**Institut für
Volkswirtschaftslehre
und Statistik**

No. 573-99

Employment adjustments and financing constraints

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Beiträge zur angewandten Wirtschaftsforschung

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Employment adjustment and financing constraints
A theoretical and empirical analysis at the micro level

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Abstract

Firms may face financing constraints as a result of rational behaviour of potential lenders due to asymmetric information. In this article, a theoretical model of employment adjustment is developed to derive hypotheses on the short-run impact of financing constraints on employment at the firm level. A unique firm panel data set for German manufacturing is used to assess the empirical evidence for this model. The data comprise high frequency data on employment adjustment and explicit statements on the existence of financing constraints. The estimation results reveal that financing constraints reduce employment and increase employment changes.

Keywords: Employment adjustment, financing constraints
JEL Classification: D21, D82, J23, L11

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1 Introduction

The assessment of causes and effects of financing constraints at the firm level has been on the research agenda during the last decade.[1] In the light of banking crisis developing in some south-east Asian countries and Russia, the impact on real firm behaviour gained additional interest. While there exists a large and still growing literature both on the theoretical and empirical aspects of financing constraints for investment decisions, the potential link to employment effects was not in the center of interest. In particular, empirical tests are rare.

Among the contributions to the analysis of the short-run impact of financing constraints on employment Nickell and Wadhwani (1991) are among the first. Controlling for other determinants of labour demand they find, as well as Nickell and Nicolitsas (1999), positive employment effects of market value and negative effects of leverage using UK firm data.[2] Sharpe (1994) uses US manufacturing sector firm data and finds that more highly leveraged firms reduce labour hoarding. As in most empirical studies on financing constraints small firms are found to exhibit stronger reactions than large firms. Two recent papers by Funke, Maurer, Siddiqui and Strulik (1998), and Winker (1999a) use German firm level data and find similar effects.

This paper aims at enlarging the body of knowledge on the financing constraints – employment nexus based on an explicit model of employment adjustment and a unique firm panel data set. While institutional aspects played a more prominent role in explaining financing constraints in the literature vintage of the fifties and sixties, the main ingredient of current approaches towards modeling incomplete financial markets is asymmetric information (see Stiglitz and Weiss (1981)). If firms have better information on project outcomes ex ante and/or ex post, problems of adverse selection, adverse incentives and costly state verification come up in external finance. Consequently, a cost gap between internal and external finance arises or more binding constraints in form of quantity restrictions ("credit rationing").

Taking financing constraints as given, firms react by cutting down investment and innovation expenditures, changing prices on non competitive markets or adjusting employment. Decisions on investment and, in particular, innovations are long run by nature. Consequently, the interdependence with financing constraints has to be taken into account explicitly.

In this paper, we concentrate on the impact of financing constraints on employment via short-run liquidity constraints. Hence, financing constraints can be assumed to be predetermined as well as the impact of long-run decisions on innovations and investment. Firms adjust employment under uncertainty about demand within a framework of monopolistic competition on the product market. The theoretical model yields testable hypotheses about the direction and the frequency of employment and price changes depending on capacity

[1] See Hubbard (1998) for a recent overview.

[2] Thereby, it is assumed that these financial variables are exogenous to the employment decision.

constraints, the autocorrelation and the volatility of demand shocks, the degree of competition on the market, and the existence of financing constraints. An endogenous adjustment of the working time is taken into account.

The empirical assessment of these hypotheses is based on a unique panel of micro data from West German manufacturing firms. The data set contains qualitative quarterly information about the employment adjustment and adjustments of the working time for 2405 firms during the period 1980–1992. In addition, it contains quarterly data on capacity constraints and annual data on firm size, demand expectations and the innovation behaviour of the firms. Finally, it includes explicit statements on financing constraints. The time-series dimension of the data permits the detailed investigation of the adjustment process, and the high frequency of the data permits the analysis of the volatility of the employment adjustment depending on the firms' financial status.

In section 2 the theoretical framework for the determinants of financing constraints and the employment adjustment is introduced. Subsection 3.1 provides a description of the data set and the empirical specification, while subsection 3.2 presents the estimation results for the determinants of financing constraints as well as the impact of financing constraints on employment and price adjustments. Section 4 summarizes the main findings.

2 Theoretical framework

2.1 Determinants of financing constraints

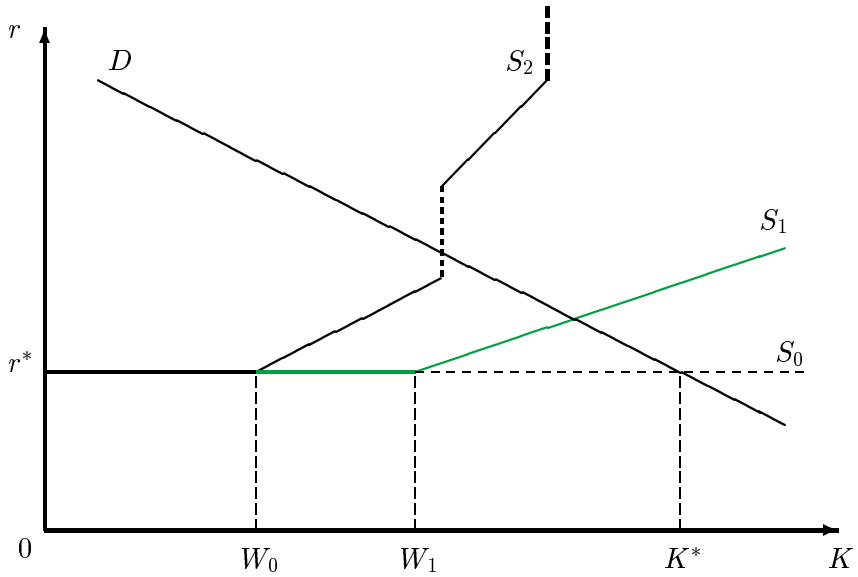
The notion financing constraints covers a broad range of capital market frictions both at the macro and the micro level.[3] In this paper, the impact of financing constraints on the employment adjustment at the firm level is at the center of interest. Hence, general conditions on financial markets are assumed to be exogeneously determined. At the firm level, financing constraints describe a situation where the demand for funds of a firm is not satisfied at the current market rate, taking all observable project characteristics into account. In particular, a firm which pays a high risk premium on its loan due to observable high risk of its projects will not be considered as financially constrained.

The interaction between firms and investors can result in financing constraints due to asymmetric information. Common themes of this approach are adverse selection and adverse incentive effects. It seems plausible to assume that entrepreneurs have better information about the riskiness of their projects than outside lenders or investors. Then, contractual rates of returns will influence the quality of financed projects,[4] leading to a gap between the costs of internal and external funds. If supply of credits by banks is limited, credit rationing might occur as described by Stiglitz and Weiss (1981), i.e. given excess demand profit maximizing banks will not raise interest rates to clear the market. The reason is that a raise of the interest changes the quality mix of

[3] See Hubbard (1998), p. 194.

[4] See Winker (1999a), section 2, for a more formal exposition.

Figure 1: Supply of and demand for funds



the loan demand, since low variance projects become first unprofitable. Similar effects occur due to incentive problems, i.e. entrepreneurs may react to a raise of the interest rate by choosing more risky projects; eventually the banks' expected returns decrease. Finally, costly monitoring of project outcomes and consideration of moral hazard problems have a similar impact on costs of and access to external financing.[5]

An upshot of some of the effects of asymmetric information for the micro relationship between firms and investor is given by figure 1 which displays demand and supply of funds for a single firm.[6] Table 1 summarizes the basic findings on the impact of variables related to information at the firm and bank level on credit demand, supply and the risk of facing financing constraints which are discussed in the sequel.

The demand for funds (denoted by D in figure 1) is determined by investment and production opportunities of the firm. Ceteris paribus, it exhibits the usual negative slope with regard to the costs of funds r. Under the complete-market assumption, the intersection of this demand function with the perfectly elastic supply of of funds S_0 at the market rate of return r^* would determine the volume of funds invested K^*.[7] The demand for external funds results by subtracting available internal funds W_0 or W_1, respectively.

It is beyond the scope of this paper to give a full characterisation of the

[5] See Bernanke, Gertler and Gilchrist (1996) for a recent overview.

[6] A similar illustration and more extensive discussion can be found in Hubbard (1998), p. 196.

[7] Here, the term investment covers all kind of expenditures for the purpose of generating returns, i.e. physical investment, employment or R&D expenditures.

Table 1: Sources of financing constraints

	uncer-tainty	business conditions		firms' expectations		banks' expectations		firm size
	σ	bc^+	bc^-	be^+	be^-	$\overline{be}^+$	$\overline{be}^-$	
credit demand (cd)	+	–	+	+	?			–
credit supply (cs)	–	+	–			+	–	+
prob(cs < cd)	+	–	+	+	?	–	+	–

demand for different sources of external funds. However, the impact of some variables related to information problems can be analyzed within this general framework. First, an overall increase in uncertainty about project outcomes (σ) shifts the demand for credit curve upwards since part of the risk is shifted to borrowers due to limited liability. Good current business conditions (bc^+) increase internal funds through increased cash flow and, consequently, reduce the needs for external funds, while bad current business conditions (bc^-) have the opposite effect. Firms' expectations on future business conditions show a different impact. While positive prospects (be^+) increase the demand for funds in order to finance innovations, capacity and production increases,[8] the impact of negative prospects (be^-) is not unequivocal. Reduced output requires less financing of input factors on the one hand. On the other hand, as long as negative prospects are private information, firms may compensate expected reduced liquidity and possible financing constraints of future periods at least partially by increased external finance today. Finally, firm size tends to reduce the needs for external funds since the growth rate of large firms is smaller, and they are more likely to be able to finance profitable projects with internally generated funds.[9]

The supply of funds to firms can also be analyzed using figure 1. It is assumed that the opportunity costs of internal funds, W_0 or W_1 respectively, are equal to the market equilibrium rate r^*. If additional external funds are required, the cost gap mentioned above leads to a positively sloped supply curve as S_1. If the effects of asymmetric information become more pronounced supply curves like S_2 may result. Here, a financing hierarchy is modeled. Up to W_0 projects are funded from internal sources. Then, the firm may have access to a limited amount of bank loans at rates increasing with the loan volume $K - W_0$. This results in the first positively sloped part of S_2. After having exhausted bank loans, the firm may try to raise additional funds by issuing equity. The step of the supply curve indicates the fixed costs related to an IPO. Since equity finance is subject to the same kind of adverse selection and moral hazard problems as loan supply,[10] the slope of the supply of funds curve

[8] A formal analysis of this effect can be found in Winker (1999a).
[9] See Egeln, Licht and Steil (1997).
[10] See Myers and Majluf (1994).

remains positive. Eventually it may become vertical, when a larger contractual rate of return does not imply higher expected returns to the investor any more due to bankruptcy risk and costs. Such a case corresponds to the strong version of credit rationing.

The analysis of the impact of observable variables on the supply of external funds does not differ substantially between these cases, i.e. a positively sloped supply curve, a financing hierarchy situation and credit rationing in the strong sense. First, an overall increase of market uncertainty (σ) increases the effects of asymmetric information. Hence, the positively sloped part of the supply curves are shifted upwards and to the left. Positive business conditions (bc^+) at the firm level correspond to increased internal funds and, consequently, shift the supply curve to the right, while the contrary effect results from negative business conditions (bc^-). Furthermore, investors may observe current business conditions and use them as proxy for firm risk. Then, an additional positive effect on the supply of external funds results. Firms' expectations (be^+,be^-) do not influence the supply curve, since they have no impact on currently available internal funds, nor can they be observed by outside lenders. However, expectations may be observable at a sectoral level. As they correlate with repayment probabilities, positive expectations for the sector ($\overline{be}^+$) will shift the supply curve to the right and vice versa for negative expectations ($\overline{be}^-$). Finally, large and old firms are to a lesser extent subject to asymmetric information and, therefore, face a flatter supply curve.[11]

Summing up the determinants of supply of and demand for external funds, some hypothesis on the variables determining the probability of facing financing constraints, i.e. prob(cs < cd), can be derived (see table 1): Positive business conditions at the firm level and positive banks' expectations based on the sectoral development reduce uncertainty and, consequently, also the probability that financing constraints become binding. The same holds true for large firms. On the other side, positive firms' expectations, which are private knowledge, increase the risk of facing financing constraints. Firms are assumed to observe and react to financing constraints, if either they are in a situation as depicted for S_2 in figure 1, i.e. they cannot obtain additional funds even at (marginally) higher interest rates, or if the available finance (intersection of D and S_1) differs markedly from optimal finance in a complete-market framework (intersection of D and S_0).

2.2 Employment adjustment

The employment adjustment is analyzed within a framework of monopolistic competition of the product market.[12] Uncertainty is introduced into the model through the assumption that employment and prices adjust only with a delay

[11] See Egeln, Licht and Steil (1997), and Winker (1999a).
[12] See Barro (1972), Dixit, Stiglitz (1977) and Blanchard, Kiyotaki (1987).

with respect to demand and cost changes.[13] The analysis of the dynamic adjustment in terms of adjustment delays and uncertainty reduces the dynamic decision problem of the firm to a sequence of static decision models which can be solved stepwise:

- Output is determined in the short run with predetermined employment, prices and capacities.
- The employment adjustment and the price setting take place in the medium run and thus under uncertainty about the location of the demand curve.
- Investment and innovation behaviour are determined in the long run, i.e. capacities and the production technology are treated as predetermined for the price and employment decision.

Financing constraints affect employment and prices firstly via the investment and innovation decision[14] and secondly directly via the financing of the wage bill. The demand for the firm's product is characterized by a firm-specific demand curve. In order to distinguish demand shifts, the price elasticity of demand, and demand uncertainty, a log-linear relation is assumed,

$$\ln YD = \eta \cdot \ln p + \ln Z + \varepsilon, \qquad \mathrm{E}(\varepsilon) = 0, \mathrm{Var}(\varepsilon) = \sigma^2. \tag{1}$$

Time and firm indices are omitted to simplify the notation. Demand YD depends negatively on the price p with constant elasticity $\eta < -1$, Z is a predetermined demand shift, and the demand shock ε introduces uncertainty: The realized value of the demand shock is not known at the time of the price and employment decision. Supply YS is determined by a short-run limitational production function with capital K and labour L as inputs,

$$YS = \min(YC, YL) = \min(\pi_k \cdot K, \pi_l \cdot L). \tag{2}$$

YC are capacities, YL is the employment constraint, and π_l, π_k are the productivities of labour and capital. In the short run, output Y is determined as the minimum of demand and supply, $Y = \min(YD, YS)$. The medium-run optimization problem of the firm is

$$\max_{\rightarrow L,p} \; p \cdot \mathrm{E}(Y) - w \cdot L - c \cdot K \tag{3}$$

subject to eqs. (1) and (2), and subject to the availability of sufficient liquidity. E is the expectation operator, w are wage costs and c are the user costs of capital which are treated as exogenous at the firm level. For the optimal solution, three

[13] A delayed adjustment is discussed in Kydland, Prescott (1982). Adjustment dynamics of employment are discussed by Blanchard, Diamond (1992) and Hamermesh, Pfann (1996). A more detailed discussion of the theoretical structure of the model here is contained in Smolny (1998a).

[14] This part of the employment-financing nexus is not treated explicitly in this paper. For a discussion, see Winker (1999b).

cases can be distinguished:

1. In case of binding capacity constraints, employment is determined from capacities. No more workers will be hired than can be employed with the predetermined capital stock. Supply, employment, and the price result from

$$YS = YL = YC, \qquad L(YC) = YC/\pi_l, \tag{4}$$

$$\ln p(YC) = \Big[\ln YC - \ln Z - \overline{\varepsilon}(\eta, \sigma)\Big]/\eta. \tag{5}$$

Employment is given by the maximal number of working places $L(YC)$. The optimal price depends with elasticity η on capacities YC and expected demand shifts Z. $\overline{\varepsilon} := \ln YS - \eta \cdot \ln p - \ln Z$ is the borderline case of the demand shock which distinguishes the demand constrained regime from the supply constrained regime. The optimal $\overline{\varepsilon}$ and therefore the regime probabilities are completely determined by the price elasticity of demand η and demand uncertainty σ.[15] In the capacity constrained regime, the adjustment of employment is inhibited, and the whole adjustment with respect to expected demand shifts falls on the price.

2. In case of sufficient capacities and liquidity, optimal employment and prices can be determined from the first order condition of eq. (3) with respect to employment,

$$p(w) \cdot \text{prob}(YL < YD) \cdot \pi_l - w = 0. \tag{6}$$

The marginal costs of employment are equal to the wage rate w. Marginal returns are determined as the price, multiplied with the productivity of labour, and multiplied with the probability that the additional output can be sold, i.e. if demand exceeds supply. The optimal price is determined by unit labour costs w/π_l, the mark-up is equal to the optimal probability of the supply constrained regime on the goods market. Optimal supply and employment result from inserting this price into the definition of $\overline{\varepsilon}$ and solving for YL and L,

$$YL(w) = \eta \cdot \ln p(w) + \ln Z + \overline{\varepsilon}(\eta, \sigma), \qquad L(w) = YL(w)/\pi_l. \tag{7}$$

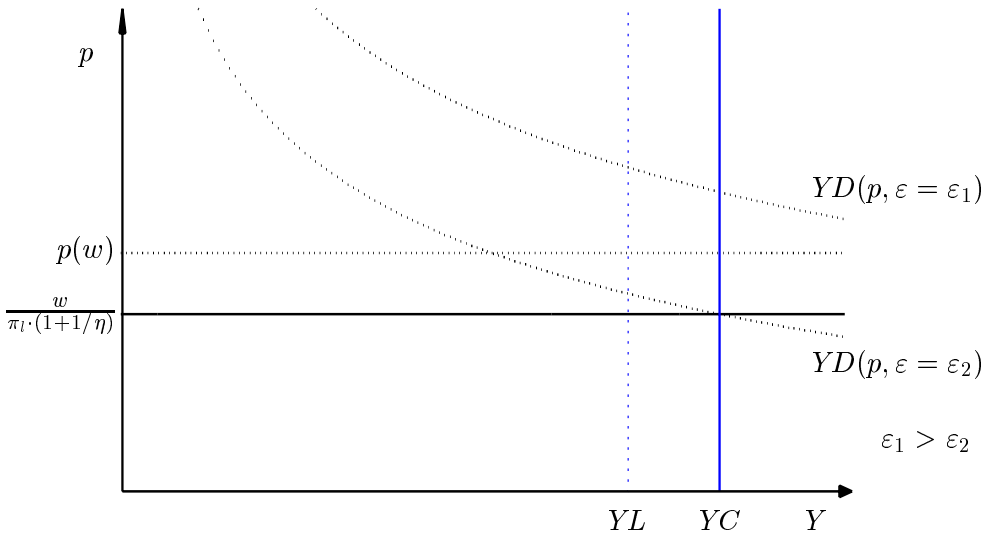
In case of sufficient capacities, the price is independent from expected demand shifts, the firm adjusts quantities.

3. Financing constraints can be treated analogously either to capacity constraints or to higher wage costs:

> If the firm cannot obtain sufficient funds to finance the wage bill, employment will be lower and the optimal price will be higher, as in case of capacity constraints.
>
> A gap between the costs of internal and external finance increases marginal production costs, increases the optimal price, and reduces employment, as in case of higher wage costs.

[15] The regime probabilities are defined as $\text{prob}(YD < YS) = \int_{-\infty}^{\overline{\varepsilon}} f_\varepsilon d\varepsilon$. f_ε is the probability distribution function of the demand shock ε.

Figure 2: Optimal employment and prices



Finally, if financing constraints hinder innovations and investment, capacities will be lower, demand will be lower, and marginal costs will be higher.

The model extends the standard formulation of monopolistic competition by introducing uncertainty about demand and medium-run capacity and financing constraints.

- Ex ante, the firm sets prices and adjusts employment under uncertainty about the location of the demand curve, i.e. the firm chooses one point in the $\{p, Y\}$-diagram (see figure 2). Relevant for the employment adjustment is a capacity limit $\overline{YS} = YL \leq YC$, the availability of sufficient funds and a minimum price $p(w)$.

- Ex post, underutilization of employment and capacities or rationing of demand can occur. The short-run demand situation can be identified from the utilization of employment, the medium-run business-cycle situation can be identified from the utilization of capacities.

The model provides a useful framework for the analysis of the employment and price adjustment during the business cycle. Suppose the stochastic process generating the demand shocks is autocorrelated. Then, an unexpected demand shock affects the utilization of labour and capital today. The adjustment of the firm depends on the availability of capacities: In case of capacity constraints (in boom periods), employment should remain unchanged, the firm should adjust the price; with sufficient capacities (in recession periods), the firm should adjust

Table 2: Employment and price adjustment

	utilization					innovation	financing
	U	Z	$\|\eta\|$	σ	π_l		constraints
ΔL	+	+	+	−	?	?	−
Δp	+	+	−	+	−	?	+
σ_L	−		−	+		?	+
σ_p	+		+	+		−	+

employment and the price should remain unchanged. That means, the model provides clear testable hypotheses about the effects of capacity utilization U on the direction $\Delta L, \Delta p$ and the frequency σ_L, σ_p of employment and price adjustments with respect to demand shocks (see table 2). The model can be understood as an error correction model for employment and prices: If the actual utilization differs from the optimum, employment and/or prices adjust.

Expected increases of demand Z either increase employment or increase prices, depending on the availability of capacities and financial funds. Uncertainty increases the variance of output and should increase the necessity of employment and price adjustments. This results in higher average costs, higher prices, and less employment. A low price elasticity of demand $|\eta|$ increases the optimal price and reduces employment. In addition, less competition should favour employment adjustments against price adjustments in case of demand shocks.[16]

The effects of innovations on the price and employment adjustment are ambiguous.[17] Process innovations reduce marginal costs which should reduce prices, but the employment effect is ambiguous due to substitution effects. Product innovations increase demand Z but tend to reduce competition $|\eta|$. Higher demand increases employment and prices, but less competition reduces employment and increases prices.

Financing constraints affect employment firstly via the financing of innovations and investment.[18] Second, financing constraints exhibit a direct effect on employment via the financing of the wage bill. Employment increases require additional liquidity, employment reductions economize on liquidity. Therefore, a lower level of employment is expected for firms with financial distress. A negative effect on employment arises also, if the gap between the costs of internal and external finance becomes larger.

In addition, it is expected that financing constraints increase the volatility of employment. Smoothing employment during the business cycle requires sufficent liquidity, and financing constraints force firms to economize on wage costs. For firms with financial distress, short-run liquidity is more important

[16] For a discussion, see Barro (1972), Blanchard, Kiyotaki (1987) and Carlton (1989).
[17] For a discussion, see Kamien, Schwarz (1982), Cohen, Levin (1989) and Smolny (1998b).
[18] See Winker (1999b).

than long-run profit maximization.[19] In addition, in case of incoming orders, the firm might convince the bank that more employment is required. In case of less orders, it is more difficult for the firm to convince the bank that labour hoarding of qualified employees increases profits in the long run.

Financing constraints also affect the price setting. A lower level of employment increases the probability of supply constraints due to an insufficient employment level. Financing constraints exhibit the same effect as capacity constraints: In case of demand shocks, the employment adjustment is impeded, and prices rise instead. A price increase is also expected, if financing constraints increase marginal costs through higher interest rates. Financing constraints should also increase the volatility of prices. Supply constraints increase the probability of price increases in case of positive demand shocks; unchanged marginal costs impede price reductions in case of demand reductions.[20] In recession periods with sufficient capacities, prices are determined by marginal costs and the price elasticity of demand. Taken together, financingl constraints reduce employment and increase prices; financing constraints also increase the volatility of both, employment and prices.

Finally, in the empirical model, it is tested for effects of financing constraints on the short-run adjustments of output and the working time. The costs of adjustments of the working time stem from a wage premium for overtime working and a partial compensation of the employees for short-time working; the returns stem from a greater flexibility of supply in case of demand changes. In the model here, the effect of financing constraints on working-time adjustments is ambiguous: On the one hand, adjustments of the working time are a first instrument for adjusting the labour input; adjustments of employment and the working time are complementary.[21] On the other hand, if financing constraints enforce a downward adjustment of employment, more overtime working should be necessary; employment adjustment and adjustments of the working time are substitutes. The effects of financing constraints on the output adjustment are clear: Less supply in case of less employment and less demand in case of higher prices should reduce output. In addition, the same asymmetric effects on upward and downward adjustments hold as for employment, i.e. the volatility of output should be higher.

[19] This effect can be interpreted as disinvestment of firm specific human capital, which is incorporated in experienced employees.

[20] The frequency of price reductions might even increase, if the firm increases the price above $p(w)$ during a temporary demand increase. A similar effect might arise in case of capacity constraints.

[21] For instance, the firm might employ a strategy of employment adjustments for less qualified workers and working-time adjustments for qualified employees.

3 Empirical analysis

3.1 Data and empirical specification

The data source for the empirical investigation of the employment adjustment is a unique panel of micro data from West German manufacturing firms. The data stem from the business survey, the innovation survey, and the investment survey of the ifo institute, Munich; the data set contains information from 2405 firms for the period 1980-1992.[22]

The innovation survey contains detailed information about the innovation behaviour of the firm.[23] In the questionnaire, it is also asked for impediments to innovation activities. Among other choices firms can select "missing external funds" and "missing internal funds". As the differentiation between missing external or internal funds seems difficult,[24] only a dummy variable indicating either missing external or internal funds is used for the empirical analysis. Thus, firms themselves indicate whether they face financing constraints, i.e. they cannot pursue profitable innovation activities since they are not able to raise necessary funds. It can be avoided to rely on proxies such as cash flow which might be less suited (see Faroque and Ton-That, 1995). The estimated equations for the determinants of financing constraints treat this financing constraints dummy as the endogenous variable, and a probit analysis is performed.[25]

The first explanatory variables cover the influence of firm size which is specified by dummy variables according to the average number of employees $\overline{l}$ of the firm over the sample. Although large firms are over-represented in the survey, as compared with total manufacturing, the sample consists mainly of small and medium-size firms. Since portfolio diversification of multi-product firms reduces risk, a diversification dummy (divers) is included to capture this effect. Overall uncertainty is measured by the volatility of demand shocks in the preceding year at the firm level. It is calculated as the relative frequency of demand changes σ_{YD}. In the questionnaire, the firms are asked whether the demand situation for their product is better, unchanged, or worse, as compared with the preceding month. σ_{YD} is defined as the sum of the 'better' and 'worse' responses, relative to the total number of observations per year.

Business conditions and business expectations at a six month horizon are also available from the business survey at a monthly frequency. bc^+ and bc^- denote the share of "good" and "bad" responses, respectively, for the current year; be^+ and be^- give the corresponding shares for future business expectations. The reference cases are firms with medium business conditions and expecting no changes, respectively. $\overline{be}^+$ and $\overline{be}^-$ are the shares of firms in the same sector – excluding the firm under analysis – expecting improving or wors-

[22]We would like to thank the ifo institute, Munich, for providing the data and Thomas Schneeweis for his help with the construction of the data set.

[23]Innovations are defined as novelties or essential improvements of the product or the production technique.

[24]See Winker (1999a) for a discussion.

[25]We also estimated a linear probability model with fixed effects by OLS.

ening business conditions, respectively. Thereby, it is assumed that banks are more likely to detect a general trend than the specific development of a single firm. A direct measure of demand expectations is contained annually (in December) in the business survey: The firms report the expected development of their product market in the medium-run (about 5 years). For the estimates, 2 dummy variables are calculated for a growing market Z^+ and for a shrinking market Z^-; a stagnating market is the reference case.

The degree of capacity utilization U of the preceding year is added as control variable. For U quantitative data are available. This reflects cash flow effects on internal finance not adequately captured by the business conditions dummies. Finally, a complete set of 11 time dummies is always included in the estimates. These dummies shall capture e.g. the development of factor costs, since firm-level data on input costs are not available from the business survey. In order to control for sector- and firm-specific effects, a specification including sectoral dummies and a linear probability fixed effects model are estimated also.

Data for employment are available from the business survey and the investment survey. In the business survey, the firms were asked quarterly whether the number of employees for a specific product will increase l^+, decrease l^-, or remain constant $l^=$ within the next 3 months (seasonally adjusted). The firms were also asked whether they exhibit overtime working h^o, more than customary overtime working h^*, short-time working h^s, or plan short-time working in the next 3 months h_3^s.[26] A prior inspection of the data reveals that adjustments of the working time are highly correlated with employment changes: Firms that exhibit (more than customary) overtime working more often report employment increases, and firms that exhibit (plan) short-time working more often report employment reductions.

A corresponding quantitative information about employment changes is available annually for about 60 percent of the firms. The cross-sectional variance of employment changes is enormous: The standard deviation of the rate of change of employment for each year is about 10 percent. The data reveal that firms which more often report employment increases (reductions) during the year exhibit more (less) employment growth, i.e. the qualitative data appear to be consistent. Each reported qualitative employment change corresponds to an about 3 percent change of the rate of change of employment, on average.

In the empirical equations, the annual employment adjustment is explained. For the quantitative data, an OLS model for the rate of change of employment is specified. For the qualitative data, ordered probit models for the annual number of increases, decreases, net increases,[27] and changes are specified. Corresponding models are specified for price changes. This should give an information about the determinants of the price adjustment as compared with the employment adjustment. The data on price changes are available monthly. Finally, ordered probit models for adjustments of output and the working time

[26] In Germany, short-time working (temporary lay-offs) are subsidized by the Federal Labour Office.

[27] Net increases are defined as number of increases minus number of decreases during the year.

are estimated.

In the empirical model, the sequential decision structure of the theoretical model is exploited for the econometric specification. In the theoretical model, financing constraints, capacities, and innovation behaviour are determined in the long run; therefore, they can be treated as predetermined for the medium-run employment and price decision. In addition, the specification of the adjustment model is based on the assumption that firm-specific demand shocks are autocorrelated. The firms exploit this autocorrelation when forming expectations about the development of demand. The model can be understood as an error correction model for the employment adjustment. These assumptions permit to interpret lagged values of financing constraints, innovations, and capacity utilization as predetermined for the employment adjustment, and the identification of the model can be sought through lagged values of the explanatory variables. For the estimates, the data are pooled and an unbalanced panel is employed. Note that the endogenous variables are already specified as changes.

The first explanatory variable is the degree of capacity utilization U, which should reflect the relevance of capacity constraints for the employment and price adjustment. σ_{YD} serves as a measure of the uncertainty about demand. The dummy variables Z^+ and Z^- capture the effect of expected demand changes.

The most important explanatory variable is the indicator dummy for financing constraints, taken from the preceding year: Financing constraints in December affect the employment adjustment in the following year.[28] In addition, it is tested for an effect of innovations on the price and employment adjustment by introducing a dummy variable which is defined for innovators in the preceding year. Consequently, only the direct effect of financing constraints is captured by the coefficient for the financing constraints dummy, not the effect through innovations.[29] Finally, firm size and diversification dummies are included as well as time dummies to control for the development of factor costs.

3.2 Estimation results

Table 3 summarizes the estimation results for the determinants of financing constraints. The dependent variable is the financing constraints dummy, which is one for firms facing financing constraints. The first two columns of estimated coefficients refer to a probit analysis, while the last column gives the results for a fixed effects linear probability model.

The first group of explanatory variables covers public and in the short run fixed firms' characteristics which are used by investors for a priori discriminating. As expected from the theoretical analysis and confirming empirical results from the literature, firm size exhibits a negative impact. Small firms ($\bar{l} \leq 100$)

[28] Note that this timing is consistent with the timing used for explaining financing constraints: Business conditions and expectations of the current year affect the financing situation in December.

[29] Effects of financing constraints on innovations are estimated by Winker (1999a). The results show that innovation expenditures are significantly reduced by almost 30 percent if firms face financing constraints.

Table 3: Determinants of financing constraints

endogenous variable			
	financing constraints dummy		
	Probit analysis		fixed effects OLS
$\overline{l} \leq 100$	0.452	0.463	–
	(11.0)	(10.6)	
$\overline{l} \geq 1000$	-0.265	-0.315	–
	(-3.6)	(-3.8)	
divers	-0.316	-0.294	–
	(-7.0)	(-6.3)	
σ_{YD}	0.220	0.201	0.006
	(2.8)	(2.5)	(0.31)
bc^+	-0.514	-0.493	-0.068
	(-6.9)	(-6.3)	(-3.9)
bc^-	0.360	0.335	0.043
	(5.0)	(4.6)	(2.3)
U	-0.123	-0.032	-0.040
	(-0.7)	(-0.2)	(-0.7)
$\overline{be}^+$	-2.629	-1.223	-0.232
	(-4.9)	(-1.9)	(-1.86)
$\overline{be}^-$	-0.914	-0.852	-0.235
	(-2.5)	(-1.9)	(-2.55)
be^+	0.219	0.274	0.032
	(2.4)	(2.9)	(1.33)
be^-	-0.064	-0.035	-0.009
	(-0.7)	(-0.4)	(-0.4)
Z^+	0.109	0.106	0.022
	(2.5)	(2.3)	(2.1)
Z^-	0.141	0.159	0.033
	(2.3)	(2.5)	(2.2)
sectoral dummies	no	yes	–
χ^2	464 (23)	555 (46)	
obs	5791	5791	5802

t-statistic in parentheses. Time dummies were included (not reported).

face a significantly higher risk of financing constraints, firms with more than 1000 employees ($\overline{l} \geq 1000$) are less likely to be impeded by missing funds as compared with the reference category of medium sized firms. The risk reducing effect of diversification (divers) is also found to significantly facilitate the access to funds.

The following four variables summarize the firm's business conditions. Variability of demand for the firm's products in the preceding year (σ_{YD}) is positively related to uncertainty about future business conditions and, consequently, significantly increases the risk of facing financing constraints. Since it does not change much over time it becomes insignificant in the fixed effects model. Good current business conditions (bc^+) reduce the risk of facing financing constraints which can be explained through increased internal cash flow and a positive signal to external lenders. The expected negative effect of bad current businesses (bc^-) is also confirmed by the estimates. No additional significant effect of the degree of capacity utilization in the past year (U) is found.

Expectations on future business conditions are mirrored by the variables in the third and forth group. The first two variables represent expectations at the sectoral level. This information is also available to banks. Consequently, positive business expectations at the sectoral level ($\overline{be}^+$) reduce the risk of facing financing constraints. This effect becomes smaller and less significant if sector specific effects are already controlled for by including sectoral dummies. The negative sign for $\overline{be}^-$ is somehow puzzling, as the theoretical analysis indicated a reduced supply of external funds in this case. This negative effect might be overcompensated by a decline in activity and, thus, loan demand at the sectoral level.

Private information on firms' expectations is comprised in the last four variables. Since firm cannot transfer credible information on their future prospects to outside lenders, these variables capture effects of asymmetric information, which is a special feature of the ifo firm panel. First, an expected improvement of the business situation (be^+) intensifies financing constraints. This confirms the importance of asymmetric information as derived from the theoretical model. An expected worsening of the business situation (be^-) may have two effects on the demand for funds working in opposite direction. Either the firm reduces its activity and, consequently, its financing requirements or it needs additional funds to compensate for reduced cash flow. Therefore, the insignificant estimate for be^- is consistent with the theoretical reasoning. The medium-run expectations about market development (Z^+,Z^-) exhibit both a significant positive impact, i.e. if markets are expected to grow or to shrink uncertainty for the performance of a single firm in this market increases. Consequently, these variables can be interpreted as an additional measure of riskiness.

Estimation results do not differ much between the two Probit analyses without and with sectoral dummies except for the influence of sectoral business expectations $\overline{be}^+$ and $\overline{be}^-$, respectively. Obviously, these variables cover some sector-specific effects in the first version. Although the absolute magnitude of the estimated coefficients for the fixed effects linear probability model in the

last column cannot be compared with the first two columns, the sign of the effects remains unchanged and most effects are still significant.

To sum up the findings for the sources of financing constraints, the estimation results are consistent with the effects expected from the theoretical analysis. Uncertainty and asymmetric information tend to increase the probability of financing constraints, while firm size, diversification and sectoral trends tend to reduce it.

In table 4, the estimation results for employment are reported. The endogenous variables are the frequency of employment increases l^+, employment reductions l^-, net employment increases Δl,[30] employment changes σ_l and the rate of change of employment $\Delta \ln L$. For the qualitative data $(l^+, l^-, \Delta l, \sigma_l)$, ordered probit models are specified; for the quantitative data $(\Delta \ln L)$, an OLS model is estimated. Corresponding models for the qualitative data on the price adjustment are reported in table 5. The explanatory variables refer to the preceding year.

The estimation results firstly reveal that capacity utilization U and the demand conditions σ_{YD}, Z exhibit well determined and reasonable effects on the employment and price adjustment. A high capacity utilization in the preceding year increases the frequency of (net) employment increases and reduces the frequency of employment reductions and employment changes. A consistent result is revealed for the rate of change of employment. A high capacity utilization also increases the frequency of (net) price increases. Note that even the frequency of price reductions is higher for those firms which work with a high capacity utilization, i.e. those firms more often change prices. These estimates confirm the results of the theoretical model, i.e. capacity constraints increase the volatility of prices and reduce the volatility of employment.

A large volatility of demand shocks σ_{YD} increases the volatility of both, prices and employment. In addition, demand uncertainty tends to increase prices and reduce employment. A consistent result is also revealed for demand expectations Z^+, Z^-. Firms expecting an increasing (shrinking) demand increase (reduce) prices and employment; firms expecting a stagnating market (the reference category) less often change employment and prices. These results confirm the assumptions applied in the theoretical model of employment and price adjustment.

Below, the effects of innovations and financing constraints on the employment and price adjustment are reported. First, innovative firms are more successful. They more often increase employment and are less often forced to reduce prices. In addition, they less often change prices and more often change employment. This hints towards an effect of innovations on the market structure, i.e. innovations protect the firms from competition.

The estimation results for financing constraints also confirm the implications of the theoretical model. First, firms with financial distress less often increase employment and more often reduce employment; the net effect on employment

[30] Net employment increases are defined as $\Delta l = l^+ - l^-$.

Table 4: Employment adjustment

	endogenous variables				
	l^+	l^-	Δl	σ_l	$\Delta \ln L$
U	1.125	-1.292	1.269	-0.469	0.102
	(6.4)	(-9.0)	(10.2)	(-3.6)	(7.3)
σ_{YD}	0.423	0.478	-0.107	0.598	0.005
	(5.8)	(7.2)	(-2.0)	(10.4)	(0.8)
Z^+	0.428	-0.269	0.353	0.060	0.018
	(9.8)	(-7.1)	(11.0)	(1.8)	(4.9)
Z^-	-0.213	0.278	-0.263	0.203	-0.008
	(-2.7)	(5.4)	(-5.5)	(4.2)	(-1.4)
innovation	0.169	-0.010	0.062	0.084	0.013
	(2.3)	(-0.2)	(1.2)	(1.6)	(2.4)
financing	-0.053	0.210	-0.157	0.135	-0.009
constraints	(-1.1)	(5.3)	(-4.7)	(3.7)	(-2.3)
$\overline{l} \leq 100$	0.053	-0.233	0.158	-0.155	-0.001
	(1.2)	(-5.9)	(4.7)	(-4.5)	(-0.3)
$\overline{l} \geq 1000$	-0.044	0.316	-0.212	0.215	-0.018
	(-0.7)	(5.9)	(-5.0)	(4.5)	(-3.7)
divers	-0.196	-0.140	0.002	-0.199	
	(-4.5)	(-3.6)	(0.1)	(-5.9)	
χ^2_{20}	671	1007	1270	407	0.086*
obs	6146	6146	6146	6146	3605

t-statistics in parentheses. Time dummies were included (not reported).
* $\overline{R}^2$ is reported.

is clearly negative. The quantitative impact is quite large: Firms with financing constraints exhibit an about 1 percentage points lower rate of change of employment, on average. Since financing constraints also affect innovations and investment, an additional negative effect on employment can be expected. Note also that the effect of financing constraints on employment reductions is larger, as compared with the effect on employment increases; consequently financing constraints also increase the volatility of employment.

As expected, the effect of financing constraints on prices is less pronounced, as compared with the employment effects. The coefficients are hardly significant. Nevertheless, the sign of the effects is consistent with the theoretical model. Constrained firms more often increase (change) prices, i.e. the quantity adjustment is inhibited and prices rise instead; the effect on net price increases is also positive albeit statistically not significant.

The results for the firm-size dummies reveal that large firms exhibit less

Table 5: Price adjustment

	endogenous variable			
	p^+	p^-	Δp	σ_p
U	0.551	0.475	0.252	0.644
	(4.6)	(2.9)	(2.2)	(5.5)
σ_{YD}	0.334	0.477	0.085	0.537
	(5.9)	(6.2)	(1.5)	(10.0)
Z^+	0.134	-0.137	0.153	0.068
	(4.2)	(-3.3)	(5.1)	(2.2)
Z^-	-0.116	0.168	-0.140	0.030
	(-2.5)	(2.9)	(-3.2)	(0.7)
innovation	0.012	-0.196	0.064	-0.096
	(0.3)	(-3.1)	(1.5)	(-2.2)
financing	0.043	0.047	0.025	0.056
constraints	(1.3)	(1.0)	(0.8)	(1.7)
$\bar{l} \leq 100$	0.035	0.152	-0.019	0.115
	(1.1)	(3.5)	(-0.6)	(3.7)
$\bar{l} \geq 1000$	-0.056	-0.010	-0.058	-0.078
	(-1.1)	(-0.2)	(-1.2)	(-1.7)
divers	-0.023	-0.052	0.001	-0.053
	(-0.7)	(-1.2)	(0.1)	(-1.7)
χ^2_{20}	279	258	305	232
obs	6153	6153	6153	6153

t-statistics in parentheses. Time dummies were included (not reported).

employment growth, as compared with small- and medium-size firms. Firm size also exhibits a positive effect on the volatility of employment. This is consistent with the higher frequency of price adjustments in small firms. Note also that diversified firms exhibit a lower volatility of employment.[31]

Finally, in table 6, the effects of financing constraints on the short-run adjustment of output and the working time are reported.[32] The estimates for output mirror those for employment: Firms with financial distress more often reduce output y^-. The effect on output increases y^+ is not significant; therefore, the effect on net output increases Δy is negative and the volatility of output σ_y is higher. Financing constraints also reduce the working time. Constrained

[31] The robustness of the results was tested by inclusion of sector dummies (see tables A3 and A4 in the appendix). The results show that the coefficients are hardly affected.

[32] The complete estimation results of the equations are contained in table A5 and A6 in the appendix. Output changes are defined corresponding to employment and price changes, the equations are estimated by ordered probit models.

Table 6: Adjustment of output and the working time

Output adjustment

	endogenous variables			
	y^+	y^-	Δy	σ_y
financing constraints	-0.014 (-0.4)	0.110 (3.2)	-0.090 (-2.9)	0.074 (2.2)
χ^2_{20}	767	1318	1008	1165
obs	6153	6153	6153	6153

Adjustment of the working time

	endogenous variable			
	h^o	h^*	h^s	h^s_3
financing constraints	-0.072 (-1.9)	0.006 (0.1)	0.151 (3.2)	0.211 (4.8)
χ^2_{20}	1175	515	849	1216
obs	6135	6153	6077	6071

t-statistics in parentheses. Time dummies were included (not reported).
The complete estimation results are reported in table A3 in the appendix.

firms less often exhibit overtime working h^o, and more often exhibit h^s or plan h^s_3 short-time working.[33] Than means, adjustments of employment and the working time are complementary.

4 Conclusions

In this paper, a theoretical model of the causes and the short-run effects of financing constraints is developed. In the model, asymmetric information and adverse incentives lead to a rationing of the credit demand of the firms or to a gap between the costs of internal and external finance. Insufficient funds prevent firms from implementing otherwise profitable investment and innovation projects in the long run; higher financing costs and medium-run liquidity constraints affect employment and prices. The employment and price adjustment is analysed within a framework of monopolistic competition on the product market, uncertainty about the location of the demand curve and medium-run capacity and financing constraints.

The central contribution of the paper is the estimation of the employment

[33] The effect on more than usual overtime working h^* is not significant.

consequences of financing constraints. The determinants of the employment and price adjustment are estimated with a unique panel of firm-level data from West German manufacturing. The data-set contains a direct measure of financing constraints at the firm level which circumvents the often arguable use of indicators for the assessment of the liquidity situation of the firms.

The empirical results clearly indicate that financing constraints matter. Liquidity-constrained firms are more often forced to reduce employment, the employment smoothing during temporary demand disturbances is restrained, and the volatility of both, employment and prices, is higher. Since financing constraints also affect investment and the implementation of innovations, additional effects on employment can be expected.

The empirical results also confirm that financing constraints are determined by factors related to internal cash flow (past success) and asymmetric information. In particular, the impact of asymmetric information is detected not only indirectly through firm size and related variables, but also directly through explicit information about future business prospects.

The findings allow for the conclusion that increasing uncertainty on financial markets or about goods demand reduces employment and increases employment volatility at the firm level. Although it is not possible to derive aggregate, i.e. general equilibrium conclusions from these firm level effects, at least some distributive effects persist: Small, fast growing, innovative firms are most heavily concerned. Consequently, financing constraints may reduce the rate of technical progress and structural change.

Besides attempts to introduce the analysis in a general equilibrium context, straightforward extensions of the present approach comprise models with endogenous decisions on inventories, investment and innovation given the possibility of financing constraints. Furthermore, it would be interesting to compare the results for profit maximizing firms with the case when firms maximize their survival probability as a result of a principal–agent framework.

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Appendix

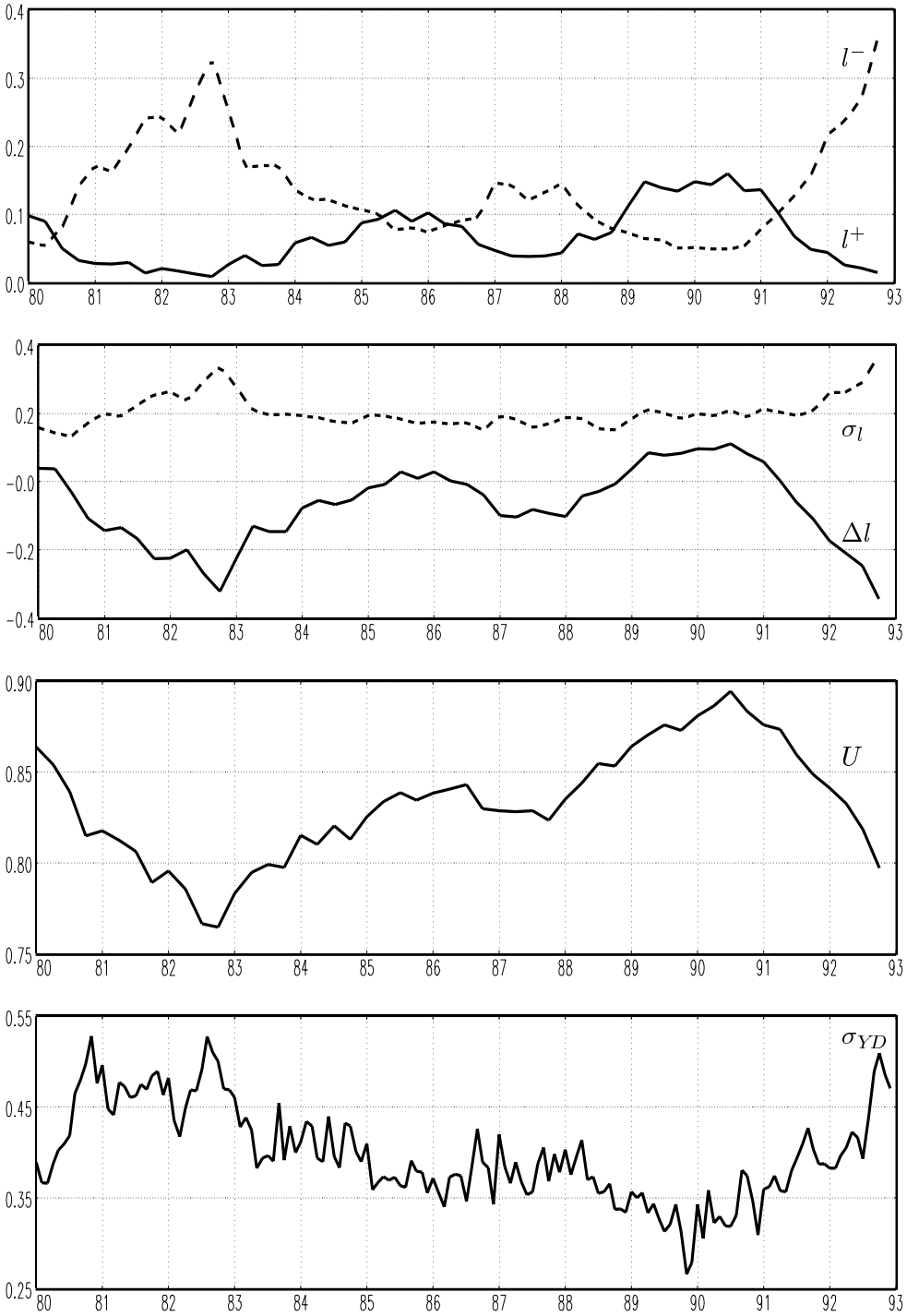
Table A1: Variable list, endogenous variables

		range	mean
	Business Survey		
l^+	planned employment increases	0,...,4	0.27
l^-	planned employment reductions	0,...,4	0.54
σ_l	employment changes	0,...,4	0.81
Δl	net employment increases	-4,...,4	-0.28
	within the next 3 month		
p^+	realized price increases	0,...,12	1.32
p^-	realized price reductions	0,...,12	0.58
σ_p	price changes	0,...,12	1.90
Δp	net price increases	-12,...,12	0.74
	as compared with the preceding month		
y^+	realized output increases	0,...,12	1.66
y^-	realized output reductions	0,...,12	2.09
σ_y	output changes	0,...,12	3.75
Δy	net output increases	-12,...,12	-0.43
	as compared with the preceding month		
h^o	overtime working	0,...,4	1.38
h^o	more than customary overtime working	0,...,4	0.29
h^s	short time working	0,...,4	0.30
h^s_3	short time working in the next 3 months	0,...,4	0.47
	Investment Survey		
$\Delta \ln L$	rate of change of employment	quant.	-0.01
	Innovation Survey		
fc	financing constraints for innovations	dummy	0.23

Table A2: Variable list, explanatory variables

		range	mean
	Business Survey		
bc^+:	good business conditions	0,...,1	0.21
bc^-:	bad business conditions	0,...,1	0.22
be^+:	expected improvement of business conditions	0,...,1	0.13
be^-:	expected worsening of business conditions	0,...,1	0.21
	within the next 6 month		
$\overline{be}^+$:	sector mean of be^+	0,...,1	0.13
$\overline{be}^-$:	sector mean of be^-	0,...,1	0.21
	calculated excluding the respective firm		
U:	capacity utilization rate	0.3,...,1	0.83
σ_{YD}:	demand changes	0,...,1	0.40
Z^+:	growing market expected	dummy	0.43
Z^-:	shrinking market expected	dummy	0.13
	within the next 5 years		
$\overline{L} \leq 100$:	firm size	dummy	0.41
$\overline{L} \geq 1000$:	firm size	dummy	0.09
divers:	diversification, product level employment		
	less than firm level employment	dummy	0.33
	Innovation Survey		
inno:	innovation activity	dummy	0.64

Figure A1: Employment, capacity utilization and demand



Source: Ifo firm panel, 2405 firms, 1980-1992.

Table A3: Employment adjustment

	l^+	l^-	Δl	σ_l	$\Delta \ln L$
U	1.291	-1.323	1.364	-0.401	0.110
	(7.0)	(-9.0)	(10.7)	(-3.0)	(7.7)
σ_{YD}	0.414	0.480	-0.116	0.599	0.005
	(5.4)	(7.1)	(-2.1)	(10.2)	(0.9)
Z^+	0.402	-0.273	0.342	0.038	0.015
	(8.8)	(-7.0)	(10.4)	(1.1)	(4.2)
Z^-	-0.215	0.289	-0.270	0.214	-0.007
	(-2.7)	(5.5)	(-5.6)	(4.3)	(-1.2)
innovation	0.148	-0.045	0.072	0.038	0.013
	(1.9)	(-0.8)	(1.3)	(0.7)	(2.3)
financing	-0.069	0.192	-0.149	0.118	-0.008
constraints	(-1.3)	(4.8)	(-4.3)	(3.2)	(-2.0)
$\overline{l} \leq 100$	0.031	-0.178	0.118	-0.113	-0.004
	(0.7)	(-4.3)	(3.4)	(-3.1)	(-1.0)
$\overline{l} \geq 1000$	-0.043	0.235	-0.157	0.151	-0.014
	(-0.7)	(4.1)	(-3.5)	(2.9)	(-2.6)
divers	-0.188	-0.188	0.033	-0.233	
	(-4.0)	(-4.7)	(1.0)	(-6.7)	
χ^2_{46}	770	1111	1347	536	0.088
obs	6146	6146	6146	6146	3605

t-statistic in parentheses.
Time and sector dummies were included (not reported).
* $\overline{R}^2$ is reported.

Table A4: Price adjustment

	p^+	p^-	Δp	σ_p
U	0.588	0.328	0.319	0.621
	(4.8)	(1.9)	(2.7)	(5.2)
σ_{YD}	0.328	0.573	0.050	0.567
	(5.7)	(6.8)	(0.9)	(10.3)
Z^+	0.144	-0.099	0.141	0.102
	(4.4)	(-2.2)	(4.6)	(3.2)
Z^-	-0.121	0.230	-0.157	0.050
	(-2.5)	(3.8)	(-3.5)	(1.1)
innovation	0.049	-0.038	0.033	0.018
	(1.0)	(-0.6)	(0.8)	(0.4)
financing	0.032	0.084	0.007	0.061
constraints	(0.9)	(1.8)	(0.2)	(1.8)
$\bar{l} \leq 100$	0.008	0.019	0.008	0.024
	(0.3)	(0.4)	(0.2)	(0.7)
$\bar{l} \geq 1000$	-0.057	0.077	-0.085	-0.029
	(-1.1)	(1.0)	(-1.6)	(-0.6)
divers	-0.032	-0.062	0.002	-0.065
	(-1.0)	(-1.3)	(0.1)	(-2.0)
χ^2_{46}	474	849	480	729
obs	6153	6153	6153	6153

t-statistic in parentheses.
Time and sector dummies were included (not reported).

Table A5: Output adjustment

	y^+	y^-	Δy	σ_y
U	-0.371	-1.053	0.521	-0.947
	(-3.0)	(-8.8)	(4.6)	(-8.4)
σ_{YD}	1.152	1.140	0.041	1.570
	(21.5)	(21.5)	(0.8)	(32.2)
Z^+	0.243	-0.146	0.251	0.066
	(7.8)	(-4.7)	(8.4)	(2.2)
Z^-	-0.177	0.282	-0.342	0.117
	(-3.6)	(6.3)	(-8.0)	(2.6)
innovation	0.246	-0.048	0.218	0.119
	(4.8)	(-1.0)	(4.8)	(2.4)
financing	-0.014	0.110	-0.090	0.074
constraints	(-0.4)	(3.2)	(-2.9)	(2.2)
$\overline{l} \leq 100$	0.057	0.069	-0.003	0.079
	(1.8)	(2.2)	(-0.1)	(2.6)
$\overline{l} \geq 1000$	-0.211	-0.207	-0.010	-0.269
	(-4.5)	(-4.5)	(-0.2)	(-6.4)
divers	-0.068	-0.083	0.015	-0.081
	(-2.2)	(-2.7)	(0.5)	(-2.8)
χ^2_{20}	767	1318	1008	1165
obs	6153	6153	6153	6153

t-statistic in parentheses. Time dummies were included (not reported).

Table A6: Adjustment of the working time

	h^o	h^*	h^s	h_3^s
U	2.069	1.715	-2.012	-1.964
	(15.7)	(9.5)	(-12.4)	(-13.2)
σ_{YD}	-0.103	0.303	0.375	0.573
	(-1.9)	(4.1)	(4.8)	(7.9)
Z^+	0.222	0.159	-0.155	-0.162
	(6.9)	(3.7)	(-3.4)	(-3.9)
Z^-	-0.175	-0.190	0.134	0.322
	(-3.3)	(-2.6)	(2.2)	(5.9)
innovation	0.237	0.181	-0.095	-0.101
	(4.2)	(2.5)	(-1.4)	(-1.6)
financing	-0.072	0.006	0.151	0.211
constraints	(-1.9)	(0.1)	(3.2)	(4.8)
$\overline{l} \leq 100$	-0.211	-0.027	-0.273	-0.198
	(-6.3)	(-0.6)	(-5.7)	(-4.6)
$\overline{l} \geq 1000$	0.089	-0.198	0.227	0.164
	(1.9)	(-3.1)	(3.5)	(2.6)
divers	-0.268	-0.295	-0.067	-0.101
	(-8.2)	(-6.6)	(-1.4)	(-2.4)
χ^2_{20}	1175	515	849	1216
obs	6135	6153	6077	6071

t-statistic in parentheses. Time dummies were included (not reported).