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Evidence from a
Polish Panel Data Set*

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**FIRMS' HETEROGENEITY IN TRANSITION :
EVIDENCE FROM A POLISH PANEL DATA SET**

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1. Introduction

This paper looks at the behavior of large industrial firms in Poland in 1988 - 1994. Having constructed a seven years panel of 173 large manufacturing enterprises, we are able to systematically test various hypotheses concerning firms reaction to the change in their environment. The observations start early enough to allow for a significant comparison of enterprise behavior before transition started, during the period of profound transformation and sharp decline in economic activity, and during the consecutive recovery which began in Poland in 1992.

At the early stages of transition there was a concern that in the absence of an adequate corporate governance, state-owned enterprises characterized by soft budget constraint would display inertia and opportunistic behavior. These fears were exacerbated in Poland where the employees held important rights of control that could degenerate into assets stripping, lack of lay-offs and excessive wage growth. Unexpectedly, however, empirical evidence provided by enterprise surveys and case studies (Dabrowski et al., 1992, Pinto et al., 1993, Estrin et al., 1993, Belka et al., 1994, Carlin et al., 1995) showed significant enterprise adjustment. The general conclusion emerging from these studies was that under the conditions of tightened macroeconomic financial discipline and increased product market competition most firms were forced to undertake important downsizing of output and employment. No link has been found between ownership and such restructuring: all firms, whether state-owned, commercialized, or privatized, were forced to adjust.

Firms responses were not, however, unanimous. If we look more closely at the way firms actually behave, a great heterogeneity in firms' reaction appears to be the dominant feature (Estrin, 1994). This suggest that beyond policy and structural changes common to all firms (mainly due to the shock of relative prices resulting from price and trade liberalization and to restrictive fiscal and monetary policies), there are firm-specific factors which influence in a significant way firms' adjustment.

In order to take into account such idiosyncratic elements we need large cross-section time-series enterprise level data base. Among first econometric studies relying on firm-level data are Halpern and Korösi (1995) analyzing the behavior of Hungarian exporting firms ; Basu et al. (1995) comparing employment and wage setting behavior at enterprise level in the Czech Republic, Hungary and Poland in the early years of transition ; Pinto and van Wijnbergen (1995) providing an econometric analysis based on data presented in Pinto et al. (1993) ; Cornelli et al. (1996) studying firms' financial structure.

Our longitudinal enterprise level data base is, to our knowledge, the first one covering the period of seven years for a significant part of the Polish manufacturing sector. Such panel allows to study in a systematic way the change in the enterprise behavior in response to the deep transformation in firms' macroeconomic, legal and institutional environment.

In section 2 we present the sample and show that firm intrasectoral heterogeneity sharply increases during the period of transition. The longitudinal dimension of our data set allows to take into account this heterogeneity. Introducing firm-specific effects we estimate in section 3 employment and wage equations. Our results confirm the hypothesis that firms have undertaken significant restructuring effort. Financial constraints placed upon firms provided incentives to search for ways of reducing costs. Firms started to shed labor and to control wages. Grosfeld and Roland (1996) have qualified such behavior as « defensive » in the sense that its primary goal was the immediate survival of the enterprises.

In section 4, we study the impact of ownership changes on enterprise behavior. Privatization affects enterprise employment and wage behavior. Its impact on the strategic part of restructuring, which is mainly proxied by investment decisions and output growth performance, is even more important. Section 5 concludes.

2. The data and the estimation method.

2.1 The sample

We use a panel of 173 large manufacturing firms for the period 1988 -1994. These firms belong to the biggest 500 (by sales) industrial enterprises in Poland. Most data for the state-owned firms come from the list of 500' public industrial enterprises published yearly until

1991 by *Zarządzanie* and then by the economic magazine, *Zycie Gospodarcze* (later *Nowe Zycie Gospodarcze*). Various other sources were used : lists of the biggest Polish firms (public and private) published by *Nowe Zycie Gospodarcze* and *Gazeta Bankowa*, public information on firms included in the mass privatization program, mandatory information disclosed by listed privatized companies (published in *Wyniki Finansowe Spolek Gieldowych*, Notoria Serwis) ; the missing data were directly obtained from the enterprises.¹

The selection procedure explains the major characteristics of the sample. First, it leads to a rather satisfactory coverage of the Polish manufacturing industry (see table A1 in appendix). This is due to the fact that the sample includes primarily large firms, even after the downsizing process has taken place: the average employment in the sample declines from 3773 in 1989 to 2613 in 1994. Second, it only includes enterprises that did exist in 1988 and were state-owned. The sample accordingly does not encompass *de novo* private firms and does not take into account firm exit. It reflects, however, changes in the ownership of the previously state-owned enterprises : we distinguish enterprises that remained state-owned, those that have been converted into Treasury owned joint-stock companies and are called "commercialized", and finally firms that have been privatized. The latter were mainly sold to strategic investors or via public offer. The relatively low number of privatized firms (15,6% of the total) simply reflects the slow pace of privatization of large enterprises in Poland, before the implementation in 1995 of the mass privatization program.² The yearly ownership structure of the sample is presented in table A2 in appendix.

The data include a large range of yearly information: number of employees, sales that will be considered as a proxy for output (after being deflated by the two-digit sectoral producer price index³), average monthly remuneration per employee, pre-tax and after-tax profits, investment expenditures (for the period 1992-1994) and subsidies. Descriptive statistics concerning the evolution of the main variables are displayed in table 1 and confirm the depth of adjustment of the enterprises in the sample. They show in particular that the large initial drop in production was first mainly accommodated through sharp reduction of real wages, and

¹ We have also included information on ten case studies analyzed under the ACE project n° 92-0223-R.

² On the results of the Polish privatization strategy, see Nivet (1997).

³ In 1994 the Polish Statistical Office (GUS) changed the sectoral nomenclature adopting the European standards. All sectoral variables used in this paper refer accordingly to the first classification (KGN) before 1994 and to the new one in 1994 (EKD).

then through important decline of employment allowing for an increase in productivity and real wages.⁴ Graph A1 in appendix shows that the dynamics of our sample fairly reflects the dynamics of the whole Polish industry. The main difference concerns the output growth, which in the Polish industry has been positive since 1992 while it remained negative in our sample until 1994. This difference is probably due to the contribution of the new private sector to the Polish recovery. This recovery is not observable in our sample because it is composed of the initially state-owned enterprises. Consequently, the growth of labor productivity in our sample is lower than in the Polish industry.

Table 1 : Mean values of variables, standard deviations in parentheses

	1989	1990	1991	1992	1993	1994
Growth rate of output	- 0.029 (0.226)	- 0.250 (0.304)	- 0.117 (0.296)	- 0.034 (0.257)	- 0.013 (0.210)	- 0.004 (0.291)
Growth rate of employment	- 0.036 (0.075)	- 0.039 (0.062)	- 0.120 (0.188)	- 0.061 (0.205)	- 0.033 (0.143)	- 0.047 (0.159)
Growth rate of labor productivity	0.007 (0.219)	- 0.211 (0.295)	0.003 (0.341)	0.028 (0.289)	0.019 (0.203)	0.043 (0.254)
Growth rate of real wages	0.201 (0.223)	- 0.364 (0.229)	0.213 (0.174)	0.278 (0.134)	0.063 (0.161)	0.102 (0.159)
Rate of investment	-	-	-	0.050 (0.044)	0.054 (0.068)	0.066 (0.080)
Gross profit margin	0.401 (0.186)	0.305 (0.156)	0.077 (0.205)	0.043 (0.196)	0.049 (0.154)	0.066 (0.106)
Net profit margin	0.234 (0.135)	0.127 (0.093)	- 0.013 (0.174)	- 0.017 (0.182)	- 0.001 (0.150)	0.031 (0.089)

The rates of growth are measured as first differences of logarithms. Labor productivity is defined as output per employee ; real wages stand for nominal monthly wages deflated by the sectoral PPI (using CPI would give a different picture; taking 1989 = 100, the CPI stands in 1994 at 2987.3, the PPI at 2262.6); rate of investment is the ratio of investment to lagged output ; gross profit margin is the ratio of pre-tax profits to sales ; net profit margin is the ratio of after-tax profits to sales

High values of standard deviations in table 1 reflect great variability in firms adjustment. The origin of this variability could be sector specific. In order to disentangle sectoral and firm specific components of variations, we have decomposed annual variances into inter-sectoral and intra-sectoral variances. The results show that the share of firm level idiosyncrasies strongly dominate sectoral specificities in firms adjustment. Moreover, the share of intra-sectoral variance is increasing for all variables from 1990 to 1994, with the most spectacular shift occurring in the case of real wages : see table 2 and graph A2 in appendix.

⁴ This kind of response has occurred in the most advanced CEE countries and sharply contrast with the initial response of Russian enterprises, where layoffs were maintained at a relatively low level due to an extreme wage flexibility, including unpaid wages : De Boissieu et al. (1995) speak about wage earners as the true « residual claimants ». Also see Cohen (1995), Duflo and Senik (1997).

Table 2 : Share of intra-sectoral variance in total variance, %

	1990	1994
Growth rate of output	73.5	85.0
Growth rate of employment	76.2	90.0
Growth rate of real wages	19.8	90.6
Rate of investment	81.4 (1992)	91.2

Total variance is calculated as: $\sigma^2 = \frac{1}{n-1} \sum_j (n_j - 1) \sigma_j^2 + \frac{1}{n-1} \sum_j n_j (\bar{x}_j - \bar{x})^2$ (j represents the two-digit sector), where the first term represents intra-sectoral variance and the second inter-sectoral variance.

2.2 The estimation method

We have shown in the previous section that the microeconomic performance appears increasingly firm-specific. In our econometric estimations we will take into account this specificity by using firm-specific explanatory variables. However if part of the heterogeneity were not captured by the regressors, the results would be biased. Therefore, taking advantage of the longitudinal character of our sample we introduce individual (firm) effects. Then the equations can be estimated using fixed effects or random effects methods. In a fixed effects model individual effects are considered as fixed parameters, while in a model with random effects, individual effects are considered to be randomly distributed across cross-sectional units. The general form of the equations will be as follows:

fixed effects model :
$$y_{it} = \alpha_i + X_{it} \beta + \varepsilon_{it}$$

where α_i is considered to be constant over time and specific to the *i*th firm;

random effects model :
$$y_{it} = \alpha + X_{it} \beta + u_i + \varepsilon_{it}$$

where u_i is constant over time random disturbance characterizing the *i*th firm.

In this paper we use random effects whenever Hausman test does not allow to reject the hypothesis that individual effects are not correlated with other regressors.

In order to test the hypothesis that the sectoral dimension of firm performance is weakening in transition, we systematically include in our estimations sector-specific variables. We also include time dummies whenever they are significant.

3. Defensive restructuring : reaction to the hardening budget constraint

There has been some discussion in the literature about how quickly and how far has enterprise budget constraint been hardened. We can find various direct and indirect evidence of such hardening. First, we look at the employment and wage behavior. Next, we consider how the change in firms environment has affected their profitability.

3.1. *Employment and wage setting behavior*

In order to investigate how the relationships between output, employment and wages have been modified during the transition period, we use a natural framework in which firms behavior is analyzed through the equations representing labor demand and wage setting at the firm level.⁵ We expect that the rate of growth of employment is an increasing function of the rate of growth of output and a decreasing function of the rate of growth of real wages. The latter, in turn, is expected to be an increasing function of labor productivity. In order to control for the sectoral evolution of employment and real wages, reflecting the structural changes in the economy, we include as explanatory variables in each equation the two-digit yearly sectoral counterparts of the endogenous variables : the sectoral rate of growth of employment and the sectoral rate of growth of real wages.⁶

We also introduce dummy variables representing the change in the ownership structure : privatization and commercialization. We use the following specifications :

$$dL_{ijt} = \alpha_i + \alpha_1 dY_{it} + \alpha_2 dW_{it} + \alpha_3 dL_{jt} + \alpha_4 PRIV_{it} + \alpha_5 COM_{it} + \varepsilon_{it}$$

$$dW_{ijt} = \beta_i + \beta_1 d(Y/L)_{it} + \beta_2 dW_{jt} + \beta_3 PRIV_{it} + \beta_4 COM_{it} + \omega_{it}$$

where

i stands for firm, j for sector, t for time; dL is the growth rate of employment, dY is the growth rate of output, dW is the growth rate of monthly real wages, d(Y/L) represents the growth rate of labor productivity, PRIV and COM are dummy variables representing the firm's ownership

⁵ Such framework is for instance used by Basu et al. (1995).

⁶ The importance of sectoral dimension in firms adjustment has been analyzed by Pinto et al. (1993), Halpern and Korösi (1995) and Estrin et al. (1993): they concluded that variations in firms adjustment was not correlated with sectors. Barbone et al. (1996) studying productivity growth in 88 Polish industries find, however, significant differences in the intensity of adjustment across sectors.

status (PRIV=1 if firm is privatized, 0 otherwise, COM=1 if firm is commercialized, 0 otherwise).

These equations reflect a cost minimization behavior : if the change in firms' environment occurs, i.e. if budget constraint is hardening and external financial sources used to cover costs are drying up, then the elasticities of labor demand to production (coefficient α_1) and of real wage to labor productivity (coefficient β_1) will increase. Also the negative elasticity of labor demand to real wage (coefficient α_2) will be higher.

The results are presented in tables 3 and 4. Because we have good reasons to expect that a structural break has occurred during the transition period, we first identify the breaking points for each equation: we test the hypothesis that the coefficients are stationary throughout 1988-1994. The hypothesis is rejected (according to the Chow test) and the systematic test of breaking points in regressions pooling yearly data (without individual effects) indicates that there are two such breaks in the employment equation (end 1990 and end 1991) and one in the wage equation (end 1991). Consequently, we present three sets of results for the employment equation and two sets of results for the wage equation.

The breaks are the first sign that firms behavior has changed in response to the implementation of reform measures. They reacted with a one - two years delay to the stabilization and liberalization package introduced at the end of 1989. This delay may be interpreted as the time needed to convince workers and managers that the economic regime has credibly changed.

In the employment equation, there is a sharp contrast between the initial and the last periods. The main difference concerns the radically increasing elasticities of employment to production and wages : the former increases four times, the latter five times. We take this result as clear evidence of the hardening budget constraint. Moreover, the sectoral component of the employment growth becomes insignificant after 1990. This could reflect a growing heterogeneity in firms behavior and an increasing capacity to differ from the general sectoral evolution. The impact of ownership changes will be discussed in section 4.

Table 3 : Estimates of employment growth equation. Dependent variable : dL_{ijt}

	1989-1990 <i>GLS. random effects</i>	1991 <i>OLS. no firm effects</i>	1992-1994 <i>GLS. random effects</i>
Constant	- 0.014** (0.007)	- 0.033 (0.026)	- 0.029** (0.012)
dY_{it}	0.060*** (0.015)	0.086 (0.112)	0.247*** (0.029)
dW_{it}	- 0.026** (0.012)	- 0.327*** (0.107)	- 0.127*** (0.041)
dL_{it}	0.322*** (0.103)	0.033 (0.087)	0.105 (0.094)
PRIV	-	0.195** (0.076)	0.042* (0.025)
COM	-	- 0.112** (0.050)	0.015 (0.015)
Hausman test	$\chi^2(3)=1.82$	-	$\chi^2(5)=7.33$
Number of observations	324	170	508
Adjusted R ²	0.343	0.112	0.155
Mean of dependent variable	- 0.038	- 0.121	- 0.047

Standard errors in parentheses ; ***: significant at 1%, **: significant at 5%, *: significant at 10%

Table 4 : Estimates of real wage growth equation. Dependent variable : dW_{ijt}

	1989-1991 <i>random effects</i>	1992-1994 <i>fixed effects</i>
Constant	0.024*** (0.006)	
$d(Y/L)_{it}$	0.149*** (0.020)	0.096*** (0.034)
dW_{it}	0.934*** (0.019)	1.004*** (0.067)
PRIV	-	0.147*** (0.057)
COM	-	0.075 (0.046)
Hausman test	$\chi^2(4)=0.81$	$\chi^2(4)=10.14$
Number of observations	494	508
Adjusted R ²	0.869	0.286
Mean of dependent variable	0.007	0.148

Standard errors in parentheses ; ***: significant at 1%, **: significant at 5%, *: significant at 10%

The picture provided by the wage equation is rather different : the coefficients of exogenous variables change little between the two periods. The growth rate of real wages depends on labor productivity growth (with a declining coefficient), but it mainly remains determined by the sectoral growth of real wages : we cannot even reject the hypothesis that the coefficient of the sectoral variable is equal to one at 5% level, for the second period. However, the fit of the regression measured by the adjusted R² collapses in 1992-1994, which suggests that the

explanatory power of sectoral wages strongly declines (this confirms the radical increase in the share of intra-sectoral variance in total variance that has been discussed in the previous section).

Both equations shed some light on the adjustment process which has been taking place within enterprises and give indirect evidence that financial constraints imposed on firms have been hardened. It is generally considered that cuts in direct subsidies and increased product market competition were two major factors which forced enterprises to adjust. We tried to test these hypotheses including appropriate proxies in wage and employment equations. The ratio of subsidization (defined as the ratio of subsidies to sales) had a positive and significant effect on the growth rate of real wages only during the first period 1989-1991, when the cut in subsidies was the most impressive. Insignificance of the coefficient of subsidies in the employment equation is surprising but may partly be explained by the weakness of our proxy which does not take into account indirect subsidies (tax arrears, etc.)

The role of the increased product market competition has been investigated in two different ways. First, we introduced a variable representing the firm's market share. Its coefficient proved to have a positive and significant effect on employment in 1991 : it shows that enterprises with greater market power were initially more reluctant, *ceteris paribus*, to adjust employment ; later on, however, the pressure to downsize affected all enterprises, the degree of their market share notwithstanding. Again, it can be interpreted as the sign of increasingly binding financial constraints and competition. Second, we wanted to test the role of foreign competition : it has been suggested that notably in Poland its contribution to firms adjustment was particularly strong. We have chosen to add, alternatively, in the equations two kinds of proxies for the external competitive pressure: the share of sectoral imports in sectoral production and a dummy representing net importing sectors. Both variables affected negatively the growth rate of real wages in the first period 1989-1991, but had no effect on employment growth. So the fact of being an import competing firm had a limited impact on large firms adjustment ⁷

⁷ This result may partly be due to the over-aggregation problem: because of data availability we used only one-digit classification. However, this kind of analysis, applied to other countries, produced ambiguous results. Djankov and Hoekman (1996), using a panel of Bulgarian manufacturing firms during 1991-1994, find that opening to international competition led to some cost efficiency improvements. But this conclusion only holds if they take into account entry and exit of firms: within a balanced panel of firms, the results are unclear. Levinsohn

We have also investigated whether employment and wage decisions at the firm level were influenced by the situation on the labor market, and notably, by the growing unemployment. In order to test such hypothesis, we have included in the regressions the regional (voivodian) unemployment rate ⁸. It had a significant negative effect on the growth rate of real wages only in the case of cross-section regression for 1990, the year when unemployment appeared for the first time, after 45 years of full employment: an unemployment rate of 7 percent resulted, *ceteris paribus*, in a 5.6 percent decrease in real wages.⁹

3.2 Hardening budget constraint and profitability

Another measure of the change in firms environment and of the hardening budget constraint can be obtained by looking at firms profitability. Under the old regime financial indicators at firm level were biased because of pervasive state interventions through, for instance, direct subsidies, arbitrary turnover taxes, different interest and exchange rates. The change of the regime, and notably price liberalization initiated in 1990 and the end of direct refinancing of loss-making enterprises, have contributed to the increased reliability of firms financial results. We define profitability as gross (or net) profit margin, i.e. the ratio of the pre-tax (or after-tax) profit to sales. Firms profitability has been strongly affected by economic transformation and 1991 clearly appears here as a major break. While in 1990 only two firms in our sample displayed negative profit, 54 firms were in this situation in 1991.

A simple regression of the net profit margin on the gross profit margin provides a measure of the change in the relationship between the State and the enterprise sector : the elasticity of net profit to gross profit increased from 0.46 in 1989-1990 to 0.9 in 1991-1994. This shows the extent of the State withdrawal, i.e. the decision to renounce profit redistribution between firms and discretionary taxation.

(1996) also shows that being an import competing (or export oriented) firm does not affect firm adjustment in Chile.

⁸ Using a regional unemployment rate takes into account weak labor mobility.

⁹ With the regional level data, Scarpetta (1997) also finds weak responsiveness of wages to unemployment in Poland.

It would be interesting to identify factors underlying firms gross profitability. Lacking strong theoretical underpinnings for such a regression, we simply try to verify whether there was any systematic change in the relative importance of two explanatory variables : labor productivity and market share. The following equation is estimated :

$$\Pi_{ijt}^G = \varphi_i + \varphi_1 (Y/L)_{it} + \varphi_2 (Y_{it} / Y_{jt}) + \xi_{it}$$

where

i stands for firm, j for sector, t for time; Π^G is gross profit margin, Y/L is labor productivity, Y_i/Y_j is the market share; PRIV and COM are defined as before.

In the presence of growing competitive pressure, φ_1 is expected to increase during transition and φ_2 to decrease. According to the break that occurred in 1991, two periods are considered : 1989-1990 and 1991-1994. The results are given in table 5. In the first period the relationship between profitability and market share is very strong, while in the second period the coefficient of the market share is insignificant and profitability is mainly explained by labor productivity (its coefficient increases three times). We take this switch in the relative importance of factors explaining profit margin as another sign of the increasingly binding financial constraints and fiercer competition.

Finally, an interesting evidence about the credibility of the regime change is provided by the comparison of firms that were making losses in 1991 with those that were profitable. The number of unprofitable firms halved between 1991 and 1994, to amount finally to 15.6 percent.¹⁰ It could be argued that these firms simply took advantage of the implementation of the law on financial restructuring of enterprises and banks: in 1993-1994 part of their debts could be cancelled, cut or rescheduled, which might result in apparent improvement in profitability. We do not have adequate information on the evolution of firms debt to directly test such hypothesis. However, if we look more closely at the behavior of initially unprofitable firms, we can see that the improvement in profitability had more fundamental

¹⁰ 76 percent of firms making losses in 1991 exhibit net profit in 1994. Graph A3 in appendix shows yearly transition probabilities between profitability categories. Pohl et al. (1996) compute such transition probabilities for five CEE countries during the period 1992-1994 in order to measure the incentives to restructure and to simulate, through a Markov process, the restructuring path until 2000.

sources. Graph 1 shows that the behavior of the two categories of firms was indeed radically different. Loss-making firms were hit much stronger in 1990 and 1991, and despite a large reduction of employment their labor productivity sharply declined. These developments led to a significant subsequent restructuring effort : a lasting improvement of productivity has been reached through a simultaneous increase in production and an important decrease of employment . On the other hand, firms that were profitable in 1991, were characterized thereafter by the stagnation of their economic indicators. So, the initial losses seem having acted as a trigger for rewarding restructuring. Such effect could not have occurred if the firms had continued to expect state bailouts and to rely on soft budget constraint.

Table 5 : Estimates of gross profit margin, GLS random effects. Dependent variable : Π_{ijt}^G

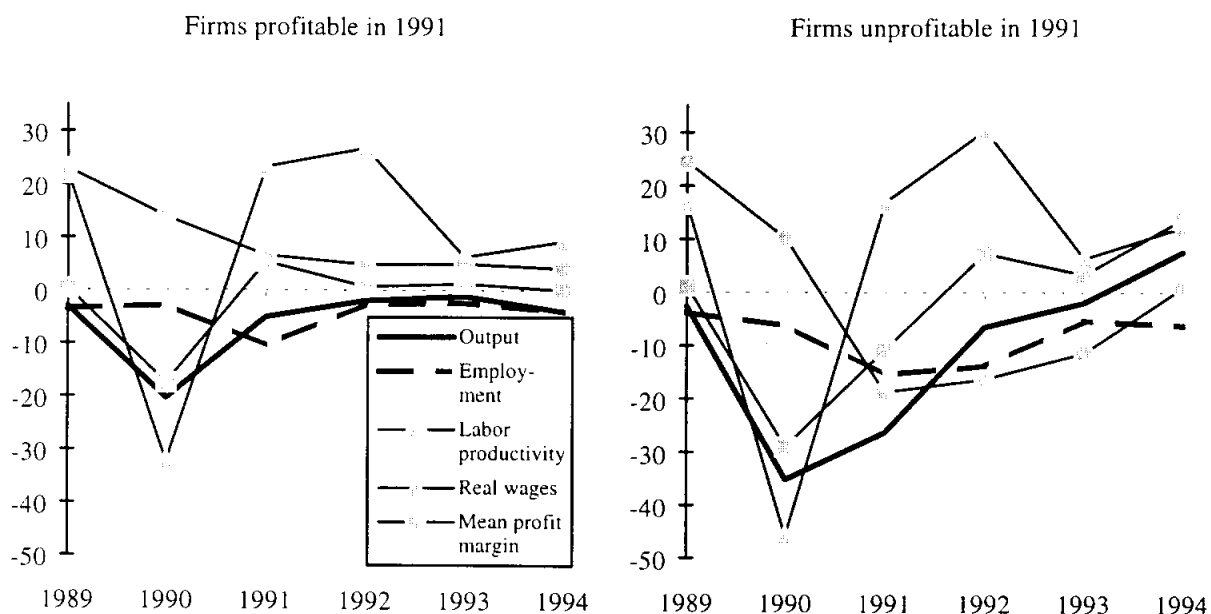
	1989-1990	1991-1994
Constant	0.366*** (0.018)	0.047*** (0.015)
$(Y / L)_{it}$	0.452* (0.270)	0.647*** (0.181)
Y_{it} / Y_{jt}	0.501** (0.256)	0.053 (0.143)
Hausman test	$\chi^2(3)=6.00$	$\chi^2(5)=2.68$
Number of observations	346	692
Adjusted R ²	0.632	0.570
Mean of dependant variable	0.353	0.059

Yearly dummies included but not reported ; standard errors in parentheses ; ***: significant at 1%, **: significant at 5%, *: significant at 10%

So, the analysis of the enterprises in our sample provides ample evidence that firms environment has been deeply and credibly transformed, modifying expectations of managers and workers. A priori, various policy measures could have contributed to this change. Our data allowed for a limited test of various hypotheses. Enterprise behavior confirmed the structural break in 1990-1991 corresponding to the implementation of restrictive macroeconomic policies and trade and price liberalizations. The role of the increased product market competition has been confirmed (cf. the vanishing coefficient of market share), but we could not find evidence that its foreign component was stronger than the domestic one : apparently, at least in the case of large firms in our sample, trade liberalization was not more important than the liberalization of economic activity which has brought about entry of new enterprises and increased domestic competition. Among hypotheses that we could not directly

test because of the lack of relevant data is notably the change in banks behavior.¹¹ The indirect evidence about the behavior of initially unprofitable firms suggests that the hardening of bank credit and the progressive enforcement of bankruptcies have convinced managers that gambling on bailouts was becoming increasingly risky and potentially costly. In assessing the downside risk facing their firms, managers had to incorporate the risk of closure.

Graph 1 : Comparison of mean growth rates (%), according to profitability status



4. The impact of privatization on defensive and strategic restructuring

We have shown in the previous section that the transformation of firms environment has brought about a radical change in their behavior. In order to test whether the pattern of response depended on the ownership status of the firm, we included in our employment and wage equations dummies for privatized and commercialized firms (see tables 3 and 4).

The introduction of a dummy for commercialized firms can be justified by a generally shared expectation that after commercialization and due to the resulting change in corporate

¹¹ On that issue see Pinto and van Wijnbergen (1995).

governance¹², enterprises would undertake bolder adjustment than in insider-controlled SOEs. It turned out, however, that the employment and wage behavior of Polish SOEs in the period of transition did not significantly differ from that of commercialized firms, except for employment in 1991¹³. A possible interpretation could be that even before commercialization, workers in SOEs, exposed to competitive environment, gave up their control rights to the benefit of managers.¹⁴ After corporatization managers effectively keep control.

The privatization dummy appears significant in the employment equation in 1991 but this result may be questionable because of the very low number (seven) of firms privatized that year. It is also significant in both equations in the next period. If the privatized firms seem, *ceteris paribus*, to lay off less workers and to pay higher wages than the state-owned firms, this may partly be due to the usual commitment to do so of strategic investors in privatized firms in Poland.¹⁵ The higher growth rate of real wages could also reveal a different wage policy dominated by the concern of attracting skillful employees. So there are significant differences in employment and wage behavior between the privatized and the public firms. However, this may be explained to some extent by the specificity of the Polish privatization strategy.

More importantly, privatization may have a positive impact on strategic restructuring. Managers must not only take measures to reduce costs. More importantly for the long term performance, they must also discover new production possibilities: transform enterprise product mix, withdraw capital from some lines of production and invest in new ventures, introduce new technologies and new forms of organizations. Such strategic restructuring behavior should be reflected in greater investment effort. It should also, through the introduction of new products and new marketing efforts, contribute to higher growth of sales. Both aspects will be studied successively.

¹² In Poland, commercialization implies elimination of the workers council and the creation of a supervisory board (appointed partly by the government and partly by the employees) supposed to oversee the management board.

¹³ We could conjecture that the firms commercialized in 1991 undertook more radical downsizing than the SOEs, because of high credibility of rapid privatization: at that time the legal requirement that commercialized firms should be privatized within two years, appeared still as really binding.

¹⁴ Maybe with the exception of decisions concerning the choice of the privatization method for their enterprise.

¹⁵ For instance, half of privatized enterprises in our sample have promised to keep employment stable during 1.5-3 years.

4.1 Privatization and investment

Investment can be considered as a major component of strategic restructuring. In our panel data set we have information about investment outlays during the period 1992-1994, i.e. the period of GDP recovery following the initial fall in output. We try to explain the firm investment rate using a basic accelerator-profit model. Two major explanatory variables are considered : the current growth rate of output, which represents a (very simplified) proxy for expected demand for output, and the lagged net profit margin, which may be considered as a measure of firms self-financing capacities. We know that firms finance most of their investment from retained earnings (see table A3 in appendix), so we expect firms investment to be an increasing function of profit margin. To control for sectoral evolution of investment, we also introduce, as in the previous regressions, the sectoral investment ratio. We also control, as before, for firm-specific effects. This leads to the following equation :

$$IR_{ijt} = \gamma_i + \gamma_1 \Pi_{i,j,t-1}^N + \gamma_2 dY_{it} + \gamma_3 IR_{jt} + \gamma_4 PRIV_{it} + \gamma_5 COM_{it} + \psi_{it}$$

where

i stands for firm, j for sector, t for time; IR is the ratio of investment spending (deflated by national investment price index) to lagged output, Π^N is the net profit margin, dY is the growth rate of output, $PRIV$ and COM are defined as before.

Preliminary econometric estimations showed that financing side played a very significant role in investment decisions and that profitable and non-profitable firms behaved differently : the first were highly responsive to liquidity constraints while the coefficient of profit margin appeared insignificant for the latter. This led us to focus only on profitable firms. Almost all privatized firms being profitable, the importance of privatization can be tested within such sub-sample.

The results of regressions are presented in table 6. The first column gives the results of a regression including all firms with positive net profit margin. It turns out that only ownership dummies are significant. The privatized firms display, *ceteris paribus*, an investment rate which is almost twice the sample mean ; in the case of commercialized firms this effect is also

positive but much weaker. This may reflect various phenomena. Again, it could be related to the investment commitment of the new strategic investors. More fundamentally, in privatized firms, corporate governance is more effective, the time horizon underlying economic decisions is probably longer, and good investment projects are more easily available.

In order to look more closely at this important issue, we estimated separately the investment equation for privatized, commercialized and state-owned firms. The results are given in the second, third and fourth columns of table 6. They are quite different for the three groups of firms, while the behavior of commercialized firms appears overall closer to that of privatized than state-owned enterprises. Profitability appears the major driving force underlying investment. This confirms the importance of self-financing, easily explainable in the situation of deeply asymmetric information between firms and suppliers of finance (banks).¹⁶ The differences in profitability coefficients suggest that privatized firms devote a higher share of profit to investment.

It is interesting to note that privatized and commercialized firms are neither sensitive to the evolution of sectoral investment nor to the growth rate of output. In other words, state-owned enterprises appear to be motivated in their investment decisions by the current expansion of production capacities while for privatized firms the short term evolution of sales is a weak guideline for investment. A possible explanation could be that the current evolution of sales is interpreted by state-owned firms as exogenously given approximation of future demand. On the other hand, privatized firms probably consider future demand as partly endogenous, which makes current output growth a poor predictor of future output. Such behavior can be viewed as an attribute of what we called strategic restructuring.

Table 6: Estimates of investment equation, 1992-1994. Dependent variable : IR_{ijt}

	<i>All firms fixed effects</i>	<i>SOEs random effects</i>	<i>Commercialized random effects</i>	<i>Privatized random effects</i>
Constant	-	0.029*** (0.008)	0.057*** (0.014)	0.015 (0.224)
$\Pi_{i,t-1}^N$	0.138 (0.102)	0.147** (0.063)	0.312** (0.120)	1.007*** (0.230)

¹⁶ However, it should be stressed that also in the developed countries retained earnings are the main source of investment. See, for instance, Corbett and Jenkinson, 1994.

dY_{it}	0.017 (0.014)	0.027*** (0.010)	0.030 (0.022)	0.068 (0.060)
IR_{jt}	-0.107 (0.136)	0.174** (0.086)	-0.188 (0.150)	0.224 (0.492)
PRIV	0.047*** (0.017)	-	-	-
COM	0.028* (0.015)	-	-	-
Hausman test	$\chi^2(5)=22.82$	$\chi^2(3)=2.12$	$\chi^2(3)=9.24$	$\chi^2(3)=3.64$
Number of observations	367	204	120	43
Adjusted R ²	0.473	0.598	0.597	0.420
Mean of dependent variable	0.060	0.048	0.060	0.112

Standard errors in parentheses; ***significant at 1%, ** significant at 5% ; * significant at 10%

4.2 Privatization and output growth

It has been argued that one of the components of strategic restructuring is firm capacity to modify the demand for its products, notably through the introduction of new products. Firm capacity to differ from its sectoral characteristics is hence essential. This leads us to test the relationship between the firm and the sectoral growth rates of production. The following equation is estimated :

$$dY_{ijt} = \delta_i + \delta_1 dY_{jt} + \delta_2 PRIV_{it} + \delta_3 COM_{it} + \tau_{it}$$

where

i stands for firm, j for sector, t for time; dY is the growth rate of production, PRIV and COM are defined as before.

The results are presented in table 7. Again, according to the Chow test, 1991 appears as a break point ; consequently we have two sets of results. They show that initially, sectoral evolution was crucial in explaining what happened to firm output. In the following period (1991-1994), firms reveal much greater heterogeneity in their behavior : the coefficient of sectoral sales is halved and adjusted R² strongly declines.

Table 7: Estimates of production equation. Dependent variable : dY_{ijt}

GLS with random effects

	1989-1990 <i>all firms</i>	1991-1994 <i>all firms</i>	1991-1994 <i>public</i>	1991-1994 <i>privatized</i>
Constant	- 0.008 (0.016)	- 0.076*** (0.014)	-0.070*** (0.012)	0.021 (0.048)
dY_{jt}	1.142*** (0.083)	0.496*** (0.083)	0.519*** (0.082)	0.487 (0.399)
PRIV	-	0.087**	-	-

		(0.038)		
COM	-	0.021 (0.024)	-	-
Hausman test	$\chi^2(1)=1.27$	$\chi^2(3)=5.10$	$\chi^2(1)=0.20$	$\chi^2(1)=0.02$
Number of observations	324	692	632	60
Adjusted R ²	0.348	0.130	0.154	0.126
Mean of dependent variable	- 0.147	- 0.042	-0.052	0.066

Standard errors in parentheses; ***significant at 1%, ** significant at 5% ; * significant at 10%

In the second period, the output growth in privatized firms is higher by 8.7 percent compared to the state-owned enterprises¹⁷, while the commercialized firms are not significantly different from the latter. Therefore, we ran separate regressions for the privatized and public firms (SOEs and commercialized). The main difference between the two classes of firms is their sensitivity to the sectoral output growth. The capacity of privatized firm to stand out against their sectoral trend can be interpreted as a sign of firm-specific creative restructuring.

5. Conclusions

State-owned enterprises, leaving the quiet world of central planning and suddenly plunging in the turbulent market environment, were forced to adjust. The analysis of our panel of large Polish manufacturing firms provides some insight into this process.

Indirect evidence clearly shows that firms believed in the irreversible hardening of budget constraint. The loss-making firms made the biggest effort in terms of layoffs and wage control. This dynamic reaction sharply contrasts with the relative passivity of profitable firms, which may be a matter of concern.

We have identified a structural break in firms behavior: it corresponds to the introduction of a package of radical reforms. One of its important effects was the increase in firms heterogeneity. In the initial period, sectoral shocks strongly affected enterprise decisions. During the recovery, the sectoral evolution becomes less significant as a determinant of firms behavior. This is particularly striking in the case of strategic restructuring of privatized firms.

Privatization affects the defensive part of enterprise restructuring, but it proves to be particularly important for strategic restructuring. Our estimations show that privatized firms exhibit investment behavior different from that of state-owned enterprises. They invest more and their decisions are not determined by the current growth of output. Finally, privatized firms have greater capacity to ensure higher output growth. This suggests that more rapid privatization could significantly contribute to the growth of the Polish economy, which until recently, was mainly stimulated by the expansion of *de novo* private sector.

¹⁷ It has often been argued that the firms were selected for privatization because of their initially superior performance. In order to test the existence of such a bias, we introduced, in the regression for 1989-1990, a dummy variable representing the 27 privatized firms in our sample. Its coefficient proved to be insignificant.

APPENDIX

Table A1: Share of the sample in the Polish manufacturing industry, %

	1989	1990	1991	1992	1993	1994
Share in output	25.81	31.99	29.36	29.63	27.16	27.30
Share in employment	16.84	17.00	16.08	16.05	15.59	14.72
Share in investment expenditures	-	-	-	25.43	33.17	30.99

Table A2 : Ownership structure of the sample, number of firms

	1990	1991	1992	1993	1994
State-owned	170	137	104	95	85
Commercialized	1	29	61	60	61
Privatized	2	7	8	18	27

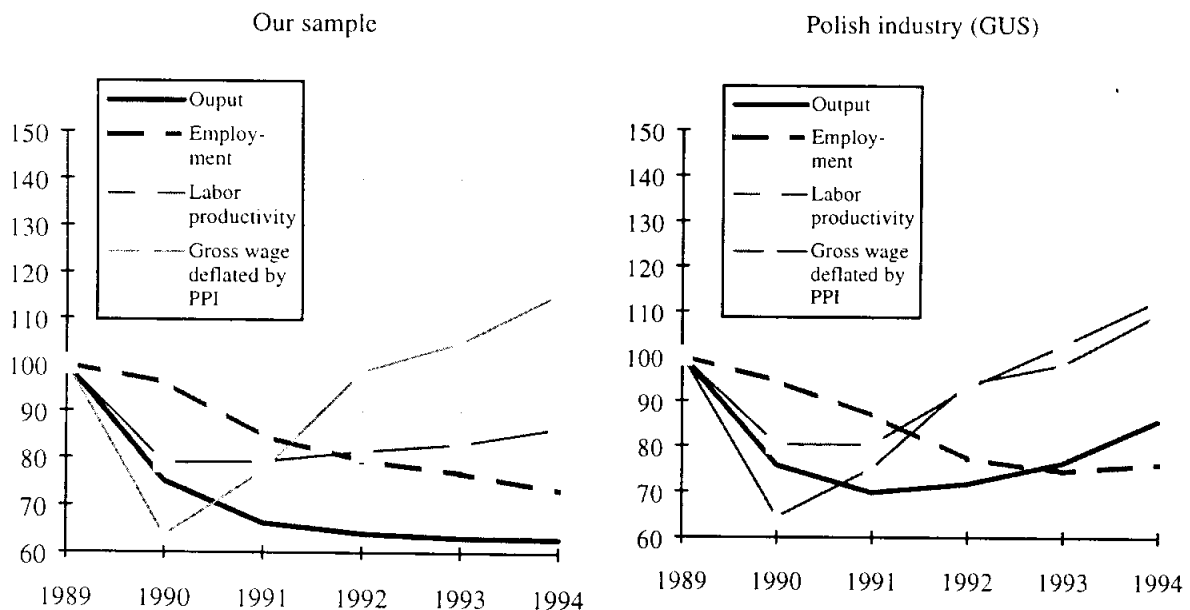
Table A3 : Sources of investment finance in Polish enterprises (and local communities)(%)

	1992	1993	1994
Retained earnings	58.1	63.3	62.4
Budgetary subsidies	5.6	4.7	4.2
Domestic bank credit	10.8	8.7	10.3
Other (a)	25.5	23.3	23.1

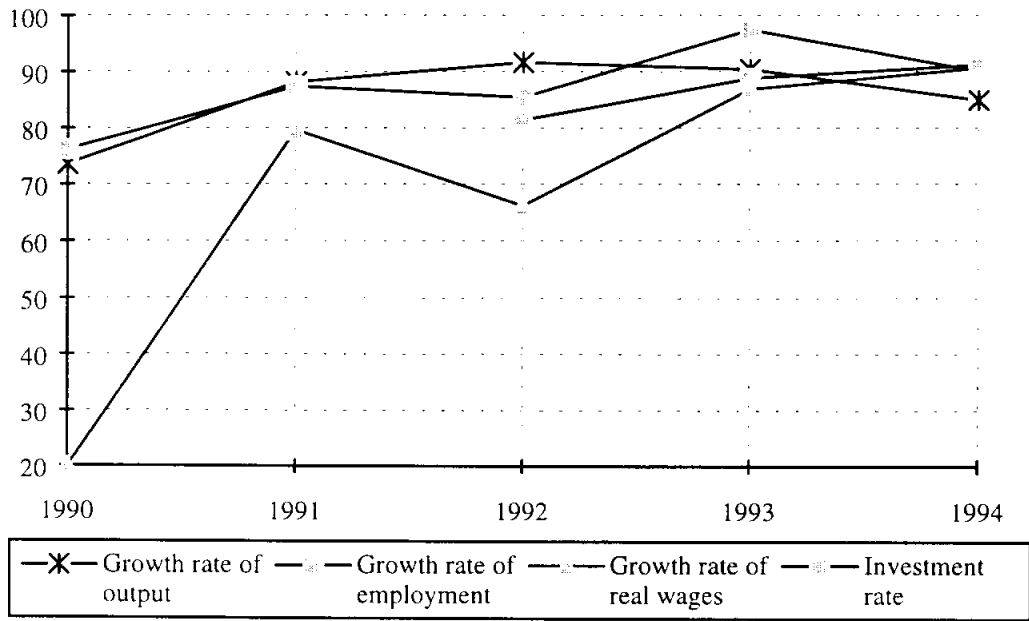
(a) includes credits from foreign financial institutions (9.8 % in 1993 and 9.1 % in 1994), parabudgetary credit lines, the value of incomplete investment, etc.

Source : *Rocznik Statystyczny*, GUS, 1994, 1995.

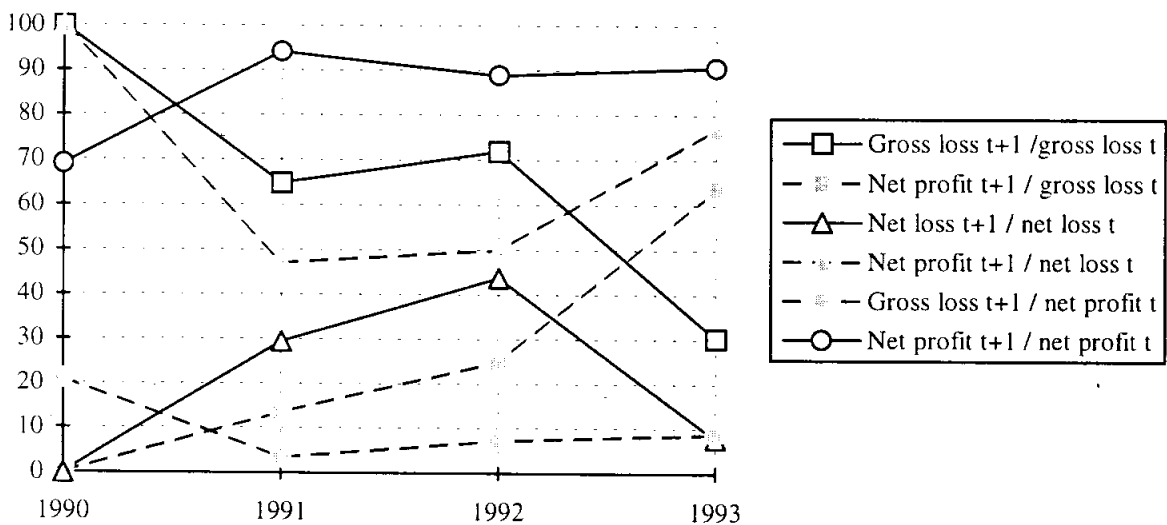
Graph A1 : Dynamics of main real variables, 1989 = 100



Graph A2 : Share of intra-sectoral variance in total variance, %



Graph A3 : Yearly transition probabilities between profitability categories (%)



A firm is classified in the category of "gross loss" if its pre-tax profit is negative, "net loss" if its pre-tax profit is positive and its after-tax profit is negative, "net profit" if its after-tax profit is positive. Transition probabilities are computed as the probability of being next year in a particular category conditionally on the current year profitability category.

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