Chapter 1

Introduction

1.1 Overview

This thesis presents three essays. The first analyzes the implications of employment protection for factor share movements. The second investigates the effects of employment protection on product market competition. In the last essay the problem of delay in joint projects is considered which can be applied to labor market issues, such as the political economy of labor market reform or questions of organization and teamwork, but constitutes a more general problem.

An introduction to the common issue of chapters two and three, employment protection, is provided in this chapter. It briefly reviews the main theoretical and empirical findings and relates them to the policy questions that arise in the discussion on labor market reform in many European countries. Subsequently, the contributions of chapter two and three are put into perspective. The last subsection addresses the delay problem considered in chapter four. It motivates the analysis by stressing its importance for various applications and puts it into its theoretical context.

1.2 The analysis of labor market institutions

The poor performance of many European Labor markets over the last 25 years has given rise to frequent calls for fundamental labor market reforms. It is claimed that European countries typically have the wrong set of labor market institution, that the labor market is to "rigid" for today's globalized world. In short, labor markets should become more flexible.[1]

Alongside this policy discussion, much analytical and empirical work has been carried out that has greatly enhanced our understanding of how labor market institutions affect market outcomes. While, as a result, there seems to be a consensus among economists that some action is needed, two divergent views can be set out. Some authors stress the interaction between the various institutional elements and argue that there are strong complementarities in labor market reform, see Coe and Snower (1997) for such a view. Therefore, only a thorough across-the-board reform will be successful for a sustained reduction in unemployment.

An alternative view is to consider the various elements of labor market institutions individually. If it is possible to single out those institutions which are particularly harmful, focussing on these issues in reform will be easier and more successful. A prominent example of such an approach is Layard and Nickell (1999) who group labor market institutions into the following categories: Taxes on labor; Laws and regulations on employees rights; trade unions, wage bargaining and minimum wages; social security systems; skills and education. Empirically they then assess the impact of each of these institutions and identify, in which fields action is necessary and promising, and where it is useless and potentially harmful. This approach has the advan-

[1] Extensive discussion of the European unemployment problem are given by Bean (1994) and Machin and Manning (1999).

tage that the relative benefits of each institution can be considered as well. Following Blau and Kahn (1999) and Agell (1999, 2002) these considerations should at least be of equal importance. They stress, that the causality may be reversed: Although the rise of the debated institutions can alternatively be explained by rent seeking motives of employed insiders, typically, many institutions were set up in response to non-satisfactory market outcomes. Thus, addressing the pros and cons of each institution at a time is likely to give a more balanced view on which policy recommendations can be based.

The approach chosen in this thesis corresponds to the second view. Employment protection (EP) as one particular labor market institution is singled out, and its implications for two specific questions, the role it plays for factor share movements, and how it affects product market competition, are analyzed.

1.3 Employment protection

Pissarides (2001, p.136) defines EP as "... any set of regulations, either legislated or written, that limit the employer's ability to dismiss the worker without delay or cost." This definition describes usefully the main aspects of EP that will be focussed on in the analysis of chapters two and three. However, EP may well be understood in a broader sense as encompassing also regulations concerning hiring, such as rules favoring disadvantaged groups, conditions for using temporary or fixed-term contracts and training requirements, see OECD (1999) for an interpretation along these lines. Employment protection goes beyond the codified legal provisions and includes other elements such as collective agreements, procedural rules and judicial practice. Somewhat contrary to this, in the literature the terms EP and employment

protection legislation (EPL) are often used synonymously, as will typically be done in the following.

Following Pissarides (2001) and OECD (1999), EP can be grouped into five categories: Administrative procedures, notice periods, severance payments, difficulty of dismissal, including the possibilities fired workers have to object against "unfair dismissals" and the leniency, with which such objections will be met by courts, and measures for collective dismissals. Each of these categories may be analyzed independently to evaluate their effects. However, in the contributions of this thesis, in line with the standard assumption in the analytical literature, streamlined and stylized visions of EP are adopted. In chapter two, EP is modelled as a tax on firing, and in chapter three as the impossibility to fire workers immediately.

At a conceptual level, it is important to distinguish between such provisions which basically amount to a payment from the employer to the worker and those which imply a deadweight loss, such as most red tape regulations. While this distinction is always important for welfare considerations, it can be important for the positive analysis as well, if wages and contract structures are endogenous. In line with this argument, the positive analysis of chapter two and three does not depend on this distinction, since wages are taken as exogenously given. Finally, if EP is defined in a broader sense, it is furthermore useful to distinguish between regulations, which will increase the cost of employment per se and those costs which can be avoided if firing is avoided.

Since EP regulations are complex and stretch over many aspects, a great deal of effort has to be invested to quantify the impact of the different regulations and to make the cross-country differences in the strength of EPL comparable. Such attempts are additionally hampered by the growing preva-

lence of short term contracts, for which typically other regulations apply. Fortunately, aggregating over the different elements of EP regulations within countries, a number of indicators of EPL strength have been developed that allow to assess questions related to the implications of EPL empirically, see Grubb and Wells (1993), OECD (1999) and Nicoletti et al. (1999), and Bertola et al. (2000) for some current conceptual issues involved.

In the indices developed, countries in Southern Europe score highest, followed by the central European countries, the nordic countries and the anglo-saxon countries, which are the least restrictive. These findings are completely in line with the perceived wisdom that strong EPL is an archetype feature of the typical institutional environment of regulated European labor markets. Accordingly, it has been frequently lined up as one of the usual suspects in the discussion about labor market reform.

Among economists the verdict on the potentially detrimental effects of EPL is disputed and opinions strongly diverge. Whereas Siebert (1997, p.52) claims that "job protection rules can be considered at the core of continental Europe's policy toward the unemployment problem", Nickell and Layard (1999, p.3079) conclude that "there is no evidence that stricter labor standards or employment protection lead to higher unemployment. ... As far as growth is concerned, there is no reason to believe that stricter labor standards or employment protection lower productivity growth rates - indeed maybe the reverse." To evaluate these claims it is necessary to review the theoretical and empirical literature on the issue.

1.4 Theoretical perspectives on employment protection

A useful starting point for the analysis of EPL is the insight of Lazear (1990). If EP takes the form of a payment from the employer to the worker upon separation, these payments could in principle be completely neutralized by an optimal contract. This would require the worker to make an equalizing payment to the employer, upon signing the contract. This could be done by a direct payment, i.e. the worker would "buy" a job or by accepting a reduced wage. However, in practice, this mechanism fails due to downward rigidity of wages, liquidity constraints on the side of the worker or moral hazard problems related to the employer's behavior. Then, if severance payments are not neutralized they will increase the cost of employment to the employer and one should expect this to affect labor demand negatively.

However, if the effects of EP on labor demand are studied in an appropriate dynamic setting, the results for labor demand are not so clear cut. Since EP provisions amount to adjustment costs, the insights of the literature on dynamic factor adjustment with adjustment costs, see Nickell (1986), can be directly applied to the problem. From this perspective, a firm's optimal labor decision should take into account the marginal contribution of an additional worker to the expected present discounted profits, the shadow value of labor, and compare it to hiring and firing costs. If hiring and firing costs are zero the optimal policy is to hire, if the shadow value of labor is positive and to fire, if it is negative. With positive hiring and firing costs, however, it is optimal to hire only, as along as the shadow value of labor exceeds the marginal hiring costs. If the shadow value of labor is negative, the firm should fire only when the absolute value is higher then the marginal firing costs. Whenever

the firm is hiring, it foresees the problem that in future downturns it will be restricted to fire. Similarly, when considering firing, it takes into account the possibility of brighter days. Keeping more workers in the firm avoids the immediate firing costs and the future hiring costs. As a result, hiring and firing costs will tend to smooth out cyclical fluctuations in labor demand.

This effect has formally been studied by Bentolila and Bertola (1990), Bertola (1990, 1992) and Bentolila and Saint-Paul (1994), among others. While these studies employ different assumptions about the stochastic environment in which firms operate and the form of adjustment costs, with wages being exogenously given, the basic mechanism described is present in all of them. Employment is increased in bad times, and it is reduced in good times, with an ambiguous effect on average labor demand, depending on such features as the form of the labor demand function, the persistence of shocks, or the size of the discount rate and of the labor attrition rate. These models also imply that the average job tenure is increased and flows in and out of unemployment are reduced. While short-term unemployment is reduced, long-term unemployment is increased. This latter effect may additionally be increased through stigma effects that arise with the presence of strong EPL for the workers that are being laid off, as analyzed by Canziani and Petrongolo (2001).

These dynamic models of labor demand take the stock of capital and wages as given. Then the question arises, how the results may be changed, if these factors are endogenous. Particularly, the relationship between wage setting and EPL is typically identified as another harmful effect of EPL for unemployment. The claim is that strong EPL protects insiders from the replacement by outsiders, which increases the bargaining position of insiders and consequently increases wages and unemployment. While this is typically

true in static models, this is less so in a dynamic setting, as analyzed in Bertola (1990). Furthermore, whether EPL will increase the insider-outsider dichotomy depends on the plausibility of the mechanism itself. As shown by Fehr (1990), the possibility to wage discriminate on the side of the employer will eliminate the problem, which then, consequently, cannot be made worse by EPL. However, many authors consider EPL as giving rise to rents for protected workers.

Another important issue is the effect of EPL on efficiency and growth. First, for a given capital stock, the remuneration of capital is typically reduced by the presence of EPL. To see this, suppose that the positive effect on labor demand during bad times and the negative effect during good times just neutralize, such that average long-run employment remains constant. Then, with wages given, the wage bill remains constant. At the same time, the existence of EPL changes the dynamic production pattern, which, compared to the unrestricted pattern, reduces revenue. Since the wage bill is fixed, the reduction is completely carried by capital. This will affect capital formation and growth negatively.

Furthermore, since labor turnover is reduced, the presumption is that, in countries with strong EPL, labor does not move efficiently from old, low productivity matches into new high productivity jobs. This is often referred to as the sclerotic effect of EP. As Bertola (1999) points out, idiosyncratic shocks are typically more important for the effects of EPL than aggregate fluctuations, since for firms, these shocks are typically more important than aggregate ones (Davis and Haltiwanger, 1999). Moreover, the relatively smooth aggregate fluctuations allow partial adjustment via natural fluctuation, i.e., voluntary quits. However, if an entire production facility is closed down, this is not possible. The issue has been investigated formally by Hopenhayn

and Rogerson (1993) and Bertola (1994). In these models, productivity and growth suffer from the presence of EPL.

However, a number of positive effects of EP have also been identified in the literature. First, it provides insurance for workers. This argument is analogous to the case of other welfare state institutions, see Varian (1980) for the case of redistribution, or Agell and Lommerud (1992) for the case of union wage compression. The argument is explored in Bertola (2002), who considers the potential of EP provisions to improve welfare, if the workers' labor income risk is not diversifiable. Similarly, Pissarides (2001) distinguishes between advance notices and severance payments and shows in a dynamic search model that both have a role to play in a world of missing insurance markets. Severance payments provide insurance against the unemployment risk, notice periods reduce the mean time the worker spends unemployed. Finally, this argument is taken one step further by Belot (2001), who relates the cross-country differences in EPL to differences in migration costs, where migration is considered as the alternative insurance mechanism.

There are further benefits of EP that have been identified in the literature. Lindbeck and Snower (1988) and Belot et al. (2002) consider the positive effects of EP on workers effort and morale. Even more attention has been given to the beneficial role that EP has in fostering human capital formation. Such arguments can be made for firm-specific (Booth and Zoega, 2001) as well as for general human capital (Fella, 2000), see also the overview in OECD (1999). This should finally increase productivity.[2]

If this is the case, why do firms not bind themselves to workers voluntarily,

[2]The EPL induced formation of firm specific human capital also gives rise to rents and, similarly to the argument about EPL increased bargaining power in wage-setting, can serve as the basis for an political economy analysis of EPL, see Saint-Paul (2002a) for such an approach.

if they benefit from such long-term relationships through higher productivity? The answer can be found in the adverse selection argument put forward by Levine (1991). A firm offering high EP to its workers individually, is likely to attract workers whose productivity is low and are relatively likely to be faced with being fired. In such a situation, state-mandated EPL serves as welfare enhancing mechanism. This point is directly relevant to the analysis in chapter three, where a firm in a low EPL country may have incentives to bind itself to its workforce. In the presence of such adverse selection, this would not be individually feasible for a single firm.

1.5 Empirical evidence on employment protection

While for some questions the theoretical predictions are unambiguous, for others a number of conflicting effects have been identified. Therefore, in the end, the various arguments have to be assessed empirically to weigh their relative importance. Following the pioneering work by Lazear (1990), a number of studies have tried to assess empirically the effects of EPL strength on employment, unemployment and dynamic labor market behavior. Important studies include, among others, Grubb and Wells (1993), Scarpetta (1996), Nickell and Layard (1999) and OECD (1999) and DiTella and MacCulloch (1999). A survey of these and other studies can be found in Addison and Teixera (2001). For most parts, the findings in the empirical literature are in line with the theoretical predictions. Strong EPL increases long term unemployment, but reduces short term unemployment. With regard to unemployment, the consensus view seems to be that EPL has no effect on unemployment. However, there is a clear negative relationship with employment, as would

be consistent with the model of Hopenhayn and Rogerson (1993), but no negative correlation exists between EPL strength and growth, as would be predicted in the same framework. Some authors, such as Nickell and Layard (1999) even find a positive relationship between EPL strength and growth. They try an alternative explanation for the negative correlation between employment and EPL strength, by arguing that this effect is spurious, since EPL is typically strongest in Southern Europe, where female participation rates have been traditionally low due to cultural values.

The empirical findings that EP is not a cause of unemployment and does not affect growth negatively, along with its beneficial insecurity reducing effects, imply that EP is here to stay. This makes the analysis in chapters two and three particularly relevant, since the derived results are not only important today, but will be in the future.

1.6 Employment protection and factor shares

The evolution of relative factor income shares is an old theme in economics. Their alleged constancy has been named one of the "great ratios" of economics (Klein and Kosobud, 1961) and their constancy is also known as one of the "stylized facts" of economic growth (Kaldor, 1965). The constancy hypothesis goes back to the analysis of Arthur L. Bowley on the functional distribution in Britain between 1880 and 1913, see Hicks (1932, p.130-133), and is therefore sometimes called "Bowley's law". However, closer inspection shows that factor shares are typically not constant, but show short, medium and long run fluctuations. While such changes can be observed in all countries, they differ substantially in size and across frequencies in a cross-section

of industrialized countries.[3] Chapter two analyzes, how such differences can be related to cross-country differences in labor market institutions and, more specifically, to different levels of EPL across countries.

The study of factor share movements can be motivated from various perspectives. First, changes in the functional distribution will have important effects on the income distribution across individuals. Classical economists, such as Karl Marx, Robert Malthus and David Ricardo, thought about income distribution in terms of distribution among factors of production, land, labor and capital. While in their times the relationship between the social classes and the owners of factors of production was tight, in modern economies the relationship between the functional and the personal income distribution is more complex. However, as argued by Atkinson (1983), the functional income distribution is still a key determinant for the individual income distribution.

Second, the relationship between the labor share and inflation has recently received attention from monetary theorists. Woodford (2001) argues that the sticky-price models underlying the new-Keynesian Phillips curve imply that the variable driving inflation is actually real marginal cost. Using average unit labor cost, i.e. the labor share, as a proxy for nominal marginal cost, he shows that it is indeed a good measure for the output gap and for the purpose of explaining inflation variation. As analyzed in detail by Rotemberg and Woodford (1999), in order to use the labor share as a suitable proxy for marginal costs, it should be corrected in a number of ways and the role of adjustment costs is one of them. Therefore, the results derived in chapter two

[3]For evidence on the non-constancy of factor shares, see Atkinson (1983), and Bronfenbrenner (1971), who surveys some older studies. Solow (1958), using some basic sampling theory, demonstrates that aggregate US factor shares are not more constant relative to what should be expected from the factor shares at the industry level.

are directly relevant to this literature, since they imply that size differences in adjustment costs directly translate into differences in labor share movements. Thus, when correcting the labor share to use it as a proxy for marginal costs, it is important to take the strength of EPL in the particular country into account.

Third, analyzing the labor share can be regarded as a compact way of looking at labor demand. In the traditional wage gap literature, the labor share, as the ratio of wages to labor productivity, was used to calculate wage gaps and to distinguish between classical and Keynesian unemployment, see Artus (1984), for example. More recently, Blanchard (1997), Caballero and Hammour (1998a), and Bentolila and Saint-Paul (1999) have addressed the interaction between labor market institutions and the labor share. In this perspective, the remarkable cross-country differences in the dynamics of labor share movements can help to gain insights into how the institutional structure affects the macroeconomic outcome. Conversely, if the effects of labor market institutions on the labor share can be evaluated, corrected wage gaps can be calculated, as in Bentolila and Saint-Paul (1999).

The analysis in chapter two adds to this literature, by focussing on the role of hiring and firing costs for the labor share. On theoretical grounds it seems natural to relate the observed differences in factor share dynamics to cross-country differences in labor market institutions, which directly relate to differences in hiring and firing costs. Empirically, Bentolila and Saint-Paul (1999) have found that adjustment cost are the most important factor affecting labor share movements.

The set-up that is considered is based on the dynamic labor demand model of Bertola (1990), which he used to study the effects of hiring and firing costs on labor demand. Here, it is used to highlight a mechanism that

causes the labor share to fluctuate counter-cyclically with respect to business conditions and pro-cyclical with wages. Higher adjustment costs imply bigger swings in factor shares. For the case of Cobb-Douglas technology two invariance results are derived, which suggest that, for factor share movements, the size of demand and wage shocks are of less importance than the size of adjustment costs.

Confronting the model with the labor share fluctuations of 20 OECD countries, the direction of the fluctuations follow the predictions of the model. Using institutional data on EPL strength, it is then shown that the labor share will deviate more strongly in response to changes in economic activity in countries with tighter EPL. For wage fluctuations, however, no clear relationship between the strength of EPL and the size of wage induced labor share movements is found.

1.7 Employment protection and product market competition

In the context of the debate on labor market reform, EP regulations are frequently blamed for hurting firms' competitiveness. Firms from countries with strong EPL are claimed to be at a disadvantage with respect to rivals operating from countries with flexible labor markets. Surprisingly, compared to the extensive literature on the labor market effects of EPL surveyed above, not much attention has been given to this connection in theoretical and empirical work. The analysis of chapter three contributes to fill this gap.

It starts from the idea that, indeed, EP has important implications for product market competition. If a firm already has hired workers, who are protected by EP regulations, it will fiercely defend its market position. In cost

terms, the decision to expand increases future fixed costs and reduces variable costs. Expanding own production by employing new workers threatens the firm with potential costs if these workers become redundant later. Thus, the firm will be more cautious about expanding its market position ex ante. This influences firms' behavior, if they interact strategically in imperfectly competitive markets. Chapter three studies the nature of this relationship and derives the resulting effects on the product market.

Two aspects are essential for analyzing the effects of EP on product market competition. First, for the assessment of the average effect of EP on a firm's market position a dynamic setting must be explicitly considered in order to trade off the ex ante and ex post effects. Second, while the mechanism under investigation is present in many settings, its importance will typically depend on the kind and intensity of product market competition and the opportunities this offers for firms to expand and defend their market position. The analysis of chapter three focusses on the case in which firms compete with each other in contests. This case is a natural benchmark, since price and quantity decisions can be neglected, but firms can affect demand through their contest behavior.

The use of contests as an allocation mechanism is particularly widespread in the rent-seeking literature, but its importance for many other areas has been increasingly recognized. Its relevance for product markets was probably first sketched by Schmalensee (1976) in his discussion of promotional competition. More recently, Konrad (2000) has analyzed trade contests and his description of competition is conceptually most similar to the view adopted in chapter three. To illustrate what is meant by contest competition, consider the procurement of some large project or a large scale sales contract. In many of these instances the allocation is not, or is only partly, determined

through the price mechanism. Instead, in such markets potential contractors typically make substantial efforts to make their offer attractive. All contestants' expenses are sunk, but only one of them can win the contract. In such instances, competition takes the form of an all-pay auction, a contest.[4]

The set-up of chapter three considers a situation in which two firms repeatedly engage in contests for contracts. One firm is based in a country with a "rigid" labor market and therefore faces EP regulations, whereas the other firm operates in a "flexible" country and is therefore in a position to hire and fire without restriction. The outcome of the contests between the firms is affected by the EP regulations, since they reduce the rigid country's firm's flexibility by increasing its fixed costs. For such a firm, which has already hired workers, losing a contest implies additional costs to this firm due to the existing EP provisions. This increases the relative benefits from winning and consequently affects contest outcome. However, ex ante, if it has not already hired workers, it will foresee the consequences of winning a contract: workers hired to carry out the contract just won will be protected later on. Therefore contests in which neither firm has not already hired workers will also be affected. The impact of EP on the average contest outcome is therefore assessed by considering a dynamic setting which allows the interaction between both situations to be captured.

The key result is that employment protection tends to increase the long run average probability of winning for the firm from the "rigid" country and that it therefore has a stronger average market position. Welfare will typically be higher in the rigid country if wage or severance payments include a rent component which accrues to the workers. The results shed doubt on the common notion that blame EPL for hurting firms'competitiveness.

[4]A good introduction to contests is given in Hirshleifer and Riley (1992).

In the existing literature, most contributions that analyze the cross-market effects between product and labor markets have focussed on the influence of product market regulation on the labor market, and particularly on the poor employment performance in Europe, see OECD (2002) for an overview. This imbalance is somewhat surprising, given the dynamic evolution of product and labor market regulation in Europe. In the process of ongoing European integration, product market regulation is increasingly being reduced, whereas labor market regulation appears quite stable. Thus, the relative importance of labor market institutions for product market outcomes is likely to be further increased in the future.

A few exceptions exist in the literature that do address the implications of labor market institutions for the product market. Koeniger (2002) analyzes the interaction of product and labor market regulation using an endogenous growth model of step-by-step innovations. In his model, EP causes firms that are losing technological leadership and market share to shift workers from production to R&D, since firing is not an option. It turns out that EP will lead to faster growth, if product market competition is sufficiently low.

Glazer and Kanniainen (2002) consider the effects of EP on a firm's choice of risky projects. They find that a firm that faces EP regulations prefers risk free projects to risky ones, but if confronted with the choice between two risky projects, it may prefer the riskier one. However, their results seem to depend crucially on the assumption that firing costs are assumed to be lower in case of complete shutdown of an establishment than in case of gradual lay-offs.

Saint-Paul (1997) studies the effects of EP on specialization in a product cycle model of international trade. Products at the beginning of the product cycle are riskier than mature products. Firms facing strong EPL will then

specialize in the latter ones. In Saint-Paul (2002b) the resulting consequences for differences in innovative behavior are considered. The innovation activities of low level EPL countries are focussed in young industries, whereas high level EPL countries innovate in mature industries. OECD (2002) also addresses the effects of EPL on innovative behavior, but focusses on the aggregate performance and does not consider differences across industries. While no simple correlation between EPL and aggregate measures of innovative activity is found, taking into account the degree of coordination of wage-setting results in a U-shaped relationship between labor market regulations and innovative behavior. Countries with low EPL and low coordination as well as countries with high EPL and high coordination show the best performances in innovation.

In the light of this existing literature, the novel contribution presented in the analysis of chapter three is the idea, that EPL can directly affect firms' product market behavior itself. A firm subject to EP provisions will defend its market position more fiercely and try to avoid slack in demand. This effect dominates the ex-ante effect that make the firm more cautious.

Finally, next to the insights gained for the relationship between EPL and product market competition, the chapter also contributes to the theoretical discussion of contests by considering sequentially dependent prizes in repeated contests. Repeated contests have been considered by Konrad (2001). However, in his setting, the contest outcome determines whether another contest is played or not, but it does not affect the players' valuations over time. However, in the situation considered here, a contest's outcome affects next period contest valuations and this gives rise to interesting interaction.

1.8 Delay in joint projects

While chapters two and three analyze specific questions about the consequences of EP, chapter four considers, how delay arises in a situation in which agents are voluntarily contributing to a joint project. This, of course, is a problem of a more general nature, but, corresponding to the main thrust of this thesis on labor market issues, it can well be applied to aspects of labor market reform or, in a more micro-labor perspective, to teamwork problems in an organizational context.

The nature of the situation studied is as follows. The joint project is a public good in the sense, that, once it is provided, exclusion is not possible and its use is non-rival, although the size of the project may depend on the number of users. The agents involved make voluntary contributions and the project is realized, once the sum of all contributions reaches a threshold value. The aim of the analysis is to show, how delay can occur in such a setting and to uncover, which are the key factors responsible for delay.

Typically, authors have explained delay in such private provision games by introducing private information. In Bliss and Nalebuff (1984) a public good is to be provided completely by one individual. Individuals who have private information about their costs, play a waiting game to see if someone will come forward to provide the good. Gradstein (1992) retains the assumption of private information about contribution costs but considers a production technology where the public good is produced by the number of contributing individuals with decreasing returns. Both find inefficient delay if the number of individuals is finite. Similarly, in applied contributions such as Alesina and Drazen (1991), delay is driven by some waiting game which originates in private information.

However, there seem to be many situations with inefficient delay in which

full information seems to be a valid approximation. Therefore it is worthwhile studying alternative causes of delay. The analysis of chapter four concentrates on the role of convex contribution costs and their interaction with other potential aspects of the situation. Convexity of contribution costs is a reasonable assumption in many settings. Depending on the nature of the contributing unit and the form of the contributions, their causes may be, for example, increasing disutility of labor or decreasing marginal utility of remaining income.

The second important feature is the discrete nature of the project. The literature on private provision of public goods has focussed to a large extent on the case, in which the public good is continuously divisible. Cornes and Sandler (1996) in their extensive overview do not discuss the case in which the public good is discrete at all, for example. However, there are subtle differences between the two cases that deserve close attention. Bagnoli and Lipman (1989) show in a static setting that the standard inefficiency results of the divisible public good case will not arise if the good is discrete. A similar observation can be made by comparing the results of Gradstein (1992) and Bliss and Nalebuff (1984). As mentioned, with a finite number of players, inefficient delay occurs in both settings. However, as the number of players goes to infinity, delay completely disappears in the model with the threshold production function, whereas in the other case, delay and inefficiency are increased.

The discrete project of chapter four that has to be completed by means of private contributions may be epitomized by the proverbial example of the building of a bridge by a group of people. Benefits only start flowing once the bridge is completed. No agent can be excluded from the benefits of the project and side payments are not allowed. All players have perfect

and complete information. The problem is analyzed in continuous time, which makes derivations of completion times in equilibrium easier and avoids equilibria which may only be artifacts of a discrete setting. The model is solved for the set of symmetric open-loop (OLE) and Markov perfect (MPE) equilibria.

The findings are as follows. In a perfectly symmetric setting with commitment, a continuum (with respect to completion time) of symmetric completing equilibria exists which contains the social optimum as the lower bound completion time. This Pareto-dominates all other symmetric equilibria, so that it is the natural outcome. If commitment is retained but players are asymmetric or players do not commit to their contribution paths simultaneously, inefficient delay occurs for distributional reasons. Finally, in a symmetric setting without commitment, inefficient delay occurs in equilibrium. No player can contribute efficiently fast, since this will leave him open to exploitation by the other players later on. Furthermore, unlike in the private provision of a continuously divisible public good, individual contributions are strategic complements, which make partial harmonization of strategies seem beneficial and this is important in many policy-related applications. The results are in line with the observation that, in many real life examples, delay seems to be closely related to asymmetric players and missing compensation mechanisms as well as to the lack of commitment devices.

Besides the contributions that explain delay as occurring from private information, the paper relates to two further strands of literature. First, there is the connection with the private provision games of a continuously divisible public good in dynamic settings analyzed by Fershtman and Nitzan (1991), Wirl (1996) and Itaya and Shimomura (2001). This literature finds that, without commitment, the provision level in steady state may either be

increased or decreased, depending on the set of admissible strategies.

Second, and more importantly, Admati and Perry (1991) and Marx and Matthews (2000) have considered voluntary contributions to a joint project, with the key feature of a pay-off function that is discontinuous at completion of the project. Marx and Matthews (2000) analyze the case where contributors have linear costs and know both their own and the total sum of contributions, but cannot observe the individual contributions of other players. With linear costs, if the project is carried out in equilibrium, inefficiency from delay is caused only by the time assumed to elapse between the players' interactions. Admati and Perry (1991) consider the case where two players with convex costs contribute alternately to a joint project. The MPE derived in chapter four can be regarded as an n-player differential game counterpart of their analysis. While they are concerned with the question of whether socially desirable projects will be carried out or not, the present analysis focusses on delay and makes it possible to consider completion times and their comparative statics explicitly. Furthermore, it allows insights to be made into important structural properties of the equilibrium, such as strategic complementarity of individual contributions.

The relevance of the latter finding may be illustrated by the following example. Consider the case of a group of regional governments of an EU member state that have to make pledges to reduce their budget deficits, since the country is faced with punishment from Brussels, because its overall deficit violates the criteria of the growth and stability pact. Then, to avoid punishment, countrywide reduction has to reach a certain threshold value. The result of strategic complementarity implies that, if a subgroup of regional governments harmonize their strategies, say, because they are ruled by the same party, such harmonization will be beneficial for the subgroup,

and overall delay is mitigated.

Returning to the analysis of labor market institutions, it is evident that the issue of delay is an important aspect of the discussion on labor market reform. Given the high unemployment rates in many European countries, there seems to be a consensus that some action is needed. Furthermore, economic analysis and examples of successful reforms offer a useful road-map as to which reforms are promising. However, in many countries reforms are not implemented, or only after long delays.

According to Drazen (2000) the attempts that have been made to explain delay or failure to implement such socially optimal policy changes within the political decision-making process can be grouped into four categories.[5] First, there are some models in which some vested interest groups block reform, because they would be negatively affected. Second, there are models, in which ex ante uncertainty is decisive. Although a majority of agents is better of ex post, the uncertainty about who will be among the winners creates an ex ante majority against reform. Third, in some models an asymmetry within the decision-making process, i.e., between the politicians and the electorate is responsible for the failure of policy changes. Finally, there are models, in which the reform is modelled as a public good, which has to be provided privately by the groups involved in the political process. The setting that is considered in chapter four belongs to this latter category.

At first sight, it seems that for the question of delays in labor market reform, the first category of models is most relevant. Employed insiders are typically thought to lose out from labor market reform and the task of policy

[5]He also gives three reasons for delay that are not related to the political decision-making process: Lack of expertise, optimal waiting due to implementation lags or temporary policy restrictions, and irrationality among politicians.

reform design is therefore to get these insiders to agree. However, the public good model of chapter four can easily be adapted to encompass this aspect as well. In principle, it is no problem to include agents that suffer a negative pay-off upon completion of the project. Therefore, the results derived in chapter four can be considered more general and do apply to the case of labor market reform as well. Of course, in such a setting, the issue of compensation from the winners to the losers will even be more important than in the asymmetry cases discussed in the analysis, but lack of commitment will still play a role. Thus, the complexity of labor market reform typically makes it necessary to address a variety of potential sources of delay, and those arising from the public good aspects of the reform will be important.