Schmollers Jahrbuch 126 (2006), 287 – 305
Duncker & Humblot, Berlin

On Estimating the Effect of Co-Determination on Personnel Turnover

By Kornelius Kraft*

Abstract

This article discusses earlier work by Frick (1996) on the impact of works councils on turnover in Germany. It turns out that his econometric methodology can be improved in several ways. Additionally the number of dismissals can be extended by including fixed term contracts that are not prolongated. Recalculating by use of his data shows that his results are very sensitive to changes in the econometric methodology as well as with respect to the construction of variables.

JEL Classification: J51, J63

Received: March 1, 2005
Accepted: January 14, 2006

1. Introduction

Frick (1996) published an article entitled "Co-determination and Personnel Turnover: The German Experience". The topic of this article is an empirical investigation on the determinants of dismissals and quits realized by German firms. An important point in this respect is the role of the works councils as the archetypical institution in order to test the exit-voice theory of Freeman and Medoff (1984). Thus the results of this study are of importance in testing this much discussed theory, aside of the specific German circumstances.

I have conducted a replication study concerning Frick's (1996) empirical analysis and reach different conclusions. The main purpose of my empirical anlysis is to check the robustness of the earlier results presented by Frick (1996). It turns out, that some of the major results depend on a) the specification of the most important variables and b) the methodology used. This replication study might be an example, how sensitive empirical results are with respect to the construction of the main variables and the choice of the econometric methods. This paper aims at demonstrating the limits of empirical research and the need for robustness checks.

* I am very grateful to Christoph Büchtemann † for the generous provision of data and to Gregor Brüggelambert, Ralf Dewenter and Jörg Stank for helpful comments.

The present analysis has a considerably policy relevance as the works council is not only an important German institution but has also been advocated by the EU (although with less decision rights than in Germany) and the introduction of a related measure, codetermination, is also discussed. Hence empirical evidence is expected to be quite helpful in this situation, but as it will be demonstrated below, at least with the data used by Frick and myself the results are quite sensitive.

2. Theoretical Foundation

The theoretical basis of Frick's study (1996) is essentially the exit-voice approach of Freeman and Medoff (1984), which is applied to a specific German institution, the works council. The interpretation of the role of works councils as a possible way to enhance communication is due to FitzRoy and Kraft (1985). FitzRoy and Kraft (1985, 1987) in particular also discuss alternative explanations for the role and effects of works councils and present the first results with respect to the economic impact of works councils.

The interpretation of works councils as a voice-channel for workers and as a possibility to reduce turnover rates (the exit-option) is debatable. The works council is interpreted as a communication channel, which apparently cannot be introduced by the firm itself. It has to be imposed externally in order to reach an efficient solution. Seemingly the average firm behaves irrationally, as it makes no use of the voice option itself, consequently suffering from too high a turnover rate. According to Frick there is no way to solve this problem internally. Frick (1996, 421) even states: "... firms on average benefit from the presence of a works council with regard to their user costs of labor: the "savings" due to avoided voluntary quits apparently more than compensate for the additional spending for severance payments and the costs of codetermination."

Works councils may but don't have to be asked for by the workers. Many firms don't have one. Hence the question when and why a works council is introduced is a very complicated one. What an influence have the industrial relations, productivity, profits and turnover *before* the works council is introduced?[1] The whole process of introducing a works council is much more complicated than usually assumed.

Moreover, the degree of apparent irrationality of the firms in question increases over time: the share of firms with a works council has been declining in recent years. According to the Max-Planck-Institut für Gesellschaftsforschung (1998), the share of firms with a works council in 1984 was 18.9 % and in 1994 only 15.0 %. It must therefore be established first whether the works council is such a great thing.

[1] See also the discussion on simultaneity issues below.

There are a number of firms which have no works council. These apparently irrational and inefficient firms survive and are not driven out of the market. Unfortunately Frick (1996) does not explain, why we still observe these firms and why these firms even show a higher productivity (FitzRoy and Kraft 1987). Furthermore, according to Addison, Schnabel and Wagner (2000), profits are also lower in firms with 5 to 100 employees which have a works council (a result, which contradicts Frick's statement above).

There may well be situations where an exogenous impact is necessary to reach optimality, and Freeman and Lazear (1995) give a number of possible reasons for this. However, in his article Frick does not present a convincing argument as to why this is the case for works councils. It has to be established in the first place why voluntary arrangements, which benefit both sides, are not introduced. Firms are obviously interested in reducing the quit rate, and of course think about internal communication in order to reduce turnover rates. Clearly, workers have an incentive to express their opinion, if there is a need for this.

The economic foundation remains fragmentary, as long as a clear argument is not presented as to why efficiency can be reached only by exogenous intervention. As already mentioned, such situations may exist, but it remains to be shown for the given context.

However, it is not useful to go deeper into this discussion, because this is not the real point of disagreement. Theory is not very helpful in this context, since neither the arguments for nor those against codetermination are totally convincing. The more interesting debate concerns the empirical test.

3. Data

The data source used in the study of Frick (1996) was collected by the Infratest institute in order to investigate the effects of the Beschäftigungsförderungsgesetz (BeschFG, Employment Promotion Act) from 1985, conducted by the Science Center Berlin on behalf of the German ministry of social affairs. Unfortunately, variables of basic economic importance are missing due to the specific purpose of the study. For example, no information on output (changes) or wages (development) is available. Although works councils are not legally allowed to negotiate about wages, they are nevertheless able to influence the average wage level. Wages are negotiated at industry level, but of course the individual wage also depends on the necessary education and the specific circumstances (wage differentials). At industry level job classifications are also determined and at firm level the works council decides together with the management how jobs within the firm should be classified according to the general scheme. Hence a "good" classification will increase the wage level, and works councils are able to influence such classifications. As data on

firm wages is not collected, any conclusion has to be made under the proviso that central economic variables are omitted.

I have access to this particular data source. An inspection reveals that some variables are problematic. Most importantly the data on dismissals can be put into question. One can also consider fixed-term contracts which were not prolonged, as well as the apprentices who did not receive a contract after finishing their apprenticeship. These can also be regarded as dismissals, as the contracts end because the employer wants them to end. It is certainly easier to allow a fixed-term contract to expire than to terminate a regular labor contract, but it is nevertheless a termination. The particular data source in question was explicitly concerned with the termination of fixed time contracts because a major feature of the employment promotion act was a prolongation of the maximum time possible for fixed-term contracts. Thus information on fixed-term contracts, their extension or non-prolongation, and apprentices is readily available, and the effect of the works councils on a variable DISMISSALS defined in such a way is an interesting question.

It is certainly possible that firms with a works council more frequently use fixed-term contracts than others, and that, in the presence of works councils, dismissals take place more frequently by way of allowing fixed-term contracts to expire. This would imply a shifting of dismissals to the short term employed (something like outsiders) and a relatively more secure employment of the persons with an unlimited contract (insiders), but it would not imply lower overall dismissal rates.

Frick uses a variable called AGE, which indicates linearly the age of the firm in question. This does not make much sense, as e.g. the oldest firm in the sample is 437 years old and the mean value is more than fifty years. Clearly the linear use of such data is not very meaningful as any difference in foundation time will be insignificant after, say, twenty to thirty years. Hence, either a logarithmic transformation or dummy-variables indicating the firm's existence for 1 to 10 years, 10 to 20 years, etc. would appear much better suited to estimate age effects. Perhaps Frick uses a logarithmic transformation, but this is not expressed in the paper.

4. Econometric Issues

4.1 Specification of the Dependent Variable

The data used by Frick has not been published, and very few people have access to it. I have the opportunity to use the same data source for this replication study. Originally 4997 firms were approached and 2392 responded to the survey. However, several companies delivered incomplete answers to the questionnaire, so that only 1616 can be used by Frick. I construct a similar

data set as Frick, excluding missing or inconsistent answers. I end up with 1653 observations. All of the following comments are based on my data set, which is, however, close to and comparable to the one used by Frick.

Without explicit explanation, Frick uses a very specific parameterization of his dependent variable dismissal and quit rate. He uses ln(RATE/(1-RATE)) with RATE defined as dismissals per 100 employees. This specific parameterization is useful if the dependent variable has values close to zero, but actually never includes the value zero. In his case this specification is definitely useless for two reasons: in 473 cases firms haven't dismissed anybody and in 267 cases firms haven't experienced any quitting by employees. This problem is not discussed in the article at all. Hence I do not know how Frick deals with it. Obviously it makes no sense to omit these observations, since very important information would get lost.

Whilst recalculating with the data Frick uses, I tried ln(1+(RATE/(1-RATE))), ln(.000000001+(RATE/(1-RATE))) and ln((RATE+.01)/(1-RATE+.01)), with RATE being the dismissal and quit rate respectively, but the coefficients and t-values are quite different to the ones reported by Frick (1996). For my Tobit calculations I simply use RATE=dismissals (quits)/employees. However, I begin by reporting the results of OLS regressions with the dependent variable ln(1+(RATE/(1-RATE))), ln(.000000001+(RATE/(1-RATE))) and ln((RATE+.01)/(1-RATE+.01)).

It is unplausible that Frick has actually used dismissals per 100 employees, as then this ratio is usually not close to zero and the logistic specification makes not much sense. Furthermore recalculations show, that the works council is never negatively significant but in some cases positively significant. I assume that he has used dismissals/employees instead. I report some of the regressions with RATE=dismissals*100/employees in the appendix, but the results are not in his favor. Otherwise RATE=dismissals(quits)/employees is used.

4.2 Heteroscedasticity

Büchtemann and Höland (1989) calculate a weighting scheme in order to correct the over-sampling of larger firms and those from manufacturing. Frick (1996, Fn 13) says that he uses this weight in order to correct for heteroscedasticity.

The results of the Breusch-Pagan test on heteroscedasticity are presented at the bottom of table one. Ahead of the weighting in all cases the Breusch-Pagan and Harvey tests on heteroscedasticity produces a Chi-square statistic, which points to severe problems. Clearly, heteroscedasticity is present here. However, weighting by the mentioned variable does not cure it. After weighting with it, the Breusch-Pagan and Harvey tests show higher values for every specification of the dependent variable. Thus contrary to what is claimed, this

particular procedure does not solve the problem, but aggravates it by a multitude. Clearly, all standard deviations are inconsistent in this case. One has to apply the White (1980) method to calculate heteroscedastic-consistent standard deviations.

To avoid intensifying the problem of heteroscedasticity by using the weighting scheme, the Tobit models presented below are based on unweighted data. However, the use of the weighted data does not lead to qualitatively different conclusions.

4.3 Ordinary Least Squares With Limited Dependent Variables

Frick's econometric specification has a further fundamental problem. Apparently Frick has not drawn the appropriate conclusions from the fact that, in 29 % of all cases, the firms have not dismissed anybody. He has the classical limited dependent variable case in which Tobit has to be applied. As Amemyia (1985, 367) puts it: "... clearly indicates that the least square estimator of beta is biased and inconsistent, but the direction and magnitude of the bias or inconsistency cannot be shown without further assumptions." Or Kennedy (1992, 232): "If the dependent variable is limited in some way, OLS estimates are biased, even asymptotically". Thus all of his results on dismissals and quits are invalid, none of his conclusions is based on reliable empirical research, and the policy implications are therefore worthless. There is no way to save his estimates.

The same is true with respect to his analysis of quitting. The percentage of firms where no person quitted is 17 % and thus less than with respect to dismissals, but still high enough to make the estimates biased. In this case too, OLS is not permissible and will produce wrong results.

4.4 Simultaneity

As it is well known, all research on turnover must consider simultaneous equation relationships between potential endogenous variables. Examples are wages and quitting, or worker decision rights and quitting.

Frick (1996, Fn 13) claims that he has tried 2SLS in order to check for simultaneity but the results didn't change. This may or may not be true, but as Least Square methods are inappropriate anyway, and simultaneous Tobit-models have to be applied, it doesn't really matter.

Ignoring simultaneity may be understandable in the case of dismissals, as the literature on this topic is not very developed. However, articles about quitting have been published for some time now and they frequently consider endogenous relationships.

In his case the most important variable, works councils, is potentially endogenously determined. *Ceteris paribus* a high quitting rate expresses bad industrial relations. With comparatively bad industrial relations on the one hand, the existence of a works council becomes more probable as a way to express dissatisfaction with the situation. This follows directly from the exit-voice theory, which Frick uses as the theoretical basis of his study.

On the other hand, in a company with poor industrial relations the management might exert pressure on the workforce in order to avoid the request for a works council. At least it is well known that some companies behave in this way, but of course there is no reliable empirical evidence available.

As industrial relations are an unobservable variable, which may either favor or, to the contrary, oppose the introduction of a works council, the direction of the possible simultaneous equation bias is difficult to identify *a priori.* If poor industrial relations induce high turnover rates and simultaneously determine the existence of a works council, the coefficient will be overestimated. If high turnover rates are connected with a lower than average probability of the existence of a works council, the coefficient will be underestimated.

Another reason for a negative bias is also possible: unions in Germany are traditionally dominated by male, German, qualified blue-collar workers of medium or more senior age working full-time. Hence it is also plausible that firms with a high share of male, German skilled workers will also have a works council. (The Probit equation explaining the existence of a works council, presented below, in part supports this assertion.) On the other hand, the type of workers mentioned shows a relatively lower turnover rate than, for example, women, who interrupt their career for childbearing or other reasons[2]. Moreover, it makes sense to be committed by way of a works council if a longer-term relationship between the workers and the firm is to be expected. Then a work force which has a low turnover rate leads to the introduction of a works council and not vice versa, and the single equation coefficient of WOCOUNC is biased. Hence a simultaneous relation between quit rates and the works council is plausible, but the direction is unclear. Whatever its direction, the existence of a bias is quite plausible and its impact must be tested.

This is even more of a problem, as the firm wages are not included (only industry averages are included) and wages may well be affected by either the quit rate or the existence of a works council, or both. If wages are not taken into account, their determinants, as well as their effects on quitting, might lead to an omitted variable bias, as works councils may well influence (increase) the average wage level and this in turn will affect (reduce) the turnover rate. If the remuneration were used as an additional variable, the direct effect could

[2] Some of the mentioned effects are controlled for in the estimations of the quitting equations, others are not.

be estimated. However, in the absence of this variable, its influence is perhaps attributed to the works council variable.

5. Empirical Re-Estimation

In principle my estimations are based on the same data source that Frick used. However, I do not enlarge the data by variables from other sources like WAGEDIFF and PERCUNION. These variables are insignificant in Frick's regressions and therefore it does not seem worthwhile including them. However, the unemployment rate at industry level is important but missing from my data. Unfortunately, I was unable to include this variable. Frick's article (1996) does not inform the reader about the source of this important variable. I approached the Federal Statistical Office in Germany and the research institute of the central employment office (IAB) and both institutions were unable to deliver data and were also unable to name a possible source for this data.

Originally the data collected by Infratest on behalf of the Science Center Berlin covered about 4000 firms. However, the data shows several gaps, and if I construct a data set similar to Frick's I end up with 1653 observations compared with 1616 used by Frick. I discard data if it is incomplete or implausible, e.g. if the ratio of female to the total number of workers is reported to be larger than one, if total employment in 1985 (the base year of the investigation) is zero or negative, if more dismissals or quits than employees are recorded or values for part-time employees are larger than total employment etc.

It turns out that the variable WOCOUNC is significant only in some specifications, namely if ln(1+RATE/(1-RATE)) is used (without weighting) or if ln(RATE+.01/(1-RATE+.01)) is applied[3]. However there remain differences with respect to Frick's results, which I cannot explain. However, his results should survive specification changes, as otherwise there might be spurious relations. Furthermore, there are obvious inconsistencies with his data and his results, which may be responsible for the differences: for example, given the coefficient of FIRMAGE in Frick it is rather unlikely that this is used in a linear way. Footnote 8 states that, in his sample, 32 % of all firms have a works council. According to the mean values shown in Table A1 24 % have one.

As explained in Section 3, Frick's use of OLS is inappropriate, as it leads to biased estimates. Therefore, Tobit has to be used. The estimation of the required Tobit model turns out to be more difficult than expected. Heteroscedasticity of the residuals leads to inconsistent coefficients if Tobit is applied, not

[3] WOCOUNC is always insignificant (and has sometimes a positive coefficient), if the percentage of dismissals instead of the ratio is used. See appendix.

only to inefficient standard errors as in the case of OLS (Amemyia 1985). I therefore have to use a specific heteroscedasticity model of Tobit. A Tobit model with multiplicative heteroscedasticity is considered. The variance σ^2 is replaced by$\sigma_i^2 = \sigma^2 e^{\gamma' z_i}$ (Cf. Greene 1997, p. 699). The additional parameters to be estimated are denoted by γ_i and the weights z_i used are determined by appropriate tests.

I use the same abbreviations as Frick for the variables in question. The definitions of all variables are given in the appendix.

Table 1 reports the results with respect to dismissals. The different OLS methods which one might think of in order to "deal with" the problem of zero dismissal rates are exposed. In rows seven and eight the results of an estimate with two corrections are presented: the variable FIRMAGE is substituted by three AGE dummies, which have unit value if the firm in question is either less than six years old, or between six and ten years old or has existed for between eleven and twenty years. Secondly, the necessary Tobit model has been applied.

Regarding the results, the variable WOCOUNC is no longer significant at conventional levels if the correct Tobit procedure is used. Hence Frick's result is highly sensitive and any policy conclusion has to be formulated very carefully, if at all.

The outcome of the estimation becomes even worse for Frick, if the dependent variable is corrected for non-prolonged fixed-term contracts and apprentices not employed after finishing their education. These are also employment relationships which end because of the will of the employer and such cases can be counted as dismissals. The corrected variable, taking into account the cases mentioned, is called DISS 2. The results are presented in Table 2. Tobit, similarly to non-reported OLS estimates, leads to a positive and significant effect of the works council. Hence, if the modified measure of dismissals is used, just the contrary of what Frick claims is true. Firms with a works council dismiss more, and not less, persons. However, as might be expected, they use the instrument of fixed-term contracts, because, in this case, German legislation makes it much easier to dismiss someone, but to the people who are dismissed it will not make much difference whether they are made redundant due to a regular dismissal or because a fixed term contract has expired without prolongation. The difference between the two specifications of dismissal rates is most likely due to the more frequent use of fixed-term contracts in firms with a works council. Following this line of reasoning works councils are probably good for "insiders" with unlimited contracts and bad for "outsiders" with fixed-term contracts. However, the most important result is that, on average, works councils are unable to reduce dismissals; on the contrary, dismissals are more frequent in such firms.

Table 1: **Determinants of Dismissals in German Firms**

Method	OLS With Büchtemann / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchteman / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchtemann / Hölan weighting scheme	OLS Without Büchtemann / Höland weighting scheme	TOBIT Weighting according to $\sigma_i^2 = \sigma^2 e^{\gamma' z_i}$	TOBIT-IV Weighting according to $\sigma_i^2 = \sigma^2 e^{\gamma' z_i}$
Dependent Variable → / Explanatory Variable ↓	ln (.000000001+ RATE / (1-RATE)	ln (.000000001+ RATE / (1-RATE)	ln (1+Rate / (1-RATE))	ln (1+RATE / (1-RATE))	ln ((RATE+.01) / (1-RATE+.01))	ln ((RATE+.01) / (1-RATE+.01))	RATE	RATE
FSIZE49	.25 (.51 / .28)	.91 (1.62 / 1.44)	-.05 (-4.70 / -3.12)	-.04 (-4.06 / -3.35)	-.33 (-4.12 / -2.33)	-.16 (-1.80 / -1.58)	.002 (.1)	-.07 (-.05)
FSIZE99	4.93 (3.48 / 4.10)	2.72 (4.02 / 3.86)	-.02 (-.52 / -.40)	-.05 (-3.85 / -3.82)	.49 (2.11 / 2.04)	-.09 (-.84 / -.82)	.01 (1.04)	.02 (1.00)
FSIZE100+	4.64 (1.50 / 2.63)	4.53 (6.32 / 6.41)	-.14 (-1.99 / -3.63)	-.07 (-4.91 / -4.98)	.18 (.35 / .61)	-.24 (-2.03 / -2.05)	.01 (.90)	.02 (.94)
BANK&INS	-2.27 (-.91 / -1.06)	-.62 (-.51 / -.50)	.003 (.005 / .10)	-.01 (-.64 / -.91)	-.47 (-1.15 / -1.42)	-.33 (-1.67 / -1.90)	-.004 (-.34)	
CONSTRUC	1.50 (1.91 / 1.34)	1.70 (2.37 / 2.48)	.06 (3.46 / 2.42)	.03 (1.86 / 1.64)	.08 (.60 / .40)	.41 (3.52 / 3.38)	.05 (4.43)	.05 (4.28)
RETAIL	1.70 (2.23 / 1.40)	1.81 (2.67 / 2.59)	.06 (3.70 / 2.95)	.01 (.72 / .81)	.04 (.28 / .17)	.20 (1.86 / 1.87)	.02 (2.00)	.03 (2.66)
SERVICES	.32 (.41 / .23)	-.26 (-.40 / -.38)	.05 (2.79 / 1.84)	.02 (1.89 / 1.44)	-.07 (-.56 / -.32)	.05 (.47 / .43)	.004 (.31)	.003 (.26)
TRAFFIC	.64 (.57 / .32)	.52 (.39 / .37)	-.003 (-.14 / -.14)	-.04 (-1.34 / -1.80)	-.21 (-1.12 / -.67)	-.11 (-.54 / -.51)	.02 (1.04)	.03 (1.45)
FIRMAGE	-.0008 (-.18 / -.11)	-.001 (-2.49 / -2.36)	-.00005 (-.47 / -.29)	-.01 (-1.74 / -1.34)	-.001 (-1.41 / -1.02)	-.002 (-.002 / -2.39)		
AGE5							.06 (2.14)	.07 (2.17)
AGE10							.03 (1.61)	.03 (1.57)
AGE20							.01 (1.51)	.02 (1.54)

SINGLE	.79 (1.32/.75)	-.21 (-.45/-.49)	-.006 (-.47/-.29)	-.005 (-.005/-.59)	.07 (.72/.44)	-.04 (-.49/-.53)	-.002 (-.27)	
LABINT	-.009 (-.66/-.32)	.02 (1.52/1.43)	.0008 (2.77/1.13)	.0005 (2.05/1.77)	-.002 (-.74/-.36)	.005 (2.15/2.01)	.0002 (1.13)	.0003 (1.36)
HIREPROB	-2.26 (-5.76/-4.20)	.1,40 (-4.72/-4.65)	-.02 (-3.46/-2.25)	-.02 (-2.81/-2.72)	-.45 (-8.99/-5.10)	-.20 (-4.23/-4.12)	-.008 (-1.91)	-.009 (-1.98)
SEASON	-2.68 (-5.76/-2.99)	-1.54 (-3.70/-3.70)	-.01 (-1.14/-.59)	-.02 (-2.53/-2.44)	-.46 (-6.00/-3.12)	-.26 (-3.90/-3.94)	-.01 (-2.01)	-.01 (-2.05)
SHORTTIME	-.14 (-.38/-.19)	-.32 (-.84/-.84)	.04 (4.44/2.67)	-.01 (-1.27/-1.24)	-.25 (-4.14/-2.01)	-.11 (-1.69/-1.63)	-.006 (-.94)	-.006 (-.95)
CHEMPLOY	-1.35 (-1.01/-.58)	-.26 (-.33/-.41)	.04 (1.26/.30)	-.03 (-1.92/-.95)	-.26 (-1.16/-.49)	-.16 (-1.24/-.87)	.01 (2.07)	.01 (1.96)
PERCQUAL	.0001 (.02/.09)	-5.71 (-5.53/-5.45)	-.00006 (-.55/-1.43)	-.09 (-4.48/-4.39)	-.0003 (-.40/-1.17)	-1.11 (-6.67/-6.41)	-.08 (-5.27)	-.09 (-5.22)
PERCBLUE	.57 (-.69/-.32)	3.95 (3.79/3.56)	.05 (2.69/1.23)	.05 (2.42/2.23)	-.25 (-1.84/-.84)	.66 (3.92/3.70)	.06 (3.99)	.07 (4.97)
PERCPART	-3.52 (-2.38/-1.19)	-3.72 (-2.21/-2.04)	-.02 (-.51/.31)	.01 (.43/.42)	-.30 (-1.24/-.66)	-.38 (-1.40/-1.24)	-.05 (-1.49)	-.06 (-1.58)
PERCFEMA	-.73 (-.66/-.33)	-.35 (-.34/-.33)	.007 (.30/.18)	-.05 (-2.64/-2.87)	-.25 (-1.34/-.66)	-.27 (-1.63/-1.59)	-.016 (-1.16)	-.015 (-1.01)
PERCAPR	-10.32 (-4.44/-2.31)	-8.05 (-3.11/-2.83)	-.26 (-4.93/-2.59)	-.18 (-3.47/-2.43)	-1.99 (-5.17/-2.70)	-1.70 (-4.06/-3.71)	-.12 (-2.49)	-.12 (-2.54)
WOCOUNC	-.29 (-.49/-.29)	-.24 (-.46/-.46)	-.01 (-.91/-.88)	-.20 (-2.17/-2.80)	-.17 (-1.72/-1.33)	-.17 (-2.11/-2.22)	-.011 (-1.48)	-.017 (-1.00)
CONSTANT	-.34 (-.55/-.76)	-4.57 (-2.62/-2.60)	.03 (1.83/2.54)	.23 (6.89/5.92)	-.16 (-1.57/2.07)	-1.79 (-6.36/-6.17)	.07 (2.42)	.07 (2.24)
R^2	.40	.11	.19	.09	.67	.10		
adj R^2	.39	.10	.18	.07	.67	.09		
Breusch-Pagan X^2	1028.64	250.78	112.26	30.33	689.79	197.20		
Harvey X^2	2651.96	610.08	1360.48	446.16	1702.79	144.89		
Log Likelihood							614.38	601.06

Notes: Uncorrected t-values and White heteroscedasticity-consistent t-values in parentheses, $n = 1653$.

Table 2

Determinants of Dismissals in Germany Including Fixed Term Contracts not Prolonged and Apprentices not Hired

Method	Weighted Tobit
Dependent variable →	DISS2
Explanatory Variables ↓	
FSIZE49	-.005 (-.69)
FSIZE99	.008 (.80)
FSIZE100+	.02 (1.95)
BANK&INS	-.01 (-.71)
CONSTRUC	.001 (.13)
RETAIL	.009 (1.02)
OSERVICES	.005 (.56)
TRAFFIC	.009 (.52)
AGE5	.005 (.37)
AGE10	.016 (1.38)
AGE20	.007 (.96)
SINGLE	.5 (.67)
LABINT	-.00006 (-.34)
HIREPROB	-.005 (-1.33)
SEASON	-.02 (-3.86)
SHORTTIME	.0004 (.07)
CHEMPLOY	-.02 (-1.72)
PERCQUAL	-.005 (-.35)
PERCBLUE	.003 (.25)

Method	Weighted Tobit
Dependent variable →	DISS2
Explanatory Variables ↓	
PERCPART	-.008 (-.38)
PERCFEMA	.02 (1.27)
PERCAPR	.15 (4.24)
WOCOUNC	.017 (2.45)
CONSTANT	.05 (1.91)
Log Likelihood	1197.40

Notes: t-values in parenthesis, $n = 1653$.

With respect to the quit rate, single equation and simultaneous equation Tobit models are estimated, taking into account the endogeneity of the works council. These results are displayed in Table 3.

If the three size dummies are used, the works council appears to be slightly significant, albeit at the unusual level of only 10%. However, if as an alternative to the size dummies, the log of employment ln(employment) is used, the works council dummy is clearly insignificant. The same is true if the potential endogeneity of the works council is taken into account[4]. Hence, at conventional significance levels the works council is never significant and therefore if the appropriate procedure is applied, the effect suggested by Frick's analysis disappears. There is no estimable impact by the works council on turnover. Hence, one can interprete these results as a confirmation of ealier research by myself (Kraft 1986)[5].

6. Conclusion

The analysis of the impact of works councils for turnover is of high political relevance. The EU has introduced a European works councils (however with less codetermination rights), and the discussion on non-union worker representatives is by no means restricted to Germany. Given that the theoretical discussion is quite ambiguous, empirical research is highly valuable.

[4] If ln(Employment) is used as the size variable, the coefficient of the works council becomes even positive.

[5] In Kraft (1986) not the simultaneity between works councils and quits is corrected but industrial relations are taken into account by use of a participation proxy, which is endogenously treated. Wages are as well included in this study.

Table 3

Determinants of Quits in Germany

Estimation Procedure	Weighted Tobit Single Equation	Weighted Tobit Single Equation	Weighted Tobit Simultaneous Equation	Probit Simultaneous Equation
Dependent Variable → / Explanatory Variables ↓	Quit Rate	Quit Rate	Quit Rate	Works Council
Ln(Employment)		-.01 (-.59)		
FSIZE49 90	.02 (1.76)		.02 (1.94)	.95 (6.77)
FSIZE99	.03 (2.02)		.03 (1.98)	1.76 (11.32)
FSIZE100+	.03 (2.13)		.04 (2.05)	2.61 (16.53)
BANK&INS	-.03 (-1.56)	-.03 (-1.91)	-.03 (-1.401	-.11 (-.39)
CONSTRUC	-.01 (-1.11)	-.01 (-1.14)	-.01 (-1.30)	-.34 (-2.26)
RETAIL	.02 (1.65)	.02 (1.48)	.02 (1.78)	-.42 (-2.85)
OSERVICES	.02 (1.12)	.02 (.99)	.02 (1.51)	-.15 (-.87)
TRAFFIC	.01 (.41)	.005 (.15)	.02 (.51)	
AGE5	.02 (.90)	.01 (.47)	.02 (.72)	-.21 (-.79)
AGE10	.02 (1.22)	.01 (.93)	.02 (1.27)	-.32 (-1.51)
AGE20	.02 (1.55)	.01 (1.16)	.02 (1.40)	-.35 (-2.36)
SINGLE	.007 (1.03)	.009 (1.17)		.20 (2.04)
LABINT	.0004 (2.11)	.0005 (2.34)	.0003 (1.56)	
HIREPROB	-.009 (-2.06)	-.01 (-2.18)	-.01 (-2.21)	.12 (1.52)
SEASON	.002 (.37)	.005 (.81)		-.05 (-.61)
SHORTTIME	.002 (.29)	.001 (.27)		-.21 (-2.81)
CHEMPLOY	.03 (1.75)	.03 (1.57)	.03 (1.86)	
PERCQUAL	-.03 (-1.73)	-.03 (-1.59)	-.02 (-1.41)	.74 (3.29)

Estimation Procedure	Weighted Tobit Single Equation	Weighted Tobit Single Equation	Weighted Tobit Simultaneous Equation	Probit Simultaneous Equation
Dependent Variable →	Quit Rate	Quit Rate	Quit Rate	Works Council
Explanatory Variables ↓				
PERCBLUE	.005 (.27)	.0004 (.02)	.003 (.14)	-.47 (-2.25)
PERCPART	-.0003 (-.01)	-.02 (-.74)		-.83 (-2.41)
PERCFEMA	.07 (4.09)	.08 (4.62)	.07 (4.50)	.04 (.10)
PERCAPPR	.03 (.52)	.03 (.56)		-.56 (-.97)
WOCOUNC	-.01 (-1.73)	-.006 (-.74)	-.01 (-.94)	
DISRATE	-.0002 (-.004)	.002 (.05)	.007 (.17)	
QUITS				-3.19 (-.51)
CONSTANT	.05 (1.76)	.07 (2.73)	.06 (2.72)	-.26 (-.40)
Log Likelihood	881.99	884.95	863.23	-727.12

Notes: t-values in parenthesis, $n = 1653$.

The purpose of the present study is the replication of earlier results by Frick (1996). He claims that the existence of a works council reduces both the number of dismissals and quits. Recalculations by use of other methods and differently calculated variables lead to opposite results. At least a lot remains open to discussion, because if the correct method, Tobit, and/or corrected data is applied, no significant impact by the works council can be estimated. If the variable dismissals is enlarged to include expired fixed-term contracts and apprentices without further employment at the firm where they did their apprenticeship, just the opposite of what Frick claims is estimated. Regarding quits, no effect of the works council is estimable.

This replication study demonstrates, that is is not a trivial task to produce results, which are robust to changes in the econometric methodology and variables construction.

Appendix 1

Ln(Employment)	Natural log of the number of employees
FSIZE49	Firms with 20 – 49 employees
FSIZE99	Firms with 50 – 99 employees

FSIZE100+	Firms with 100 or more employees
INDUST	Firms operating in manufacturing industry
CONSTRUCT	Firms operating in construction
RETAIL	Firms operating in retailing
TRAFFIC	Firms operating in traffic and communications
BAnKS&INS	Firms operating in banking and insurance
OSERVICES	Firms operating in other private services
SINGLE	Multi-plant firm
LABINT	Wages and salaries as a percentage of sales
WOCOUNC	Works council dummy (1=yes)
SEASON	Firm reports seasonal fluctuations
HIREPROB	Firm reports hiring problems
CHEMPLOY	Change in employment (employment 1987-employment 1985)/employment 1985
FIRMAGE	Firm's age
AGE5	Firm has existed for not more than five years
AGE10	Firm is between six and ten years old
AGE20	Firm is between 11 and 20 years old
PERCFEMA	Ratio of workforce female
PERCAPR	Ratio of apprentices in relation to total workforce
PERCQUAL	Ratio of qualified employees
PERCPART	Ratio of part-time employees
PERCBLUE	Ratio of blue-collar workers

Appendix 2: Determinants of Dismissals in German Firms RATE=Dismisals*100 / Employees

Method	OLS With Büchtemann / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchteman / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchtemann / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme
Dependent Variable →	ln (0.000000001+ RATE / (1-RATE)	ln (.000000001+ RATE / (1-RATE)	ln (1+Rate / (1-RATE))	ln (1+RATE / (1-RATE))	ln ((RATE+.01) / (1-RATE+.01))	ln ((RATE+.01) / (1-RATE+.01))
Explanatory Variable ↓						
FSIZE49	.80 (1.51 / .80)	1.43 (2.26 / 2.05)	-.0005 (-.14 / -1.18)	-.001 (-.03 / -.12	.09 (1.51 / .81)	.17 (2.19 / 2.14)
FSIZE99	5.79 (3.71 / 4.38)	3.77 (4.92 / 4.78)	.002 (.23 / -.84)	.001 (.04 / .11)	.68 (3.76 / 4.46)	.47 (4.88 / 4.96)
FSIZE100+	6.13 (1.79 / 3.14)	6.58 (8.11 / 68.24)	.24 (10.81 / -4.48)	.23 (7.78 / 7.12)	.92 (2.31 / 3.90)	.91 (9.07 / 9.02)
BANK&INS	-2.29 (-.83 / -.97)	-.01 (-.01 / -.09)	.005 (.27 / 1.58)	.16 (3.32 / 2.34)	-.26 (-.83 / -.96)	.04 (.23 / .22)
CONSTRUC	1.85 (2.14 / 1.59)	1.60 (1.97 / 2.11)	-.002 (-.43 / -1.25)	-.04 (-1.35 / -1.77)	.21 (2.10 / 1.47)	.16 (1.53 / 1.69)
RETAIL	2.18 (2.60 / 1.64)	2.10 (2.73 / 2.66)	-.0005 (-.09 / -.33)	.02 (.66 / .72)	.25 (2.56 / 1.62)	.24 (2.57 / 2.58)
SERVICES	.52 (.61 / .35)	-.33 (-.45 / -.43)	-.0003 (-.05 / -.11)	.04 (1.49 / 1.20)	.06 (.57 / .33)	-.005 (-.06 / -.05)
TRAFFIC	1.13 (.91 / .52)	.97 (.65 / .62)	.0006 (.07 / .21)	.07 (1.25 / -1.31)	.13 (.89 / .50)	.12 (.65 / .65)
FIRMAGE	.0004 (.07 / .05)	-.01 (-2.25 / -2.13)	.000006 (.19 / .88)	.0002 (1.05 / .96)	.00003 (.04 / .03)	-.002 (-2.82 / -2.62)
SINGLE	.91 (1.40 / .79)	-.32 (-.59 / -.63)	-.002 (-.47 / -1.45)	-.04 (-2.03 / -1.74)	.11 (1.39 / .79)	-.05 (-.79 / -.83)
LABINT	-.009 (-.63 / -.31)	.02 (1.27 / 1.20)	-.00003 (-.34 / -1.13)	-.001 (-1.92 / -1.77)	-.001 (-.63 / -.31)	.002 (.87 / .83)
HIREPROB	-2.33 (-7.00 / -3.93)	-1.52 (-4.55 / -4.50)	.001 (.50 / 1.56)	.02 (1.85 / 2.36)	-.27 (-6.95 / -3.92)	-.17 (-4.00 / -4.05)

Continued Appendix 2

Method	OLS With Büchtemann / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchteman / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme	OLS With Büchtemann / Höland weighting scheme	OLS Without Büchtemann / Höland weighting scheme
Dependent Variable →	ln (0.000000001+ RATE / (1-RATE)	ln (.000000001+ RATE / (1-RATE)	ln (1+Rate / (1-RATE))	ln (1+RATE / (1-RATE))	ln ((RATE+.01) / (1-RATE+.01))	ln ((RATE+.01) / (1-RATE+.01))
Explanatory Variable ↓						
SEASON	-2.87 (-5.60 / -2.91)	-1.60 (-3.40 / -3.39)	-.0004 (-.01 / -.50)	-.01 (-.73 / -.74)	-.33 (-5.57 / -2.91)	-.21 (-3.54 / -3.55)
SHORTTIME	.16 (.40 / .20)	-.26 (-.60 / -.61)	.0004 (.14 / .40)	.03 (1.67 / 1.56)	.02 (.40 / .21)	-.03 (-.56 / -.51)
CHEMPLOY	-1.39 (-.94 / -.57)	-.06 (-.07 / -.10)	.002 (.21 / 1.66)	.02 (.61 / 1.60)	-.16 (-.94 / -.57)	-.02 (-.19 / -.28)
PERCQUAL	.0007 (.13 / .58)	-5.80 (-4.97 / -4.94)	.00006 (1.73 / 1.05)	.07 (1.67 / 1.70)	.00005 (.08 / .36)	-.68 (-4.71 / -4.72)
PERCBLUE	-.40 (-.44 / -.21)	3.38 (3.72 / 3.51)	.002 (.33 / 1.00)	.03 (.67 / .80)	-.04 (-.41 / -.19)	.51 (3.51 / 3.38)
PERCPART	-4.18 (-2.57 / -1.28)	-4.25 (-2.24 / -2.11)	.001 (.12 / .97)	.07 (.96 / 1.15)	-.48 (-2.56 / -1.28)	-.47 (-2.01 / -1.95)
PERCFEMA	-.63 (-.52 / -.26)	-.02 (-1.17 / -.01)	-.001 (-.16 / -.73)	-.03 (-.65 / -.89)	-.07 (-.51 / -.26)	-.02 (-.16 / -.17)
PERCAPR	-10.74 (-4.20 / -2.19)	-8.31 (-2.93 / -2.62)	-.001 (-.06 / -.33)	-.07 (-.62 / -1.05)	-1.24 (-4.17 / -2.18)	-.94 (-2.59 / -2.47)
WOCOUNC	-.14 (-.42 / -.12)	-.05 (-.09 / -.09)	.001 (.31 / 2.01)	.02 (.96 / 1.62)	-.02 (-.20 / -.12)	.01 (.11 / .11)
CONSTANT	-.22 (-.32 / -.44)	-3.83 (-1.95 / -1.94)	-.004 (-.95 / -1.10)	-.12 (-1.71 / -1.90)	-.03 (-.37 / -.52)	-.39 (-1.61 / -1.47)
R^2	.32	.13	.09	.11	.32	.14
adj R^2	.31	.12	.08	.10	.31	.13
Breusch-Pagan X^2	1038.90	189.68	84.54	103.76	1036.45	41.77
Harvey X^2	2600.67	599.06	3072.27	1840.76	2714.20	636.43

Notes: Uncorrected t-values and White heteroscedasticity-consistent t-values in parentheses, $n = 1653$.

References

Addison, J. T. / *Schnabel,* C. / *Wagner,* J. (2000): Die mitbestimmungsfreie Zone aus ökonomischer Sicht, Hamburger Jahrbuch für Wirtschafts- und Gesellschaftspolitik 45, 277 – 292.

Amemiya, T. (1985): Advanced Econometrics, Oxford.

Büchtemann, C. F. / *Höland,* A. (1989): Befristete Arbeitsverträge nach dem Beschäftigungsförderungsgesetz (BeschFG), Bonn: Bundesministerium für Arbeit und Sozialordnung.

Fitzroy, F. R. / *Kraft,* K. (1985): Unionization, Wages and Efficiency, Kyklos 38, 537 – 554.

Fitzroy, F. R. / *Kraft,* K. (1987): Efficiency and Internal Organization: Works Councils in West German Firms, Economica 54, 493 – 504.

Freeman, R. B. / *Lazear,* E. P. (1994): An Economic Analysis of Works Councils, in: J. Rogers. / W. Streek (Hrsg.), Works Councils – Consultation, Representation, and Cooperation in Industrial Relations, Chicago, 27 – 52.

Freeman, R. B. / *Medoff,* J. L. (1984): What Do Unions Do?, New York.

Frick, B. (1996): Codetermination and Personnel Turnover: The German Experience, Labour 10, 407 – 430.

Kennedy, P. (1992): A Guide to Econometrics, Oxford.

Kraft, K. (1986): Exit and Voice in the Labor Market: An Empirical Study of Quits, Journal of Institutional and Theoretical Economics 142, 697 – 715.

Max-Planck-Institut für Gesellschaftsforschung (1998): Die Entwicklung der Mitbestimmung in Daten, Cologne.

White, H. (1980): A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity, Econometrica 48, 817 – 830.