling yrs	-0.0039	0.00007	0.00411	0.00245	-0.00213	-0.00055	-0.00396	- 0.00073	0.01112	-0.00565	0.00069	-0.00147
	-10.7	0.86	7.76	4.03	-6.07	-1.38	-3.73	-1.96	6.76	-2.94	0.6	-1.14
1999-00 X schooling yrs2							0.00001	0.00005	-0.00062	0.00075	-0.00020	0.00002
							0.1	2.36	-4.4	4.92	-2.86	0.25
2005-06 X schooling yrs	-0.00215	0.00039	0.00578	0.00229	-0.00326	-0.00305	-0.00577	- 0.00107	0.02069	-0.00500	-0.00185	-0.00700
	-4.41	3.52	9.14	2.92	-7.12	-5.88	-4.17	-2.15	10.52	-2.03	-1.25	-4.29
2005-06 X schooling year2							0.00013	0.00008	-0.00113	0.00085	-0.00015	0.00021
							1.53	3.07	-6.98	4.57	-1.7	1.99
Age	-0.01763	- 0.02202	0.01833	0.00584	-0.00203	0.01751	-0.01798	- 0.02393	0.01847	0.00815	-0.00285	0.01815
	-14.46	-29.12	11.57	2.93	-1.74	12.69	-14.68	-30.86	11.92	4.07	-2.28	12.86
Age2	0.00010	0.00026	-0.00030	0.00001	0.00014	-0.00021	0.00008	0.00030	-0.00029	-0.00002	0.00015	-0.00022
	4.18	20.59	-9.64	0.15	6.18	-7.95	3.36	22.48	-9.53	-0.4	6.19	-8.31
Islam	0.02590	0.000	-0.04555	-0.03640	0.00185	0.05336	0.02620	0.000	-0.04651	-0.03716	0.00274	0.05406

		84						67					
	10.74	1.92	-16.21	-9.65	0.88	19.51	10.81	1.46	-17.07	-9.86	1.21	19.44	
Christian	-0.00932	0.00170	-0.06916	0.13654	-0.00346	-0.05631	-0.00993	0.00188	-0.06690	0.13443	-0.00228	-0.05720	
	-3.25	2.56	-15.91	22.63	-1.28	-16.82	-3.48	2.66	-15.7	22.07	-0.77	-16.59	
Other minorities	0.06182	0.01988	-0.12752	0.10597	-0.02145	-0.03870	0.05441	0.02118	-0.12143	0.11312	-0.02573	-0.04155	
	6.48	7.18	-15.91	8.24	-3.48	-4.63	5.93	7.23	-15.35	8.79	-4.02	-4.93	
SC/ST	0.01190	0.00230	0.11788	-0.06362	0.00849	-0.07694	0.01609	0.00251	0.11205	-0.06375	0.01099	-0.07789	
	6.93	6.65	47.28	-22.24	5.23	-42.85	9.14	6.87	45.57	-22.24	6.25	-42.35	
HH land holdings	0.00651	0.00422	-0.11834	0.13341	-0.01268	-0.01312	0.00667	0.00437	-0.11670	0.13231	-0.01329	-0.01336	
	12.63	34.5	-98.31	125.74	-20.55	-17.69	13.23	35.47	-98.6	126.7	-20.44	-17.75	
HH literacy rate	0.00055	0.00031	-0.00098	-0.00138	0.00065	0.00085	0.00094	0.00033	-0.00139	-0.00198	0.00104	0.00107	
	18.15	32.27	-23.67	-26.55	21.95	24.29	29.62	33.12	-32.65	-36.48	31.61	28.53	
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
	NOB	267157	LL	-316342.7	PseudoR2	0.2875	NOB	267157	LL	-313230.03	PseudoR2	0.2945	

Table A12: Multinomial logit marginal effects, women aged 15-35, pooled results for 1993-94, 1999-00 and 2005-06

	Linear						Non Linear					
	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed	Non - workers	Students	Manual workers	Manual self-employed	Non manual workers	Non manual self-employed
Dummy for 1999-00	-0.03794	0.00062	0.00691	0.01764	0.00712	0.00565	-0.03617	0.00145	0.00620	0.01521	0.00796	0.00534
	-14.41	2.83	8.29	8.82	5.14	6.18	-12.95	3.47	7.71	7.46	5.17	5.52
Dummy for 2005-06	-0.03572	-0.00046	0.00866	0.01284	0.00860	0.00609	-0.03201	0.00090	0.00558	0.00967	0.01049	0.00537
	-9.85	-1.84	7.64	4.72	4.35	4.73	-8.25	1.48	5.19	3.45	4.72	3.95
Schooling years	0.01394	0.00162	-0.00747	-0.01331	0.00498	0.00025	0.00558	0.00219	-0.00338	0.00027	-0.00269	-0.00196
	35.25	28.87	-40.01	-39.74	43.69	2.36	4.71	24.66	-6.11	0.27	-7.76	-6.25
Schooling years2							0.00095	-0.00004	-0.00036	-0.00123	0.00050	0.00017
							8.61	-9.86	-6.25	-12.49	21.97	7.55
1999-00 X schooling yrs	0.00140	-0.00004	0.00007	-0.00027	-0.00086	-0.00030	-0.00051	-0.00029	0.00050	0.00125	-0.00108	0.00013
	2.95	-1.84	0.31	-0.66	-6.93	-2.43	-0.35	-3.35	0.76	0.98	-2.55	0.35
1999-00 X schooling yrs2							0.00014	0.00002	-0.00003	-0.00009	0.00001	-0.00004
							0.99	3.28	-0.47	-0.73	0.33	-1.31
2005-06 X schooling yrs	-0.00631	0.00005	0.00205	0.00548	-0.00124	-0.00003	-0.00795	-0.00034	0.00513	0.00400	-0.00169	0.00086
	-11.65	1.7	8.79	11.83	-7.99	-0.2	-4.73	-2.94	7.07	2.8	-3.34	1.97
2005-06 X schooling year2							0.00008	0.00002	-0.00031	0.00025	0.00003	-0.00007
							0.51	3.68	-3.96	1.85	0.83	-2.27
Age	0.02209	-0.00006	-0.00620	-0.00974	-0.00008	-0.00100	0.02163	-0.00095	-0.00548	-0.00828	-0.00174	-0.00118
	16.22	-22.01	-12.78	-8.73	-0.18		16.21	-22.84	-12.15	-7.77	-3.3	-2.72
Age2	-0.00047	0.00007	0.00013	0.00021	0.00003	0.00003	-0.00047	0.00007	0.00012	0.00019	0.00005	0.00004
	-17.91	17.48	13.94	9.74	3.11	4.25	-18.18	18.75	13.59	9.18	5.5	4.45
Islam	0.11255	-0.00077	-0.03523	-0.06231	-0.00591	-0.00832	0.10776	-0.00079	-0.03294	-0.06075	-0.00505	-0.00823
	54.54	-8.22	-50.43	-35.44	-7.79	-14.06	53	-8.76	-48.07	-36.47	-5.69	-13.63
Christian	-0.18561	0.00125	-0.00032	0.16454	0.01045	0.00969	-0.18225	0.00124	-0.00011	0.15605	0.01458	0.01049
	-33.07	6.77	-0.19	30.58	8.51	6.9	-32.97	6.92	-0.07	29.71	9.79	7.24
Other minorities	-0.19345	0.00390	-0.01907	0.21498	-0.00447	-0.00189	-0.19089	0.00397	-0.01725	0.21196	-0.00568	-0.00210

	-16.8	5.84	-7.63	19.38	-1.97	-0.75	-16.71	5.98	-7.31	19.32	-2.34	-0.84
SC/ST	-0.05882	- 0.000 15	0.03385	0.01559	0.00977	-0.00025	-0.05680	- 0.000 16	0.03112	0.01422	0.01168	-0.00006
	-27.63	-1.71	35.16	9.11	12.86	-0.41	-27.12	-1.95	33.79	8.68	13.57	-0.1
HH land holdings	0.01564	0.000 09	-0.02140	0.01472	-0.00292	-0.00612	0.01487	0.000 07	-0.01983	0.01387	-0.00287	-0.00611
	30.14	6.02	-54.66	61.27	-13.08	-20.51	28.29	4.9	-50.79	59.22	-11.93	-20.3
HH literacy rate	0.00093	0.000 09	-0.00050	-0.00049	0.00000	-0.00003	0.00097	0.000 09	-0.00053	-0.00069	0.00017	0.00000
	25.34	24.75	-35.37	-16.18	-0.33	-2.98	25.71	24.75	-38.43	-23.04	11.32	0.37
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	NOB	24469 2	LL	-210821.8	PseudoR2	0.3037	NOB	24469 2	LL	-209554.33	PseudoR2	0.3079