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## Young and out: An application of a prospects-based concept of social exclusion

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# MEMORANDUM

No 17/2005

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Røed and Lars Westlie**

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30 May 2005

## **Young and Out: An Application of a Prospects-Based Concept of Social Exclusion\***

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### **Abstract**

We develop a forward-looking empirical concept of social exclusion based on the estimated transition probabilities from a random effects multinomial logit-model. Youths are considered socially excluded if they are currently outside school/work and have a low predicted probability of re-entering in the near future. Implemented on extraordinary rich event history data of compulsory school graduates, we estimate social exclusion among Norwegian youths and find that social exclusion is (i) non-cyclical; (ii) rare among teen-agers, except for immigrant children and individuals with a disadvantaged family background; (iii) more prevalent among young adults in their early twenties; and (iv) independent of gender.

\* This paper is part of the project 'Marginalisation and Social Exclusion', funded by the Norwegian Research Council. Thanks to Erling Barth for valuable comments. Correspondence to: Oddbjørn Raaum, The Ragnar Frisch Centre for Economic Research, Gaustadalléen 21, 0349 Oslo, Norway. E-mail: oddbjorn.raaum@frisch.uio.no

## 1 Introduction

The concepts of ‘marginalisation’ and ‘social exclusion’ have become increasingly popular among policy makers and social scientists, particularly in Europe (Byrne, 1997; 1999; Kronauer, 1998; Social Exclusion Unit, 2001; Atkinson *et al.*, 2002; Gallie, 2004). Social exclusion has been at the top of the political agenda in the European Union since the early 1990’s (Atkinson and Davoudi, 2000), and in the Amsterdam Treaty (Article 136 and 137), the fight against social exclusion is defined as a Union Objective. While member states have been asked to prepare national action plans to combat social exclusion, the Lisbon summit in 2000 underlined the need to organise cooperation so that knowledge of how to effectively address social exclusion can be shared (Böhnke, 2004).

Despite their prominent role in the European public and scientific discourse, the concepts of social exclusion and marginalisation are without a precise agreed-upon content. Their popularity emanates from their apparent ability to distil and pinpoint social phenomena thought to be of increasing importance in modern societies. These phenomena may vaguely be described as processes by which certain individuals or groups of individuals lose their foothold in important spheres of society, often with severe consequences for their quality of life. A marginalisation process is typically thought to involve a multiplicity of problems that interact in ways that make their total impact more harmful than suggested by simply adding them up. It is a process of ‘losing ground’ on a number of arenas simultaneously, such as the labour market, the social network, and the political and cultural life (Cousins, 1997; Fleming and Keenan, 2000). However, the former of these arenas is typically assumed to play a key role in marginalisation processes, and there is ample evidence that labour market marginality tends to spill over to other spheres of social life. In particular, labour market marginality has been shown to cause social isolation and poverty, almost

regardless of the institutional structure and welfare system of the society (Gallie and Paugam, 2004).

A particular cause for concern lies in the suspicion that there are self-enforcing mechanisms at work, implying, e.g., that an apparently ‘innocent’ incidence of unemployment or illness in some cases sets off vicious circles leading into poverty, social isolation, discouragement and skills deterioration, which again feeds back into even more unemployment or illness and perhaps the outbreak of serious social problems such as drugs abuse and crime. The idea that ‘some unemployment’ sometimes causes ‘more unemployment’ is empirically well established (Heckman and Borjas, 1980; Gallie et al, 1998; Røed and Zhang, 2003), particularly for youths. (Lynch, 1989; Røed and Raaum, 2002; Kieselbach, 2004; Social Exclusion Unit, 2004). In most cases, however, unemployment does not set off vicious circles leading to social exclusion. It is therefore important to understand how the sources of innate characteristics and social background interact with labour market events in order to trigger social exclusion processes. While some persons may be more or less ‘born into’ a state of social exclusion, others are excluded as a result of a chain of unfortunate events. Family background clearly plays a central role here, both through its impact on individuals’ opportunities and through its impact on choice behaviour, given these opportunities. While emphasis on inadequate opportunities is often associated with a structural ‘underclass’ understanding of social exclusion, focus on choice behaviour is associated with a more individualistic neo-conservative ‘blaming the poor’ interpretation (MacKay, 1998). The dividing line between choice and constraints may often be blurred, however. And the precise way in which family background affects individual performance is also a matter of controversy. A key hypothesis is that advantaged families hold a specific culture for education and career (Gambetta, 1987), and that this culture promotes a strong family engagement in the children’s schooling and early employment. Human capital the-

ory, on the other hand, would phrase this family engagement in terms of investments made by families with larger economic capacity and/or 'inherited' culturally determined endowments (Becker and Tomes, 1979). In addition, cognitive abilities important to school and employment careers are to some extent transmitted from one generation to the next by nature (Scarr and Weinberg, 1978).

The aim of the present article is to develop empirically meaningful concepts of marginalisation and social exclusion that are consistent with existing theory, and show how they can be implemented on panel data in a way that provide new insights into the workings of the underlying causal mechanisms. The Norwegian event history register data we use are extraordinarily rich, and our findings will therefore provide a good description of actual processes of marginalisation and social exclusion among Norwegian youths. They contain a complete account of early labour market histories for several cohorts, from the day they complete compulsory education, normally at the age of 16, and until they reach their mid-twenties. Each individual is tracked – semester-by-semester (two per calendar year) – through work, education, inactivity (with or without various kinds of income support), unemployment, rehabilitation, disability, military service and childbirths. We maintain throughout a strong focus on individuals' attachment to the structured arenas provided by the labour market and the schooling system, realising that the dynamic processes we identify to some extent arise from interactions with other spheres of social life. As education is the core activity for most teen-agers and young adults, leaving is crucial to the proliferation of marginalisation and exclusion among youths. Put simply, dropping out of school is a necessary, but far from sufficient condition for early social exclusion.

Based on our reading of existing sociological and economic literature, we set up a statistical model for the purpose of analysing the causal mechanisms behind school to work transitions as well as post-schooling transitions between different labour market positions,

focusing on the forces that may lead to long-lasting exclusion. We argue that the concepts of marginalisation/exclusion are not particularly helpful if they simply are associated with observed states in the labour market, such as ‘long-term unemployment’ or ‘out of the labour force’. The reason is that individuals’ occupation of such states may have widely different implications across the population. The idea we try to implement empirically in this article is that people should not be considered marginalised or excluded due to their current position in the labour market only, but rather with reference to their prospects for the future (Atkinson, 1998). In our terminology, persons are ‘socially excluded’ if they are currently out of school and work and also have a high probability of remaining outside beyond the year to come. We define ‘marginalisation’ as a process by which a person’s probability of re-entering school or work declines over time towards social exclusion.

The remainder of this article is structured as follows: In the next section, we discuss the concepts of marginalisation and social exclusion. We first review how they have been interpreted in the existing economic- and sociological literature, and then propose our own definitions, based on a novel ‘probability interpretation’. Section 3 presents our data and provides some descriptive statistics. Section 4 presents the statistical model we use to evaluate each individual’s future labour market and educational prospects and discusses how our notions of marginalisation and social exclusion can be made operational. Section 5 lays out the empirical results, including estimates of social exclusion and marginalisation among Norwegian youths. We study gender differences and how family (including immigrant background) affect the risks of exclusion and marginalisation. Finally, Section 6 concludes.

## **2 Marginalisation and Social Exclusion – A Probability Interpretation**

In order to understand the dynamic process of social exclusion, it is necessary to recognise the central roles that education and work play in human lives. Economists tend to view



educational attainment primarily as an investment in future income. While the only reason for working is to make money for consumption, the only negative aspect of education and work is the associated loss of leisure (some studies add taste for education or psychic costs of schooling). The social psychology and sociology literature, on the other hand, emphasises the importance of education and paid work for each person's sense of social identity and self-worth (Gill, 1999; Kieselbach, 2004). From this perspective, participation on the social arenas offered by paid work and education is viewed as a psychological necessity. It is argued that there is a diffuse relation between person and role, and that 'who people are' is essentially inseparable from 'what people do' (Zerubavel, 1981). The formal and structured arenas of work-places and schools are of course of particular importance for persons who have not (yet) been able to integrate fully into other social arenas. Hence, for immigrants and refugees, labour market participation has a particularly pivotal role, and may be considered the key to successful integration in all spheres of society (Knox, 1997).

There is ample and convincing evidence of the human deprivation that occurs when the psychological necessities offered by work are not adequately met (Warr, 1987; Feather, 1990; Kasl and Jones, 2000). This deprivation contains the seeds of a vicious circle because it may lead to discouragement and resignation, which again contribute to less efficient job search and impaired job prospects, which yet again feeds back into more psychological deprivation and discouragement, and so on. During extended out-of-work-periods, some persons may also find it difficult to maintain their skills; and just like physical capital, human capital is likely to depreciate in the absence of 'regular maintenance'. Skills-depreciation further deteriorates individual 'employability', and thereby reinforces the vicious circle (Phelps, 1972; Hargreaves Heap, 1980; Pissarides, 1992). The extent to which motivation and skills are depreciated during idleness is likely to vary a lot from individual to individual, depending on both personality and social network.

Even though the concept of marginalisation is frequently used in politics as well as research, it is rarely given a precise definition. Related to modern sociological language, social exclusion entails a failure to participate in spheres of the society for which there are strong social norms to participate (Germani, 1980). Exclusion occurs both by expelling someone from a place he or she formerly belonged and by denying access to ‘outsiders’. Marginalisation can then be viewed as an unstable position between the poles of exclusion and inclusion. It is like standing in the doorway; eventually, a marginalised person moves out towards exclusion or in towards integration.

The extent to which a ‘bad fortune’ in the labour market entails the stigma associated with social exclusion depends on the extent to which the situation is considered to be self-inflicted. Social norms regarding individual responsibility clearly change over time. There are indications that the life courses of human beings have become less predictable and ‘standardised’, and more subject to pluralism and individual discretion (Esping-Andersen, 1990; 1995). With a larger scope for free choices regarding, e.g., education and work, bad fortunes are also to a larger extent than before deemed to be deserved. The subjective responsibility associated with free choices therefore offers a sort of *risk society* in which there are winners and losers, and in which the losers may have reasons to blame themselves for their faith. But the extent to which, e.g., unemployment is considered to be self-inflicted, and hence challenges existing work-norms, obviously depends on the economic environment. It may therefore vary substantially over the business cycle. During economic slumps, the ‘work imperative’ deteriorates, and social networks are established outside the workplaces. Hence, the stigma typically associated with unemployment comes to lack credibility (Kelvin and Jarret, 1985), and unemployment alone is less likely to cause social exclusion. During booms on the other hand, everyone ‘knows’ that there is work to be had for able and willing persons. Unemployment then tends to be viewed as self-

inflicted. Social networks move back to the workplaces. Consequently, the idea that unemployment leads to social exclusion is probably more relevant in good times than in bad times, although unemployment itself is obviously more prevalent in bad times.

Even from an individual perspective, it may seem obvious that *integration* is preferred over *exclusion*. However, some people obviously choose temporary non-participation. Some are simply tired of school; others are adventurous and keen to explore other arenas than domestic school or workplaces. Another group deliberately chooses to challenge existing norms and occupy a state of social exclusion. In these cases, the normative foundation for public policies aimed at re-integration may be weak. But the dividing line between voluntary and involuntary outcomes may be blurred. First, choices that are voluntary in the first place may have unintended longer-term consequences, which are not (easily) reversible. Hence, what started out as something voluntary is transformed into something involuntary. Second, situations that are involuntary in the first place may become voluntary. This may happen if labour market experiences feed back to individuals' knowledge and to the structure of individual preferences through a self-enforcing habit-effect (Vendrik, 1993). For example, a person who becomes involuntarily unemployed may acquire new information about the workings of the unemployment insurance (UI) system, and after a while find that he/she actually enjoys the leisure associated with this state. The preferences may of course be altered in the opposite direction also. As pointed out by Goldsmith and Darity (1992), a period of unemployment can create a 'trauma escape effect', making some people more determined than ever to obtain and keep paid work. In more general terms, individual labour market ambitions are highly sensitive towards the (continuously updated) perception of individual labour market opportunities.

Whatever the motives some individuals may hold for 'voluntarily' being outside school or work, they are unobserved by the researcher. Nevertheless, a fruitful definition of

social exclusion among youths needs to account for existence of voluntary dropout decisions that have no detrimental effects on future outcomes. Identification of marginalised and excluded members of society often rest on rather trivial accounting exercises, by which different observed labour market states (such as long-term unemployed, underemployed, disabled etc.) are associated with the states of marginalisation and exclusion, respectively. Used in this way, the concepts of marginalisation and social exclusion only provide a sort of re-labelling of well-defined labour market states, it suppresses the heterogeneity among the long-term unemployed, and ignores the changing composition of the unemployment pool over the business cycle.

Atkinson (1998, p. 14) advocates a forward-looking perspective on social exclusion by pointing out that ‘people are excluded not just because they are currently without a job or income, but because they have little prospects for the future’; see also Atkinson *et al.* (2002), and Social Exclusion Unit (2004). From this perspective, social exclusion is intrinsically related to characteristics of the individual and to the individual’s reaction to events. The operational content of the social exclusion concept should consequently not be based on the occupation of a particular unfortunate state per se, but on the individual’s probability of escaping from it. Such probabilities are of course never observed directly. And even if they were observed, the act of drawing a sharp line between the excluded and the non-excluded according to their escape probabilities embodies a certain flavour of arbitrariness. Such ‘dividing lines’ may be justified, though, either on the ground that we simply wish to identify those that in the absence of intervention have the lowest escape probabilities (along a basically continuous scale), or that there exists a threshold in the escape probability below which the escape process changes qualitatively. And although the probabilities themselves are unobserved, it may be possible to estimate them. More generally, it may be possible to

observe behavioural patterns that are indicative of particularly low probabilities of escaping from a state of inactivity.

In this article, we develop a concept of social exclusion, which can be implemented empirically on the basis of individual transition probabilities. Somewhat loosely, we consider a young person, who belongs to a group for which there are norms to be active, to be socially excluded at some moment in time if the person is currently outside the structured arenas of school and work, and also has a high probability of remaining outside in the near future, given that the economy is in (or returns to) a ‘normal’ state. The latter condition is imposed to ensure that unemployed persons are not considered to be socially excluded simply because there happens to be a cyclical slump. It may nevertheless be the case that, e.g., a business cycle slump *causes* social exclusion, in the sense that some people may remain inactive even after the economy has picked up. An important characteristic of the socially excluded may indeed be that they have become (partly) disconnected from business cycle developments, in the sense that they are not ready to take full advantage of general improvements in the state of the economy (Wacquant, 1994).

### **3 Data and Descriptive Statistics**

The population in our dataset consists of all individuals who completed compulsory school in Norway during the years from 1992 to 2000. Graduation from compulsory school typically occurs at the end of the spring semester in the year of the 16<sup>th</sup> birthday. More than 90 per cent continue in upper secondary school (high school), along one of two major educational tracks. The general track of 3 years prepares for college or university and the other track consists of various vocational educations of 3-4 years if completed without delay, see, e.g., Opheim (2004). We use information from administrative registers in Norway to construct complete early adult life histories for these individuals until 2001. Together, the registers contain monthly information about employment, education, unemployment, long-

term sickness, temporary and permanent disability, military service, childbirths, labour income, and all kinds of income transfers. We combine the registers to construct ‘semester-states’; i.e., for each semester (spring, autumn) in each year, we define for each individual a main economic activity. This main activity is basically defined as the activity that took up most time during the semester. We end up with the following space of mutually exclusive states

In education	(State 1)
Employed	(State 2)
Out of work	(State 3)
Inactive	(State 4)
Disabled	(State 5)
In military service (males only)	(State 6)
On maternity leave (females only with a child under 1 year of age)	(State 7)

Unlike many other studies where alternatives to work and school are merged into a state labelled ‘not employed’ (Arum and Shavit, 1995), or ‘home’ (Keane and Wolpin, 1997), we use a detailed description. Since occupation of states outside school and work can have very different explanations, we distinguish according to employment attachment and search behaviour, as well as ‘exogenous’ events like military service and births.<sup>1</sup> Employees absent from work due to long-term sickness and job seekers registered as unemployed or labour market program participants at the Public Employment Office are classified as ‘out of work’. Norway has a mandatory national military service for males. In principle, all men are supposed to serve for one year at around the age of 19, but a large proportion are not enlisted, due to weak health or ‘excess supply’ and many postpone service until after completing tertiary education, see Sørensen (2005). A military career, following the one-year service, is classified as ‘work’. Prospective parents who hold a job are entitled to one year

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<sup>1</sup> We also build on studies arguing that unemployment and ‘out-of-the-labour-force’ should be considered as distinct states (Flinn and Heckman, 1983; Atkinson and Micklewright, 1991; Bradley et al, 2003).

of paid leave and this right is typically exercised by mothers. ‘Inactivity’ is a residual category containing those without a trace in any of the official registers.

The first cohort in our data completed compulsory school in 1992 and we construct life histories covering the 19 subsequent semesters (9½ years). For later cohorts, there is a shorter observation window. In addition to the individuals’ life histories, we have gathered information about their nationality, county of residence, and family background characteristics (e.g., education and income of their parents). Table 1 provides a summary of the cohort structure and the associated observation window in the data. It also illustrates the importance of school dropout in explaining social exclusion among teen-agers. Around four per cent of the youths leave school directly after compulsory school, but as we will see, a substantial fraction returns to school after a year or two.

Table 1 A Summary of the Cohort Structure in the Dataset			
Year of compulsory school completion	Number of individuals	Fraction leaving school after compulsory school completion	Number of semesters in data-window
1992	53,350	0.056	19
1993	51,209	0.047	17
1994	52,008	0.028	15
1995	51,984	0.031	13
1996	51,869	0.027	11
1997	51,639	0.030	9
1998	51,803	0.030	7
1999	50,930	0.034	5
2000	51,421	0.032	3
Total	466,213	0.036	

Note: In 1994, a school reform was implemented in Norway ('Reform 94') that gave all graduates from compulsory school a legal entitlement to an immediate place in upper secondary school. This is the reason behind the substantial decline in the fraction leaving school at the earliest possible occasion.

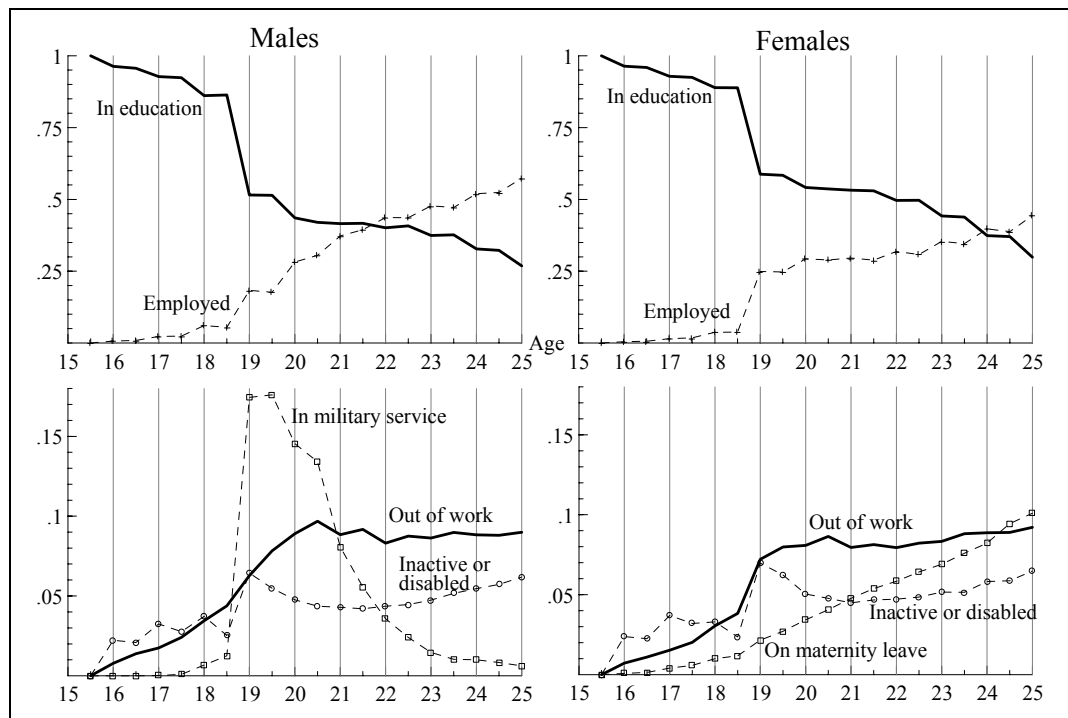


Figure 1. Distribution of states during the first 19 semesters after completion of compulsory school. All cohorts completing compulsory school in 1992-2000.

Note: Autumn semesters are marked with vertical grids.

Figure 1 describes the distribution of semester-states for the 19 semesters following completion of compulsory school. The two upper panels of Figure 1 show the fractions of males and females, respectively, participating in education and work – at different stages of



their adolescence. The two lower panels show the fractions belonging to other states. The graphs display a familiar pattern, where the fraction in school declines with age along with an increasing employment share. About 8-10 per cent starts, but drop out of secondary school without completing a full three-year track. Very few of the early school dropouts enter employment directly. Girls stay in school longer than boys, partly reflecting a higher female proportion in the upper-secondary track that qualifies for university which again is related to superior academic performance of girls at age 16, see Hægeland et al (2004). There is a steep decline in educational activities around age 19, which corresponds to the typical time of graduation from the three-year track. Far from all students who leave school enter employment, and the fractions out of work or inactive rise sharply at age 19, where also many boys enter military service. Five years (10 semesters) after graduation from compulsory school (typically at the age of 21), 40 per cent of the men and 50 per cent of the women are still in education. Figure 1 also shows that the fraction of individuals who are out of work or outside the labour force stabilises at around 15 per cent after age 19, for both men and women. Compared to the United States, Norwegian youths stay in school longer and the employment share is lower. For example, Keane and Wolpin (1997) show that about 55 per cent of US males aged 20 are working, 25 per cent are in school and 20 per cent are at ‘home’.<sup>2</sup>

#### **4 A Statistical Model with definitions of Social Exclusion and Marginalisation**

In this section, we set up a dynamic multinomial logit-model with random effects, to explain individuals’ movements between the states over time. We do not model transitions to

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<sup>2</sup> The different patterns are partly explained by definitions and samples. For example, Keane and Wolpin, 1997, unlike us, condition their school category on grade completion and the NLSY79 data cover earlier cohorts than our study.

military service and childbirth, since these are considered exogenous.<sup>3</sup> The model allows for all possible transitions between states, with the exception that ‘disability’ can only be reached from ‘out of work’ or ‘inactivity’. The very few transitions from education or work to disability that actually occur in the data are treated as exogenous events since they typically reflect serious congenital handicaps or accidents. We also assume that the disability state is absorbing. Consequently, we model 14 different transitions all together.

Turning to the modelling of endogenous transitions, let  $p_{jkai}$  denote the probability for individual  $i$  of being in state  $k$  in semester  $a$ , given that state  $j$  was occupied in semester  $(a-1)$  ( $j = 1, 2, 3, 4$ ,  $k = 1, 2, 3, 4, 5$ ,  $j \neq k$ ). The transition probabilities depend on five types of factors: i) gender and age, or time since compulsory school graduation ii) immigrant and family background measured by parental education and income as well as teenage parenthood; iii) prevailing economic environment measured by local unemployment rates; iv) the state occupation history; and v) individual unobserved heterogeneity. In order to facilitate the statistical analysis, we have to make some assumptions regarding the functional form of the relationship between independent variables and outcomes. We assume that the transition rate probabilities can be formulated as multinomial Logit in the following way:

$$p_{jkai} = \frac{\exp(x'_{jkai}\beta_{jk} + v_{ki})}{1 + \sum_{k \neq j} \exp(x'_{jkai}\beta_{jk} + v_{ki})}, \quad (1)$$

where the vectors  $x'_{jkai}$  contain all observed factors assumed to influence individual  $i$ 's transition rate from state  $j$  to state  $k$  in semester  $a$ , see details in Appendix. The variable  $v_{ki}$  is an unobserved covariate characterising his/her propensity for making a transition to state  $k$ . The destination-specific unobserved characteristics are assumed independent of

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<sup>3</sup> As individuals complete military service and maternity leave, they are again included in the analysis with an origin state equal to the last observed state before military service or maternity leave.

$x'_{jkai}$  and semester-invariant, like in, e.g., Cameron and Heckman (1998; 2001). Most of the explanatory variables are represented in a non-parametric fashion, i.e., they are represented in the model by one dummy variable for each possible value of the underlying explanatory variable. The most flexible representation regarding interaction effects of age, educational attainment, and the event history is not feasible, however. We have therefore defined groups based on combinations of educational experience (0, 1-5, 6 and >6 semesters) and semesters spent ‘out of work’ or as ‘inactive’ (0, 1, 2 or > 2 semesters) or as ‘employed’ (0, 1, 2 or >2 semesters); see Appendix, Table A2, for details.

As indicated in the previous section, the phenomenon of ‘social exclusion’ will be associated with, first, being currently outside the structured arenas of work and education, and second, having a high probability of remaining outside these arenas in the future, given a ‘normal’ economic environment. Disabled individuals will clearly be considered ‘socially excluded’ according to this definition, since we consider disability to be an absorbing state. Individuals who are ‘out of work’ or ‘inactive’ are candidates of ‘social exclusion’, but only if they have a low probability of returning to work or education in the near future. Social exclusion in a semester  $a$  is then defined as follows:

*Definition 1 (Social Exclusion): An individual  $i$  is socially excluded in semester  $a$  if he/she is currently (i) disabled or (ii) out of work or inactive, with a probability of entering into employment or education during the next year smaller than a positive number  $\psi_s$ , given that business cycle conditions are normal.*

The concept of marginalisation then naturally refers to a process that threatens to result in social exclusion:

*Definition 2 (Marginalisation): An individual  $i$  is marginalised in semester  $a$  if he/she is (i) out of work or inactive and (ii) not currently socially excluded (accord-*

*ing to Definition 1), but (iii) will become socially excluded in the future if no transition occurs.*

It follows from our definition that marginalisation only takes place when an element of self-enforcing deterioration of employment/education prospects is present. In the model, such a self-enforcing mechanism is allowed for by means of the event history dummy variables. The idea is that the probability of leaving unemployment, sickness and inactivity depends on the number of semesters an individual has belonged to any of these two states. This is similar to the notion of ‘duration dependence’ often encountered in empirical analyses of unemployment spells, only that in our case, it is the accumulated time spent outside work and education during adolescence that is relevant for future prospects, and not its division into distinct spells.

In spite of their empirical orientation, our concepts of exclusion and marginalisation rely on unknown parameters and intrinsically unobserved latent variables, hence they cannot yet be used to analyse the social exclusion process. We now turn to their empirical equivalents, estimation of the model parameters, and the identification of the influences exerted by unobserved heterogeneity. Let  $N_i$  be the set of semester-observations available for individual  $i$ , and let  $y_{jka} = 1$  if the observation for individual  $i$  in semester  $a$  resulted in a transition from state  $j$  to state  $k$ , and zero otherwise. Furthermore, let  $K_j$  be the set of feasible transitions for an individual in state  $j$ ;  $K_1 = \{2, 3, 4\}$ ,  $K_2 = \{1, 3, 4\}$ ,  $K_3 = \{1, 2, 4, 5\}$ ,  $K_4 = \{1, 2, 3, 5\}$  and  $K_5 = \{\emptyset\}$ . The contribution to the likelihood function formed by this particular individual, conditioned on the unobserved covariate vector  $v_i$  can then be expressed as follows:

$$L_i(v_i) = \prod_{a \in N_i} \left[ \prod_{k \in K_j} \left( \frac{\exp(x'_{jkai} \beta_{jk} + v_{ki})}{1 + \sum_{k \in K_j} \exp(x'_{jkai} \beta_{jk} + v_{ki})} \right)^{y_{jkai}} \left( \frac{1}{1 + \sum_{k \in K_j} \exp(x'_{jkai} \beta_{jk} + v_{ki})} \right)^{1 - \sum_a y_{jkai}} \right] \quad (2)$$

Since the individual likelihood contributions in (2) contain five unobserved variables, they cannot be used directly as inputs to the likelihood function to be maximised. The unobserved variables have to be integrated out of the likelihood function. In order to avoid potential bias associated with the selection of a particular distribution function for the unobservables, we use a non-parametric approach to account for unobserved heterogeneity. In practice, this implies that the unobserved variables have a joint discrete distribution (Lindsay, 1983) with the number of mass-points chosen by adding points until it is no longer possible to increase the likelihood function (Heckman and Singer, 1984) or according to an information criterion that punishes parameter abundance. The likelihood can then be formulated as

$$L = \prod_{i \in N} \sum_{l=1}^W q_l L_i(v_l), \quad \sum_{l=1}^W q_l = 1, \quad (3)$$

where  $q_l$  is the probability of a particular combination of mass-point locations  $v_l$ , and  $W$  is the optimal number of mass-points. The appropriateness of additional points is, at each stage of the estimation procedure, evaluated by means of simulated annealing (Goffe *et al.*, 1994). We follow the recommendations provided by Baker and Melino (2000), and determine the number of mass-points on the basis of the Hannan-Quinn information criterion.

This non-parametric approach is of course only meaningful if the model is non-parametrically identified. In our case there is a substantial variation in exogenous time-varying covariates in the form of business cycles that ensure identification. The intuition behind this source of identification is that persons who according to observed characteristics have had, for example, a particularly high probability of making a particular transition

without actually making it have revealed a low *expected* value of their corresponding unobserved propensity of making that transition. For a more formal discussion of the usage of time-varying covariates to identify competing risks transition rate models, see McCall (1994) and Brinch (2000).

## 5 Results

The preferred model contains 14 support points in the distribution of unobserved heterogeneity and a total of 550 estimated parameters. In this section, we take advantage of the estimated model to assess the existence of social exclusion and marginalisation among youths in Norway during the 1990's, on the basis of the concepts and definitions set out in the previous section. We also present some key results regarding the dynamic properties of the marginalisation process, as it is captured by the degree of event history path dependence in the various transition propensities, and its interaction with business cycle developments. Parameter estimates (with standard errors) regarding the impact of current state and past event history, are presented in the Appendix, Table A2.

Before we present empirical evidence on social exclusion and marginalisation based on our definitions, we assess the predictive ability of our statistical model by comparing observed and simulated event histories. By attributing every individual their true explanatory variables to start with and drawing person-specific 'intercepts' from the estimated distribution of unobserved heterogeneity, we simulate the complete event histories on the basis of the estimated model. Given that the simulation results are based entirely on the estimated model (with no attempts to correct accumulated errors in the state space distribution), we find the model predictions displayed in Figure 2 highly satisfactory.

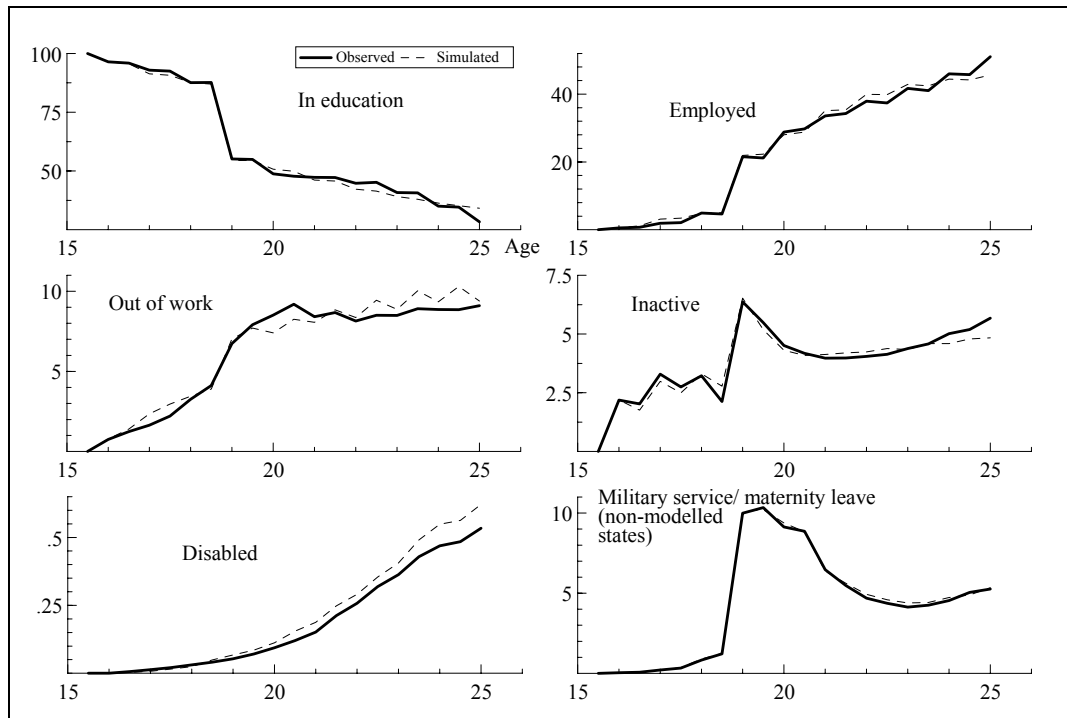


Figure 2. Observed and simulated (based on estimated model) distribution of states during the first 19 semesters after completion of compulsory school (age 16-25).

A key factor in our estimates of social exclusion and the associated marginalisation process is the extent to which the probabilities of *re-entering* work and education change as the time spent outside them increases. While the exact estimates related to this 'duration dependence' is spelled out in detail in the Appendix, Figure 3 shows the estimated transition probabilities as functions of total time spent 'out of work' or in 'inactivity' for a 'reference individual'. The graphs are all plotted for average labour market conditions, with the rate of local unemployment set to its mean value for the observation period. From the upper right-hand panel, we note that for a person without a completed upper secondary education (<3 years of post-compulsory education), the average predicted probability of making a transition from 'inactivity' to 'education' after just one semester outside is approximately 25 per cent. After two semesters outside work and education, it increases to 37 per cent, suggesting that many teen-agers and young adults deliberately take a one-year break from school

without any significant risk of experiencing marginalisation or social exclusion. But, for individuals who fail to return after one year, the education propensity drops substantially, to 11 per cent after three semesters and to only 5 per cent after five semesters. The same pattern can be seen in the predicted transition rates to education from out of work, although these transition rates are much lower. We also see that individuals with a completed upper secondary education typically have a lower probability of taking up education again, the longer they have been outside work and education.

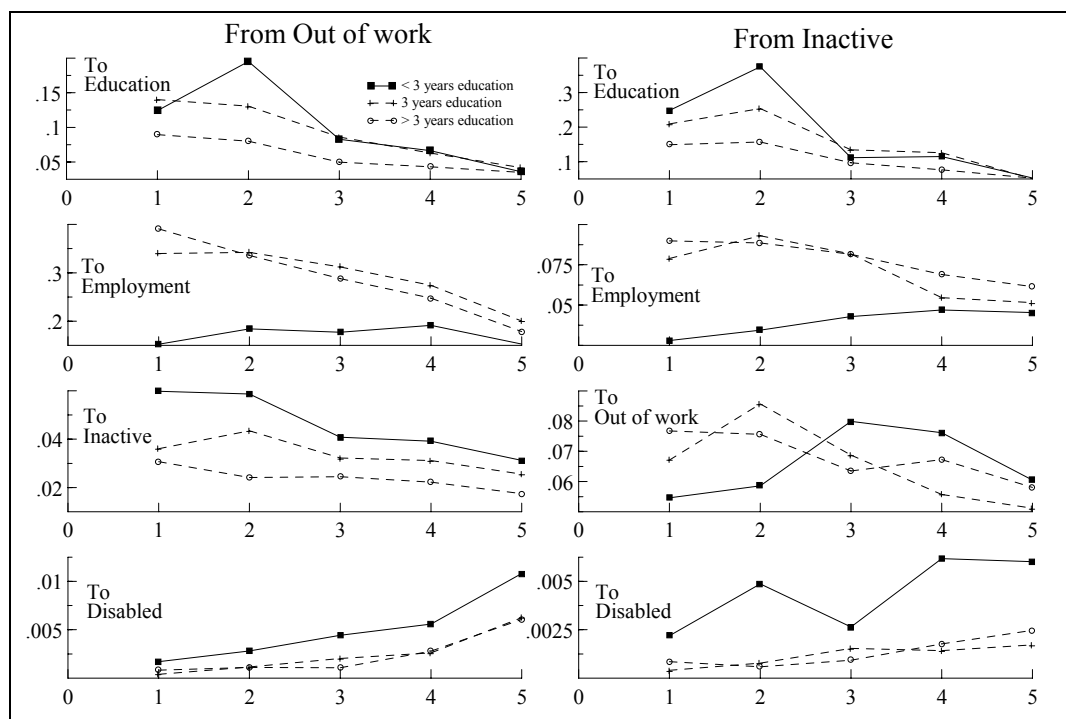


Figure 3. Estimated transition probabilities as a function of number of semesters outside employment/education.

Note: The curves are scaled to match the observed transition propensity for a newly unemployed person with 6 years education. Note also that the scale on the vertical axis varies from graph to graph.

Another interesting feature of Figure 3 is the pattern of transition probabilities to ‘employment’. For example, after one semester ‘out of work’, the probability of being employed in the next semester is as high as 40 per cent for individuals with high education (more than 3 years), 34 per cent for individuals with upper secondary education (3 years), but as low as 15 per cent for individuals with less than three years of post-compulsory schooling. However, if a job is not obtained during the subsequent semesters, the job prob-



ability declines sharply for highly educated individuals, while it increases for individuals with less schooling. After five semesters outside work and education, there is virtually no difference between the different educational groups. Hence, our estimates support the idea that the stronger the participation norms are to start with, the more adverse are the consequences of not being able to ‘get inside’; i.e., the better the starting point, the steeper the decline in response to sustained bad luck.

The overall picture arising from Figure 3 is that for most youths, there is a negative duration dependence associated with the time spent outside work and education, in the sense that the probability of returning declines as a function of time spent outside, while the probability of becoming permanently disabled increases. However, we find that this negative duration dependence is significantly stronger in good times (when unemployment is low) than in bad times, particularly for the return-to-work probability, see Appendix Table A3. This finding supports the hypothesis that it is more scarring/discouraging, and, hence, sends a stronger negative signal, to remain outside when there are strong norms to be inside.

In the remainder of this section, we use the simulated data and predicted transition probabilities to examine the prevalence of social exclusion and marginalisation among Norwegian youths. In particular, we investigate how social exclusion interacts with gender, socio-economic status of the family, immigrant status, previous experience, and business cycles. Our exposition is based on the social exclusion and marginalisation definitions outlined in Section 3, with the threshold probability of returning to work or re-enrollment in school during the next year set to 0.25 (that is  $\psi=0.25$ ). Hence, social exclusion is defined as currently being outside school/work *and* having at least a 75 per cent probability of staying outside for more than a year. Marginalisation is defined as being outside with a probability of staying outside currently below 75 per cent, while at the same time being subject

to negative duration dependence causing the return probability to fall below the social exclusion threshold if no transition to school/work occurs. The overall prevalence of social exclusion and marginalisation is obviously strongly dependent on selection of threshold probability ( $\psi$ ). While a higher value of  $\psi$  certainly raises the level of social exclusion (almost proportionally), the effect on marginalisation is ambiguous. However, the qualitative conclusions discussed in this section are not sensitive towards variations in this parameter, and in the Appendix, we present some figures based on alternative thresholds.

#### *Social exclusion and marginalisation by gender*

The six panels in Figure 4 display the fraction of individuals who are considered socially excluded or marginalised, by age and gender. The upper part displays the fraction of each age group that are excluded and marginalised; i.e. the *unconditional* exclusion and marginalisation propensities. The middle and lower parts show the fractions of those currently 'out of work' and 'inactive' who are deemed to be socially excluded or marginalised, i.e. the *conditional* social exclusion and marginalisation propensities. The conditional propensities are of course much higher than the unconditional, since they condition on one of the criteria (being currently 'out of work' or 'inactive') being satisfied. The unconditional propensities are strongly influenced by the inflow into 'out of work' and 'inactivity'. The Norwegian school system with 3-4 years of (voluntary) upper secondary education, following graduation from compulsory schooling at age 16, invites a division of youths into teen-agers (16-19) and young adults (20-25).

Looking at the whole graduation cohort (the unconditional propensities), in the upper part of Figure 4, less than one percent of the teen-agers are socially excluded. This finding primarily reflects the fact that few individuals leave school during the first three years after compulsory school completion. Exclusion is steadily increasing in age, but at a mod-

erate rate, partly reflecting the rising shares of the age groups that are either ‘out of work’ or ‘inactive’, conf. Figure 1. Since the stock of persons out of work or inactive is constant during the twenties, see Figure 1, the age effect on the social exclusion propensity must largely be explained by declining return probability among those who actually are ‘out of work’ or ‘inactive’. In other words, the social exclusion age profile reflects that being outside in the mid 20’s is associated with lower return probabilities than being outside in teenage years. Focusing on those ‘out of work’ or ‘inactive’, shown in the middle and lower part of Figure 4, less than one of five teen-agers is socially excluded. The vast majority of the inactive early school leavers enter work or reenrol in school within a year, and the exclusion propensity is substantially lower for the ‘inactive’ than for those ‘out of work’ (typically unemployed). This clearly indicates that many youths deliberately take a year off, without experiencing serious problems of entering the job market or reenrolling in school. We have characterised marginalised youths as those who stand in the doorway and are destined to become socially excluded unless they get a job or reenrol in school in the near future. Figure 4 shows that a tiny minority, less than two percent of the graduation cohorts, is in this position during teen-age years. Marginalisation tapers off as the youths enter their twenties.

Turning to young adults (20-25), exclusion becomes increasingly more important as the youths age. While the conditional SE is constant at around 0.2 for young adults out of work, it increases to above 0.3 for the inactive as they approach their mid-twenties. Marginalisation vanishes during the twenties, which partly reflects how MARG is defined. A majority of those currently out of work or inactive, have a history involving occupancy in these states and those with the poorest job prospects have become excluded. Crudely speaking, as individuals approach their late 20’s, they no longer stand in the doorway; they have either moved in or out.

This naturally leads up to the question about how the risks of social exclusion and marginalisation depend on when you leave school or work. Figure 5 displays the conditional exclusion and marginalisation propensities for new ‘first-time’ entrants into ‘out of work’ and ‘inactivity’. These graphs clearly show that the two states are distinctly different. Becoming unemployed entails a much higher social exclusion risk for teenagers than for young adults, while moving towards ‘inactivity’ entails a higher social exclusion risk for young adults than for teenagers. The former of these phenomena probably reflects that unemployment is, indeed, a particularly traumatic experience for very young people. The latter is likely to reflect that voluntary inactivity during teenage years is relatively ‘normal’, while there are strong norms against the same type of behaviour among young adults. The age profiles among ‘new-comers’ in Figure 5 also emphasise that duration dependence and sorting are the key explanations behind the age-pattern of rising exclusion rates among individuals ‘out of work’, see the middle panels of Figure 4. In terms of both individual characteristics and labour market history, the stock of unemployed 25-year-olds is very different from the stock of unemployed teenagers.

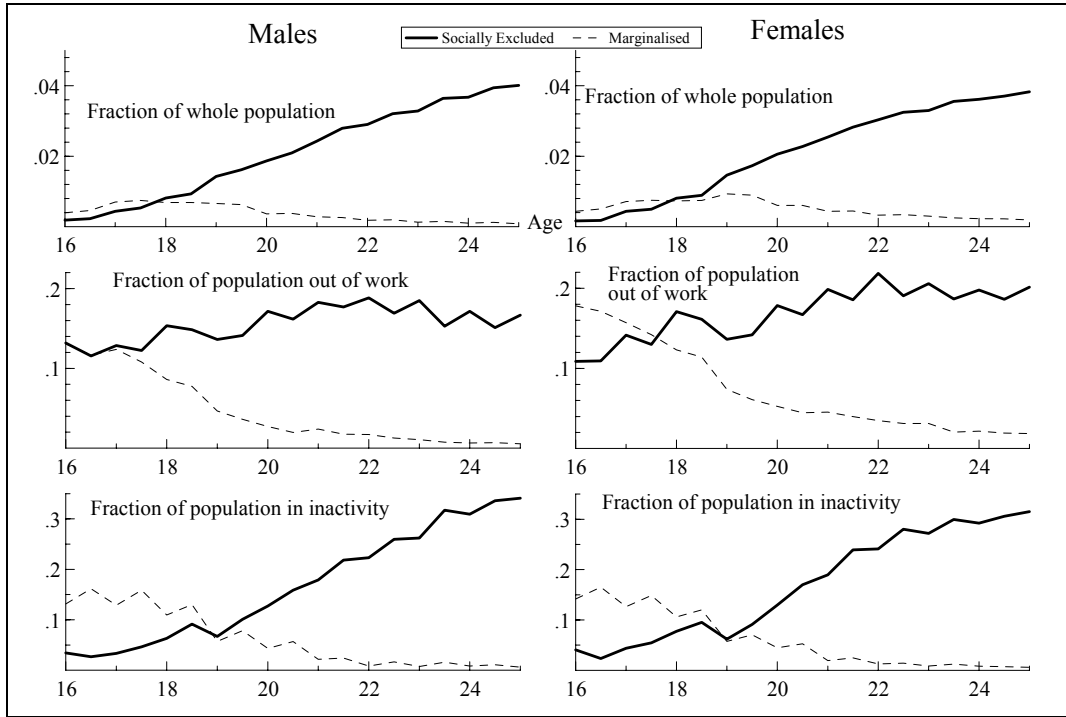


Figure 4. Fraction of population Socially Excluded and Marginalised at different ages ( $\psi=0.25$ )

Gender differences in social exclusion are negligible. In total, a somewhat lower fraction of the males are marginalised in the age group 18-22, presumably reflecting that military service (among boys) is more prevalent than early child-bearing (for girls). The middle part in Figure 4 shows that this is due to a higher female marginalisation propensity among those out of work, counteracting the effects of a higher school drop out rate among males. The parameter estimates, see Appendix, Table A3, show that males are more likely than females to leave their education both to work and enter unemployment. Having left school, males also have a lower probability of returning. These estimates illuminate the current gender differential in educational attainment; see Opheim (2004). Girls outperform boys because they stay in school longer, but also because they return more frequently. Gender differentials are also found for transitions from out of work and inactivity. While females are more likely to return to school, males have higher work probabilities. No difference is found for disability.

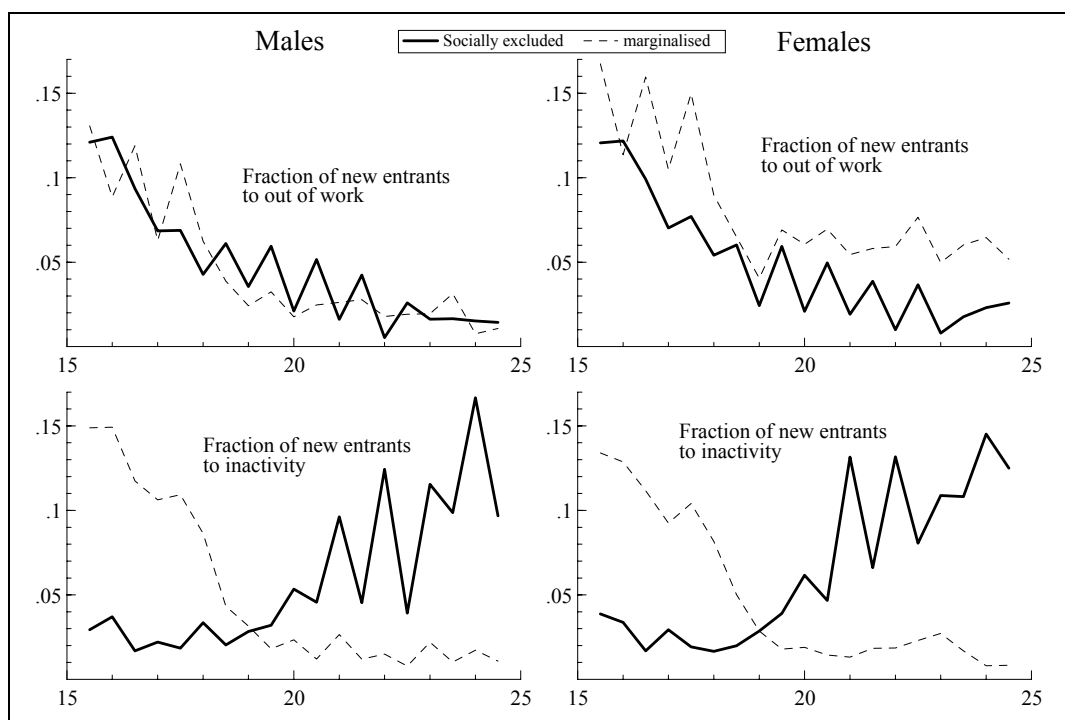


Figure 5. Fraction of population Socially Excluded and Marginalised among individuals entering into “out of work” and “inactivity” for the first time in their career ( $\psi=0.25$ ).

To summarise, while social exclusion hardly hit teen-agers just because they leave the arenas of work and education, they are at risk if they stay outside too long (as reflected in the marginalisation propensities). Even among the teenage school dropouts, only about 10 per cent have a probability less than 0.25 to reenrol in school or enter employment within a year. This reflects the fact that a number of youths that are tired of school do take a deliberate break at this stage, without necessarily having any serious social problems. Social exclusion does, however, gradually become more widespread during the twenties.

### *Business cycle effects*

Local labour market conditions affect most transitions; see details in Appendix, Table A3. Higher local unemployment obviously implies that it is more difficult to get a job and a higher risk of losing one. It also reduces the opportunity cost of schooling (Cameron and Heckman, 1998). Hence, although our parameter estimates indicate that the flows from

education to ‘out of work’ and ‘inactivity’ depend positively on the rate of unemployment, we find that higher unemployment causes an overall increase in educational activities (not shown).

Although our definition of social exclusion refers to future prospects associated with normal business cycle conditions, business cycle variations may affect the unconditional social exclusion propensity through two channels: First, a higher local unemployment rate increases the inflow into ‘out of work’ and ‘inactivity’. Second, it reduces the stigma associated with being in these two states, and, hence, modifies the negative duration dependence generally associated with being outside. As it turns out, these two effects roughly cancel out in our data, implying that our concept of social exclusion is virtually non-cyclical; see the upper panels of Figure 6. The intuition behind this result is that poor business cycles causes more people to be ‘out of work’ and ‘inactive’, while at the same time (and precisely for this reason) dampens the adverse affects associated with belonging to these states. The latter phenomenon can clearly be seen by examining the two conditional SE paths in the middle panel of Figure 6.

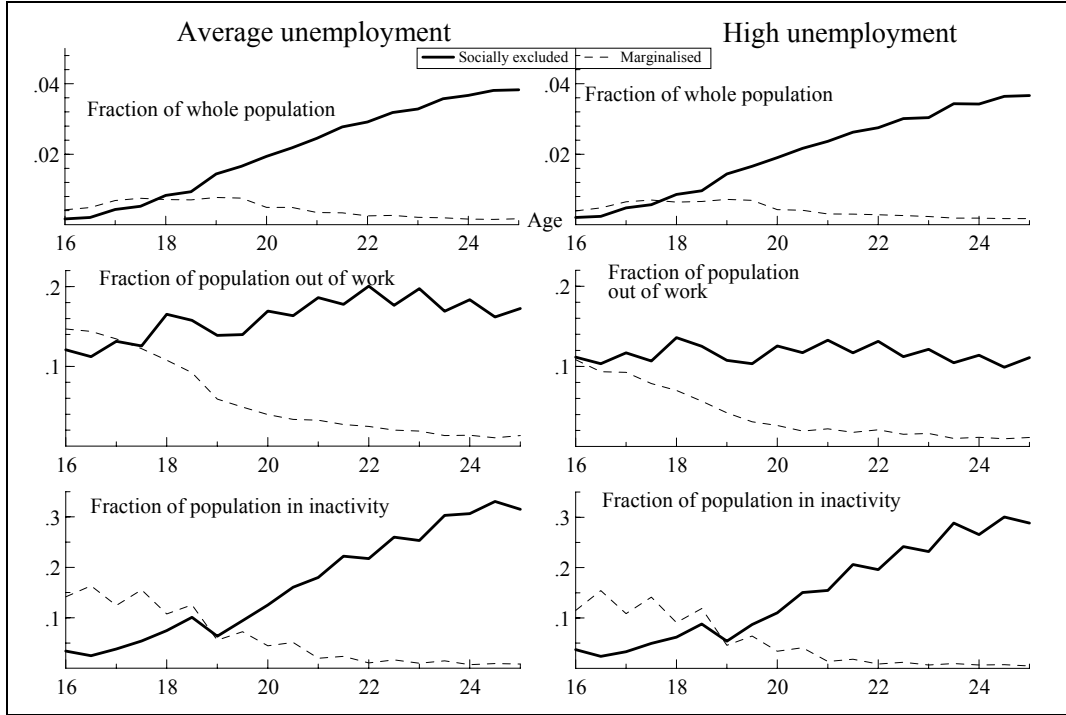


Figure 6. Fraction of population Socially Excluded and Marginalised at different business cycle conditions ( $\psi=0.25$ )

Note: High unemployment is defined as two percentage points above the average unemployment rate.

### *Family background*

Overwhelming evidence, across time and countries, shows that school performance, educational careers and adolescent labour market outcomes vary strongly across socio-economic groups. All transition rates in our model depend on a rich set of family characteristics; see Appendix, Table A1, for details. The total effects of parental education and income on social exclusion are illustrated in Figure 7. We display the social exclusion and marginalisation propensities for two groups, with disadvantaged and advantaged family background, respectively. 'Disadvantaged' youths are those with both parents holding 11 years of schooling or less and with family income below the 20th percentile. 'Advantaged' youths are those with both parents holding at least 15 years of schooling and with family income above the 80th percentile. Both groups constitute about 8 percent of the sample. Information on occupational status of parents is not available in the data and rather than using la-



bour market status at a single point in time, which would involve substantial measurement error due to temporary employment shocks, we use the average labour earnings of the parents during compulsory school age (ten years). Combining earnings and education, we have a concept of family background, which is closely related to class. Although the criteria for class divisions and their empirical implementation vary a lot, a common element is a concern for inequality. In this study we measure class-inequality in terms of income and education. As pointed out by Esping-Andersen (2004), income and occupational class are 'pretty much two sides of the same coin'. Occupational status and earnings are highly correlated (Erickson and Goldthorpe, 1992) and the same is true for Marxian-inspired class categories (Wright, 1979).

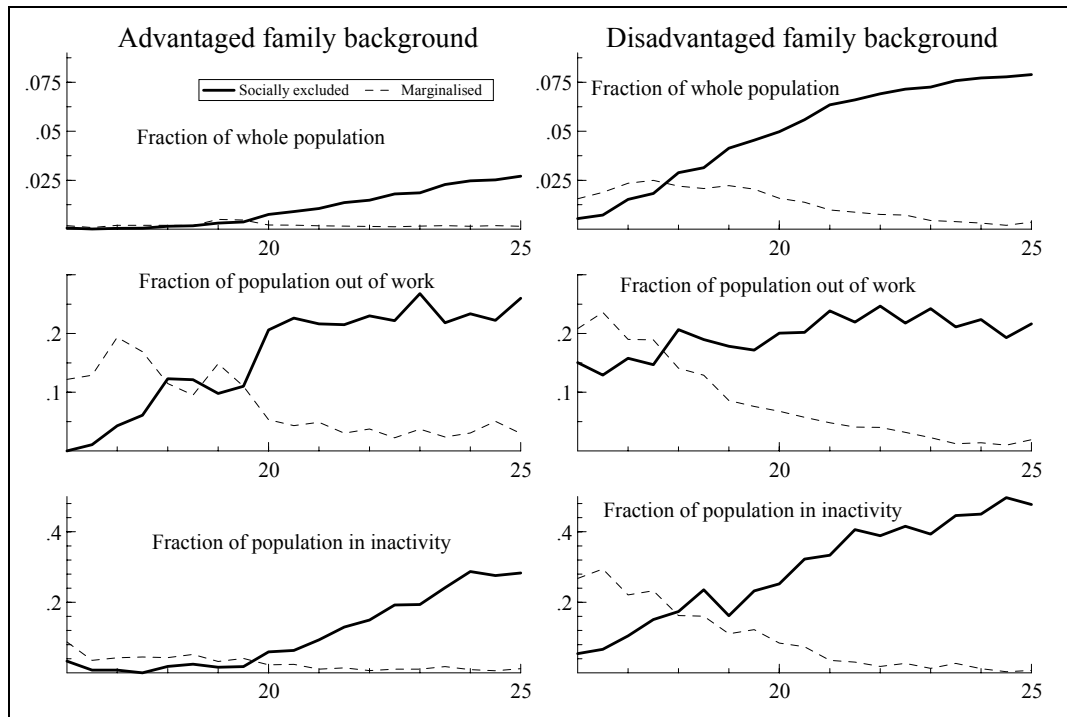


Figure 7. Fraction of population Socially Excluded and Marginalised according to their family background characteristics ( $\psi=0.25$ ).

Note: The concepts of advantaged and disadvantaged background are explained in the text.

Figure 7 displays the social exclusion and marginalisation propensities by age and family background. As previously, the upper part of the figure displays the unconditional

social exclusion propensities. The importance of family background is dramatic, especially during the teenage years. While social exclusion is simply non-existent among the advantaged youths, close to 5 per cent of those aged 19 with a disadvantaged background are excluded. As the advantaged youths enter their twenties, social exclusion picks up for them as well, but the proportion is still less than a third of what is found for those with a disadvantaged background.

Further insight is gained by looking at the conditional social exclusion propensities in the middle and lower part of Figure 7. Even conditional on being 'out of work', we find that social exclusion is substantially higher for teen-agers with a disadvantaged background than for those with an advantage background. However, this difference disappears entirely as the youths enter their 20's. Parental resources do affect social exclusion among the inactive youths, as those with advantaged background are more likely to reenrol in school or enter jobs. In particular, very few of the inactive teenagers from an advantaged background are excluded. And, in contrast to the propensities for individuals 'out of work' the impact of family background on the social exclusion propensity among 'inactive' individuals does not disappear with age.

Marginalisation also varies across families and is basically non-existent for youths from advantaged backgrounds. One exception is the tiny fraction of teen-agers with advantaged backgrounds who are out of work. The inactive teenagers with rich and highly educated parents are definitely not at risk. Among the disadvantaged teenagers who drop out of school and become inactive, however, more than 20 per cent are marginalised.

Figure 7 also suggests that the differential school dropout rate is a major factor behind the difference in marginalisation and social exclusion between disadvantaged and advantaged youths. Children of parents with low education and income are much more likely

to leave school and enter unemployment or inactivity, and thereby become more exposed to marginalisation processes and social exclusion.

### *Immigrant youth*

Youths with foreign family backgrounds constitute about 4 per cent of the sample. Ethnic minority children are often considered as a group at risk, due to inferior school performance (Hægeland et al., 2004), early school drop out (Opheim, 2004) and high unemployment rates. Policies to improve the educational attainment among young immigrants from non-western countries are frequently discussed and implemented, UFD (2003). From a long-run perspective on integration, it is useful to distinguish between immigrants arriving after school-starting age (here called child immigrant) and those born in Norway or who arrived before school-starting age (here called second generation immigrants).<sup>4</sup> There are important differences between these two groups. One distinction is related to their ability to speak and write fluent Norwegian. Presumably, children raised in Norway will, on average, have better language skills. In addition, among the child immigrants, a larger fraction has a refugee background. No matter if they have fled their country of origin due to war, unrest, human rights violations or environmental catastrophes, the consequences are likely to be that they have certain traumas. And traumas probably do not foster high motivation for school and labour market success. Finally, the outcomes of the second generation provide more informative evidence on the extent to which children and grandchildren of immigrants will have similar careers compared to the native population.

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<sup>4</sup> The two groups of immigrants are fairly equal in size, 2.15 and 1.86 per cent of the sample for child immigrants and second generation, respectively. As we ignore region of origin, any difference between the two groups can be due to compositional effects. Immigrants from rich industrial countries have school and labour careers similar to those of natives, but they represent a minority. Moreover, the fraction with parents from the OECD-area is very similar among child and second-generation immigrants, 20 and 25 per cent respectively. Even the year of graduation is equally distributed in the two groups.

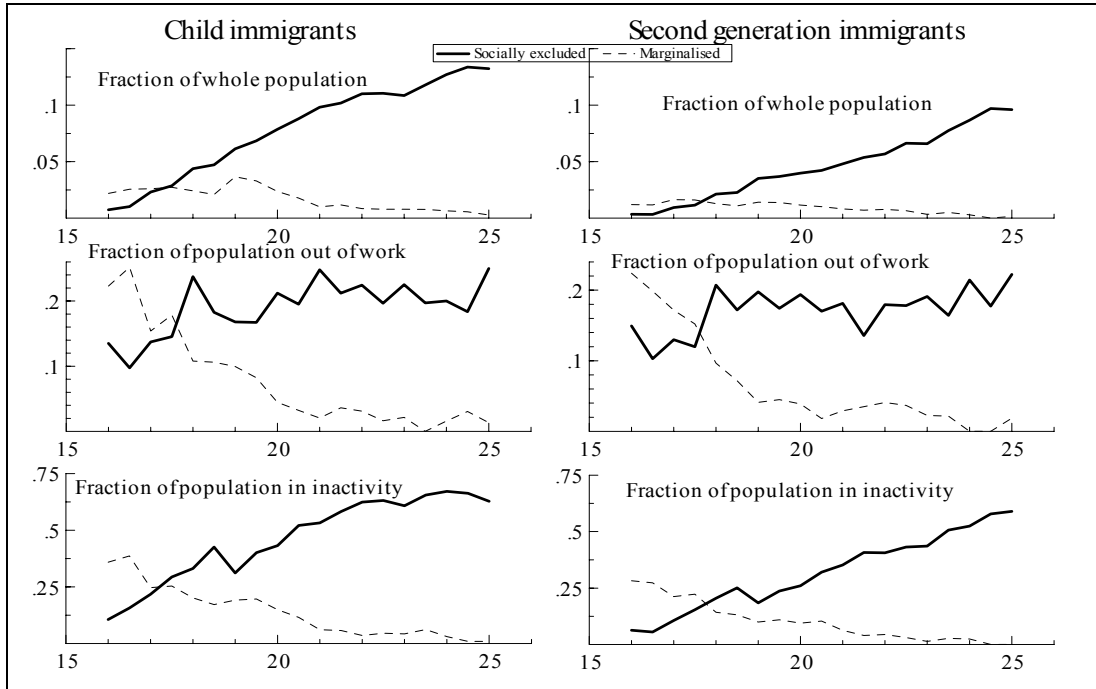


Figure 8. Fraction of population socially excluded and marginalised among child and second generation immigrants ( $\psi=0.25$ ).

The specific problems experienced by immigrants are transparent when we look at the proportions excluded in Figure 8 and compare them with previous figures in this section. Among child immigrants, more than 10 per cent are socially excluded when they reach their early twenties, compared to about 5 per cent for the second generation and 2 per cent for the whole population (see Figure 4). It is important to emphasise that we do not calculate the causal effects of having immigrant background, since other characteristics (such as family background) differ between immigrants and natives, and the simulations are based on each individual's true explanatory variables. Although a part of the exclusion among immigrants can be explained by observed family characteristics like earnings and parental education, the second-generation immigrants are equally exposed to social exclusion as majority youths from a disadvantaged background.<sup>5</sup>

<sup>5</sup> A small fraction is found in both groups since 9.4 per cent of the disadvantaged youth are child immigrants and 6.9 per cent are second generation immigrants.

There is a considerable difference across immigrant generations as those born in Norway, or arrived during pre-school years, are far less exposed to social exclusion than their immigrant school mates who entered during school-age. This suggests that years of residence matter, for the children themselves via, e.g., language skills, or indirectly through parental acquisition of language or knowledge about norms and institutions. According to this interpretation, the immigrant population will soon catch up with natives.

Again, early school leaving plays a crucial role in explaining exclusion among youths. In the spring term of the third year of post-compulsory schooling, 88 per cent of all teen-agers were enrolled in school, compared to 78 percent of the child immigrants and 82 percent of the second generation immigrants. Thus, differential exclusion patterns among immigrants and natives, as well as within the immigrant population, can largely be explained by school-dropout and inflow into unemployment and inactivity.

Social exclusion among those ‘out of work’ or ‘inactive’ is displayed in the middle and lower part of Figure 8. While the exclusion propensity among those 'out of work' is of similar magnitude as for natives, immigrants who become ‘inactive’ are more exposed to social exclusion. More than half of the child immigrants who become inactive in their twenties are socially excluded. Turning to marginalisation, it is clear that immigrant teen-agers face a considerably higher risk than an average youth with ethnic Norwegian parents, very much like youths in general with a disadvantaged family background.

## **6 Conclusions**

We have developed a forward-looking concept of social exclusion, consistent with existing theories of marginalisation and exclusion mechanisms. We advocate a probability interpretation of social exclusion, where individuals should not be considered excluded solely on the basis of their current labour market state, but rather with reference to their (particularly

poor) prospects for the future. We have also outlined a statistical tool designed to make this idea operational on real data, and used it to analyse marginalisation and social exclusion among Norwegian youths during the 1990's. The analysis reveals that our proposed concept of social exclusion is approximately non-cyclical, reflecting, among other things, that a slump leaves more people unemployed, but at the same time diminishes the scarring/discouragement/signalling effects associated with unemployment experience. Our methodology has provided the following insights into the dynamic process of social exclusion in Norway:

First, the average probability of being socially excluded – in the sense of being currently outside work/education, and have a more than 75 per cent probability of remaining outside for more than a year – rises from around half a percentage point in early teenage years to around 4 per cent in the mid 20's.

Second, family background has an enormous impact on the social exclusion probability. Teenagers with highly educated and rich parents have approximately zero risk of becoming socially excluded. Children growing up in disadvantaged families with poor and less educated parents, as well as immigrant children, are far more exposed to marginalisation and exclusion. Second generation immigrants are more similar to natives than immigrant children, indicating a convergence of education and labour market careers over time.

Third, the gender difference is negligible although male youths typically leave school earlier than their female school mates.

Fourth, teenagers who spend up to one year outside school and the labour market, face a minimal risk of social exclusion. But as the period 'outside' is extended beyond one year, the risk of social exclusion increases rapidly. Unemployment during teenage years entails a substantial risk of social exclusion, even at short durations.

Fifth, shorter breaks from work/education during early adulthood (age 20-25), when participation norms are stronger, also entail a substantial risk of social exclusion.

Finally, individuals with favourable prospects, for whom norms of being integrated and successful are strong, experience more adverse consequences of sustained failure. While individuals with high education have a much higher probability than individuals with low education of returning to work/education after a short spell of unemployment or inactivity, their return probabilities converge rapidly as the time spent 'outside' increases.

## Appendix

Table A1		
Explanatory variables ( $x'_{jkal}$ )		
Type of variable	Representation in the model	Included in
<b>I Present situation, economic environment, and past experiences</b>		
Current state and event history (detailed description in Appendix)		
If presently in education	13 dummy variables capturing education experience (0, 1-5 semesters, 6 semesters, >6 semesters) and semesters spent outside work/education (0,1,2,>2)	Transitions from education
If presently in work	9 dummy variables capturing education experience (0-5 semesters, 6 semesters, >6 semesters) and work experience (1 semester, 2 semesters,>2 semesters)	Transitions from employment
If presently out of work (unemployed/sick)	15 dummy variables capturing education experience (0-5 semesters, 6 semesters, >6 semesters) and semesters spent outside work/education (1,2,3,4,>4)	Transitions from out of work
If presently inactive	15 dummy variables capturing education experience (0-5 semesters, 6 semesters, >6 semesters) and semesters spent outside work/education (1,2,3,4,>4)	Transitions from inactivity
Business cycle conditions	Yearly local unemployment rates (at the level of municipality. 435 municipalities )	All transitions
Interaction between time spent outside school/work and business cycle condition	On variable computed as the product of the number of semesters spent outside school or work and the local unemployment rate	Transitions from out of work and inactivity
Reform 94	Dummy for individuals who completed compulsory school after implementation of Reform 94	All transitions. A separate effect is allowed for in the first semester
<b>II Individual background and family characteristics</b>		
Gender	1 dummy variable indicating male	All transitions
Region of residence	6 dummy variables (Oslo, South-East (except Oslo), South-West, Mid-Norway, North-Norway, Unknown)	All transitions
Family income up to the age of 16	Average (de-trended) yearly family income during the period when the offspring was between 0 and 16 years	All transitions



Table A1		
Explanatory variables ( $x'_{jkt}$ )		
Type of variable	Representation in the model	Included in
Parents outside labour force in year of graduation	Dummy if one of the parents is out of the labour force at the year when offspring graduate from compulsory education	All transitions
Fathers education	Years of education	All transitions
Mothers education	Years of education	All transitions
Parents' combined education	The product of the father's and the mother's years of education (divided by 12)	All transitions
Teenage parent	1 dummy indicating that one of the parents was a teenager at the time of birth	All transitions
Parents missing	2 dummies for missing father and/or mother	All transitions
Nationality	A dummy for second generation, and a dummy for child immigrants	All transitions
Early starter	1 dummy for individuals who started at school a year earlier than normal	All transitions

Table A2  
Definition of State Occupation and State History Variables and Associated Parameter Estimates and Standard Errors

Definition of Dummy Variables					Estimates and Standard Errors									
Dummy variable	Present state	# sem. in state 1	# sem. in state 2	# sem. in state {1,2}	Transition to state 1 (education)		Transition to state 2 (employment)		Transition to state 3 (out of work)		Transition to state 4 (inactivity)		Transition to state 5 (disability)	
					Est.	S.E.	Est.	S.E.	Est.	S.E.	Est.	S.E.	Est.	S.E.
1	1	0	0	0	-	-	-4.66	0.05	-2.90	0.03	-1.75	0.02	-	-
2	1	1-5		0	-	-	-3.51	0.03	-2.14	0.01	-1.67	0.01	-	-
3	1	1-5		1	-	-	-1.78	0.04	-0.68	0.04	-1.12	0.05	-	-
4	1	1-5		2	-	-	-1.82	0.04	-0.75	0.03	-1.18	0.04	-	-
5	1	1-5		>2	-	-	-0.96	0.04	0.13	0.03	-0.81	0.05	-	-
6	1	6		0	-	-	-0.62	0.03	Ref.	Ref.	Ref.	Ref.	-	-
7	1	6		1	-	-	-0.86	0.05	-0.38	0.07	-0.86	0.08	-	-
8	1	6		2	-	-	-0.61	0.04	0.05	0.04	-0.69	0.05	-	-
9	1	6		>2	-	-	-0.85	0.06	-0.04	0.06	-1.00	0.09	-	-
10	1	>6		0	-	-	-0.72	0.03	-0.42	0.01	-1.05	0.01	-	-
11	1	>6		1	-	-	-1.07	0.03	-0.83	0.03	-1.72	0.04	-	-
12	1	>6		2	-	-	-1.01	0.03	-0.89	0.03	-1.69	0.04	-	-
13	1	>6		>2	-	-	-0.88	0.04	-0.42	0.04	-1.36	0.05	-	-
14	2	0-5	1		-0.02	0.05	-	-	-0.09	0.03	-1.96	0.04	-	-
15	2	0-5	2		-0.36	0.04	-	-	-0.24	0.04	-2.29	0.05	-	-
16	2	0-5	>2		-2.00	0.05	-	-	-0.56	0.03	-2.84	0.05	-	-
17	2	6	1		-0.50	0.04	-	-	-0.34	0.03	-2.15	0.04	-	-
18	2	6	2		-0.38	0.04	-	-	-0.44	0.03	-2.67	0.05	-	-
19	2	6	>2		-1.19	0.04	-	-	-0.77	0.03	-3.02	0.04	-	-
20	2	>6	1		-0.98	0.04	-	-	-0.43	0.03	-2.49	0.04	-	-
21	2	>6	2		-1.26	0.04	-	-	-0.56	0.03	-2.99	0.05	-	-
22	2	>6	>2		-1.83	0.04	-	-	-0.73	0.03	-3.16	0.04	-	-
23	3	0-5		1	-0.44	0.03	-1.12	0.03	-	-	-0.35	0.05	1.14	0.40
24	3	0-5		2	0.18	0.03	-0.76	0.03	-	-	-0.20	0.05	1.81	0.38
25	3	0-5		3	-0.89	0.04	-1.01	0.03	-	-	-0.78	0.06	2.04	0.37
26	3	0-5		4	-1.12	0.04	-0.94	0.03	-	-	-0.83	0.06	2.27	0.37
27	3	0-5		>4	-1.83	0.04	-1.26	0.02	-	-	-1.15	0.05	2.83	0.35
28	3	6		1	Ref.	Ref.	Ref.	Ref.	-	-	-0.54	0.06	Ref.	Ref.
29	3	6		2	-0.07	0.04	0.01	0.03	-	-	-0.35	0.06	1.06	0.44
30	3	6		3	-0.65	0.05	-0.25	0.03	-	-	-0.81	0.07	1.47	0.43
31	3	6		4	-1.07	0.06	-0.48	0.04	-	-	-0.95	0.09	1.61	0.43
32	3	6		>4	-1.62	0.06	-0.94	0.04	-	-	-1.29	0.07	2.34	0.36
33	3	>6		1	-0.46	0.04	0.13	0.02	-	-	-0.71	0.06	0.71	0.44
34	3	>6		2	-0.71	0.04	-0.16	0.03	-	-	-1.09	0.07	0.87	0.45
35	3	>6		3	-1.31	0.05	-0.44	0.03	-	-	-1.20	0.08	0.71	0.49
36	3	>6		4	-1.53	0.06	-0.67	0.04	-	-	-1.37	0.10	1.60	0.43
37	3	>6		>4	-1.85	0.06	-1.10	0.04	-	-	-1.72	0.09	2.26	0.37
38	4	0-5		1	0.25	0.05	-2.82	0.05	-0.45	0.05	-	-	1.38	0.63
39	4	0-5		2	0.90	0.05	-2.38	0.05	-0.14	0.05	-	-	2.41	0.53
40	4	0-5		3	-0.68	0.07	-2.53	0.05	-0.20	0.05	-	-	1.43	0.71
41	4	0-5		4	-0.65	0.06	-2.43	0.06	-0.24	0.06	-	-	2.29	0.58
42	4	0-5		>4	-1.53	0.06	-2.56	0.05	-0.57	0.05	-	-	2.16	0.56
43	4	6		1	0.11	0.05	-1.75	0.04	-0.21	0.05	-	-	-0.28	0.78
44	4	6		2	0.43	0.05	-1.45	0.05	0.16	0.06	-	-	-	-
45	4	6		3	-0.43	0.07	-1.82	0.06	-0.29	0.07	-	-	0.96	0.88
46	4	6		4	-0.56	0.08	-2.28	0.08	-0.56	0.09	-	-	0.81	1.20
47	4	6		>4	-1.58	0.09	-2.45	0.07	-0.75	0.08	-	-	-	-
48	4	>6		1	-0.28	0.05	-1.68	0.05	-0.13	0.06	-	-	0.41	0.93
49	4	>6		2	-0.23	0.06	-1.68	0.06	-0.14	0.07	-	-	0.04	1.11
50	4	>6		3	-0.82	0.07	-1.88	0.06	-0.42	0.08	-	-	0.39	1.22
51	4	>6		4	-1.09	0.09	-2.08	0.09	-0.40	0.10	-	-	-	-
52	4	>6		>4	-1.52	0.09	-2.25	0.08	-0.60	0.09	-	-	1.29	0.87

Table A3  
Gender, Local Unemployment and Family Background Variables, Associated Parameter Estimates and Standard Errors  
Estimates and Standard Errors

From state	Effects of	Transition to state 1 (education)		Transition to state 2 (employment)		Transition to state 3 (out of work)		Transition to state 4 (inactivity)		Transition to state 5 (disability)	
		Est.	S.E.	Est.	S.E.	Est.	S.E.	Est.	S.E.	Est.	S.E.
<b>Education</b>											
	Male	-	-	0.18	0.01	0.19	0.01	0.01	0.01	-	-
	Log local unemployment (U)	-	-	-0.19	0.01	0.57	0.01	0.29	0.01	-	-
	Time spent outside school/work * U	-	-	-	-	-	-	-	-	-	-
	Mothers schooling (MS)	-	-	-0.07	0.00	-0.12	0.00	-0.03	0.00	-	-
	Fathers schooling (FS)	-	-	-0.07	0.00	-0.11	0.00	-0.03	0.00	-	-
	FS*MS/12	-	-	-0.01	0.00	0.02	0.01	0.17	0.01	-	-
	Parental Income	-	-	-0.06	0.01	-0.29	0.01	-0.17	0.01	-	-
	1.gen immigrant	-	-	-0.40	0.02	-0.23	0.03	0.22	0.03	-	-
	2.gen.immigrant	-	-	-0.38	0.02	-0.50	0.04	0.12	0.03	-	-
<b>Employment</b>											
	Male	-0.48	0.01	-	-	-0.11	0.01	-0.19	0.02	-	-
	Log local unemployment (U)	0.10	0.01	-	-	0.64	0.02	0.26	0.02	-	-
	Time spent outside school/work * U	-	-	-	-	-	-	-	-	-	-
	Mothers schooling (MS)	0.12	0.00	-	-	-0.04	0.00	0.06	0.00	-	-
	Fathers schooling (FS)	0.10	0.00	-	-	-0.03	0.00	0.05	0.00	-	-
	FS*MS/12	-0.05	0.01	-	-	0.01	0.01	0.10	0.01	-	-
	Parental Income	0.24	0.01	-	-	-0.21	0.01	-0.07	0.02	-	-
	1.gen immigrant	0.26	0.04	-	-	0.05	0.04	0.29	0.06	-	-
	2.gen.immigrant	0.39	0.04	-	-	-0.15	0.05	0.37	0.06	-	-
<b>Out of work</b>											
	Male	-0.06	0.02	0.19	0.01	-	-	-0.31	0.02	0.05	0.07
	Log local unemployment (U)	0.08	0.04	-0.63	0.03	-	-	0.15	0.06	-0.66	0.31
	Time spent outside school/work * U	0.05	0.01	0.07	0.01	-	-	-0.01	0.02	0.03	0.07
	Mothers schooling (MS)	0.07	0.00	-0.02	0.00	-	-	0.01	0.01	0.00	0.02
	Fathers schooling (FS)	0.05	0.00	-0.02	0.00	-	-	0.00	0.00	0.04	0.01
	FS*MS/12	-0.03	0.01	-0.07	0.01	-	-	0.07	0.02	-0.07	0.06
	Parental Income	0.10	0.01	0.14	0.01	-	-	-0.06	0.02	-0.11	0.05
	1.gen immigrant	0.52	0.05	0.24	0.04	-	-	0.40	0.06	-1.00	0.36
	2.gen.immigrant	0.46	0.06	0.16	0.05	-	-	0.41	0.08	0.10	0.29
<b>Inactivity</b>											
	Male	-0.15	0.02	0.08	0.02	0.30	0.02	-	-	0.22	0.21
	Log local unemployment (U)	0.30	0.05	-0.41	0.04	0.37	0.05	-	-	1.01	0.60
	Time spent outside school/work * U	-0.04	0.02	0.04	0.01	0.05	0.02	-	-	-0.22	0.17
	Mothers schooling (MS)	0.08	0.00	-0.04	0.00	-0.09	0.00	-	-	0.01	0.05
	Fathers schooling (FS)	0.08	0.00	-0.03	0.00	-0.07	0.00	-	-	-0.04	0.05
	FS*MS/12	-0.07	0.01	-0.05	0.01	-0.09	0.02	-	-	0.10	0.14
	Parental Income	0.17	0.01	0.07	0.01	-0.15	0.01	-	-	-0.06	0.16
	1.gen immigrant	-0.30	0.05	-0.56	0.05	-0.59	0.06	-	-	-0.59	0.06
	2.gen.immigrant	-0.39	0.06	-0.40	0.05	-0.67	0.07	-	-	-1.45	0.82

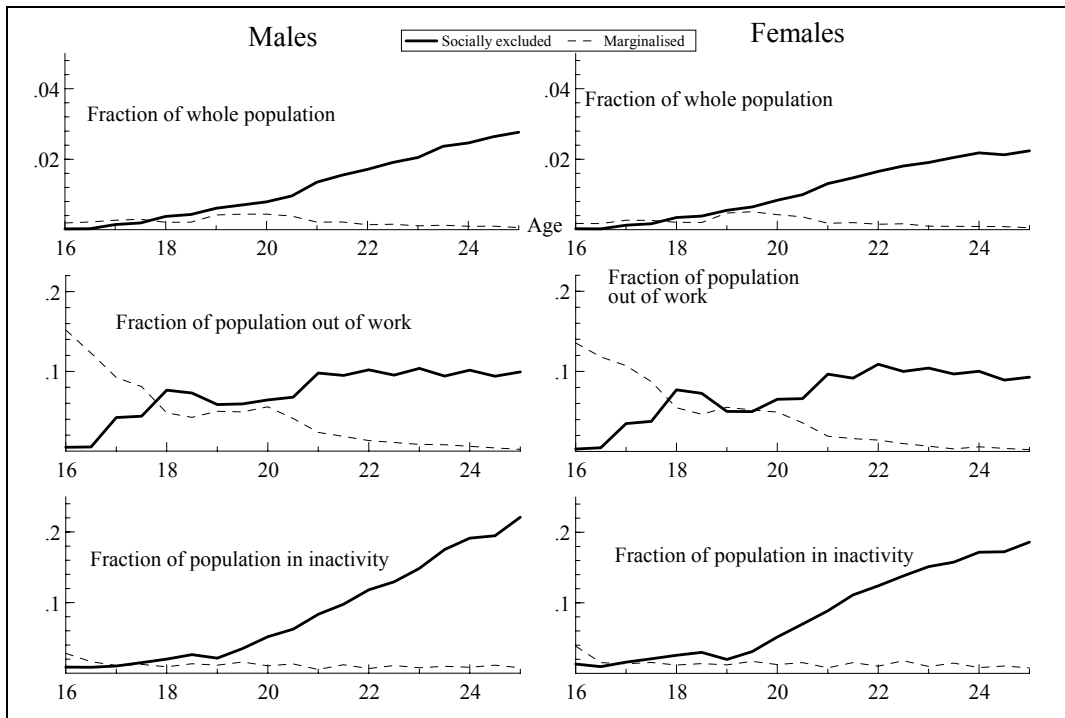


Figure A1. Fraction of population Socially Excluded and Marginalised at different ages ( $\psi=0.10$ )

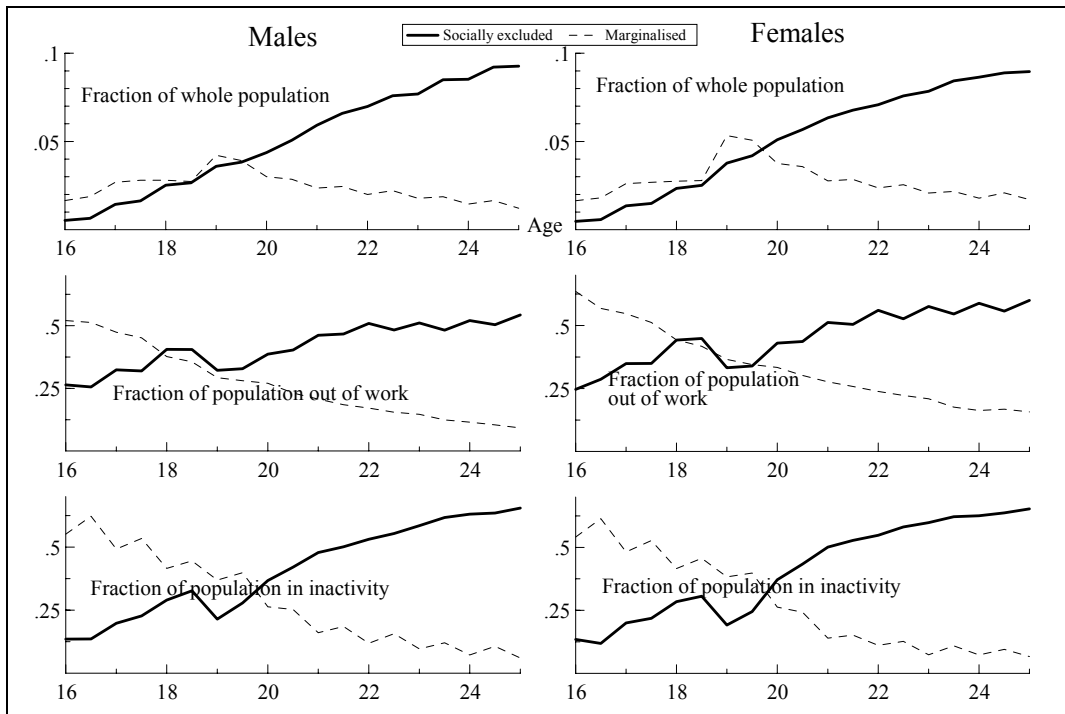


Figure A2. Fraction of population Socially Excluded and Marginalised at different ages ( $\psi=0.50$ )

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