Incentive contracts in labour market equilibrium

The intent of this research project is to examine the relationship between wage contracts in individual firms and the equilibrium in the labour market. We will analyse the relationship between wage contracts and unemployment, human capital investment, innovation and welfare. The project will to a large extent be undertaken by the head of the project Espen R. Moen in collaboration with Åsa Rosen at the University of Stockholm.

In the 1980s, the relationship between wage contracts and macroeconomic performance, in particular the unemployment rate, was much in focus. Prominent examples are the work on profit sharing (Weitzman 1985) and efficiency wage models (Shapiro and Stiglitz 1984). Our theoretical analysis deviates from this literature in two directions:

First, our analysis employs more sophisticated models of contracts. In the early literature, wage contracts were modelled in a rather parsimoniously way. Since then theories of contracts have developed considerably. New developments include rent extraction models (Laffont and Tirole 1993), multi-tasking (Homstrøm and Milgrom 1991), and theories of promotions and deferred compensation (here the seminal contribution came early, see Lazear and Rosen 1981). Based on these recent theoretical models of contract theory, we intend to study the relationship between wage contracts and macroeconomic performance.

Second, our analysis includes search frictions in the labour market. Search and matching models of the labour market have become increasingly popular over the last decade, in particular the Diamon-Mortensen-Pissarides equilibrium search model (see Diamond 1982, Mortensen 1986, and Pissarides 2000 for an overview of the literature). We will apply the competitive search equilibrium concept, developed in Moen (1997). A core element in our analysis is what we refer to as *equilibrium feedback* mechanisms. Equilibrium feedback exists if a given agent's outcome depends on the behaviour of agents on the same side of the market, because their behaviour influences the actions of agents on the other side of the market.

The project will be segmented into four parts. We will focus on developing theoretical models in the following four areas:

1. The effects of performance pay on unemployment and welfare

2. Human capital formation in labour markets with frictions

3. Labour market determinants of turnover and entrepreneurship

4. Behavioural job-search: the role of contracts and institutions

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Espen R. Moen plans to spend the academic year 2004-2005 as a Visiting Professor at the Economics Department of Northwestern University, at the invitation of Professor Dale T. Mortensen. Mortensen is one of the leading experts in labour economics and was one of the founders of equilibrium search theory. His formal invitation to stay at Northwestern may be produced upon request.

During the remainder of the project Moen plans to make several visits to universities in the U.S. and to the London School of Economics, which houses leading economists in both labour economics and contract theory. The doctoral student on the project is also

commitment device. Another interesting case is whether the minimum wage is the cause of underinvestment in training.

An even more interesting extension will be to scrutinise the assumption of distinct search markets. The division of a search market into submarkets is fundamental in order to obtain an efficient allocation of resources. In the literature, the assumption made is either that there is no division, or that the market divides completely so that no worker- or firm heterogeneity exists within a given market segment. A more satisfactory approach would be to model the degree of market segmentation explicitly, so that the number of active submarkets becomes endogenous. In order to do so, we will take into account that the division of a given market into submarkets, either by a market maker or indirectly by firms through their choices of contingent wage offers, will be costly. The cost may reflect measurement costs, which are higher the more accurately worker types are measured. Fascinating questions are then a) whether the market will divide into submarkets at a socially optimal degree, b) whether investments in human capital remain optimal, and if not, c) whether subsidised human capital investment improves welfare.[3]

3. Labour market determinants of job turnover, human capital investments and entrepreneurship.

Labour markets in different economies vary significantly with respect to remuneration practices and career paths. Japan (and to a lesser degree Europe) is characterised by low worker turnover. Employees are typically promoted in-firm and relatively late in their careers. In the US, by contrast, turnover rates are much higher, and short-term bonuses are more likely to be used to motivate the work force (Aoki 1990, Morita 2001). Furthermore, compared to

opportunism by workers, while long-term incentives with deferred compensation may distort turnover decisions and lock workers in with their current employers.

The labour market for employed (experienced) workers. The second building block is the labour market for employed workers, which we model using the Diamond-Mortensen-Pissarides equilibrium search framework. Particularly important in this context are feedback mechanisms created by the present wage of searching workers on this group's probability of obtaining a job. If the present wage for a subgroup of workers increases, this makes it less attractive to open vacancies directed towards the entire group of workers, as the expected wage necessary to attract worker increases. This in turn influences all the workers in the market. In a preliminary model we show that this feedback mechanism exists if workers with different current wages search in the same submarket, or if the firms cannot advertise wages contingent on a worker's current wage.[5]

Intuition suggests that equilibrium feedback mechanisms may create multiple equilibria. If all the other firms in the market choose long-term wage contracts with deferred compensation, few firms open vacancies for employed workers, because the wages they have to pay in order to attract such workers are so high. The turnover rate is thus low, and the costs of using long-term wage contracts due to distorted turnover decisions are small. We refer to this as low-turnover equilibrium. By contrast, if the other firms in the market choose short-term wage contracts, more firms open vacancies for experienced workers, since these are easier to attract, and the cost associated with distorted turnover decisions are higher. Thus, short-term wage contracts may be optimal. We refer to this as high-turnover equilibrium.

This research idea contributes to the literature on multiple equilibria and labour market turnover. One branch of this literature argues that adverse selection probl   This

incentives to enter the market in order to search for viable projects. Accordingly, this may affect workers' incentives to become entrepreneurs.[7]

It is tempting to interpret the Japanese labour market as being in a state of low-turnover equilibrium. The US labour market, by contrast, may be seen as being in a state of high-turnover equilibrium, with more emphasis on short-term contracts and high turnover, and less emphasis on firm-specific human capital, fostering more entrepreneurship and new start-ups. Both systems have their strengths and weaknesses, the Japanese system fosters long-term decision making, while the US system gives rise to an efficient allocation of workers across firms and a large supply of entrepreneurs.

4. Behavioural job-search: the role of contracts and institutions

A growing body of research explores economic behaviour outside the classical paradigm of rational agents maximizing a time-invariant utility function with time-independent discount rates (se for instance Brocas and Carillo 2003). In this part of the project we will explore the labour market consequences of one such deviation from the classical paradigm, and allow for time-dependent (hyperbolic) discounting.

Hyperbolic discounting is present if a person's discount rate (relative to a given point in time) diminishes as the time horizon increases. Thus, at any given point in time, it is considered relatively more unattractive for a consumer to delay consumption one day when consumption is to take place in the near future, than when consumption is to take place in the more distant future. This leads to time-inconsistent behaviour: A person will tend to consume more and save less than he or she would prefer from an *ex ante* perspective (Frederick *et al* 2002).

This may have consequences for the behaviour of unemployed workers, who face several intertemporal choices. First, a worker's choice of search intensity influences future incomes. Second, when deciding whether to accept a job or to continue searching, the alternative is to hope for a better job offer in the future. Hyperbolic discounting leads to lower search intensity and a greater tendency to accept bad job offers than the person would have preferred from a prior perspective.[8] This is discussed in Paserman (2002).

We will discuss the equilibrium effects of hyperbolic discounting in a search model of the labour market. Our conjecture is that too many low-quality jobs will flow into the market, offering wages that are too low relative to (from a prior perspective – here and below) socially optimal levels.[9]

An intriguing question is to what extent institutions that may help workers commit to efficient search behaviour, arise endogenously in the market. For instance, an employee may write a contract with his current employer on unemployment benefits and job search assistance in order to induce optimal search behaviour if unemployed.[10] Alternatively, a worker may take

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[7] Gromb and Scharfstein (2001) study a firm's choice between intrapreneurship and entrepreneurship (start-up), and find that multiple equilibria may arise due to informational asymmetries regarding managerial talent. Landier (2002) shows how the stigma of entrepreneurial failure also may give rise to multiple equilibria. In a recent paper, Fonseca et al (2001) studies the supply of entrepreneurs within a search theoretical framework. Their focus is on how the regulatory costs of starting a new firm may reduce the supply of entrepreneurs.

[8] The claim that the reservation wage of searching workers is too low from a prior perspective builds on the

out private insurance against unemployment, and in addition write a contract with a placement agency. The placement agency must then be able

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