Employee Lay-off under different Modes of Restructuring

Kristien Coucke
Vlerick Leuven Gent Management School

Enrico Pennings
Erasmus University Rotterdam

Leo Sleuwaegen
VLGMS, Catholic University of Leuven and Erasmus University Rotterdam

Keywords:
Relocation, Downsizing, Exit

Correspondence:

Kristien Coucke, Vlerick Leuven Gent Management School, Vlamingenstraat 83, 3000

Leuven, Belgium. E-mail: Kristien.Coucke@vlerick.be.

Abstract

In recent years, there has been a growing concern about the effect of globalisation on employment in most West European countries. More and more firms had to drastically restructure their operations in order to survive the rise in global competition. Restructuring often leads to a collective lay-off of employees. We use a theoretical model to examine how firm and industry characteristics have an impact on different modes of restructuring. (1) Close down part of its activities and relocate abroad, (2) Downsizing through a significant decrease in employees or (3) Dismiss all employees and exit the market. Using a unique sample of Belgian firms reporting collective layoffs, we test empirically the predictions of the model. Relocating firms are found to be most profitable among the restructuring firms, have invested more in the recent past, operate in sectors with significant economies of scale and belong more often to a multinational group than firms opting for downsizing or exit. Downsizing firms are more capital intensive than relocating firms, while exiting firms are less profitable, smaller, younger and more labour intensive than downsizing or relocating firms.

1. Introduction

In an environment characterised by a strong rise in global competition, an increasing number of firms have to adapt their strategy in order to survive. When profits decline, firms are forced to restructure. Restructuring can take many forms but the most common mode results in the lay-off of employees. The decision to layoff employees reflects a difference in the current size of the workforce and the size of the workforce that would maximise the market value of the firm. The resulting decrease in labour force may however reflect different strategies. In this paper we consider exit, relocation, and downsizing as alternative modes to restructure the operations of a firm in a particular location. A lay-off of employees can follow from a relocation strategy, where the firm restructures on a global scale and shifts (part of) its production abroad. An incumbent firm can also try to become more cost efficient on a local scale. In a country like Belgium where labour cost is high, firms have an incentive to further automatise their production process. The latter restructuring mode is denoted by downsizing, which reflects a reduction in employment. Though downsizing may occur without layoffs through voluntary buyout and early retirement programs, downsizing in this paper refers to a reduction of the size of the firm's workforce through collective layoff, i.e. a dismissal of a significant part of the workforce. In the extreme, if a firm is unable to raise its profitability to positive levels, it will decide to exit the market.

The decision to relocate follows from the presence of new and growing markets with large differences in labour costs and can be stimulated by attractive government regulations in foreign countries. Relocation is further enhanced by a reduction in transport costs which allows global firms to choose the most cost efficient production location elsewhere and transport it back to the final consumers. Despite the media attention that relocation activities have gained the last decade, the existing literature

provides no evidence which firms relocate, downsize or exit. In this paper, we first propose in section 2 a theoretical model how firm and industry characteristics have an impact on the decision to choose one of these three restructuring modes. Our theoretical propositions lead to empirical testable hypotheses in section 3. In section 4 we present the data. Section 5 examines the results and section 6 concludes.

2. Modes of restructuring through employee lay-off

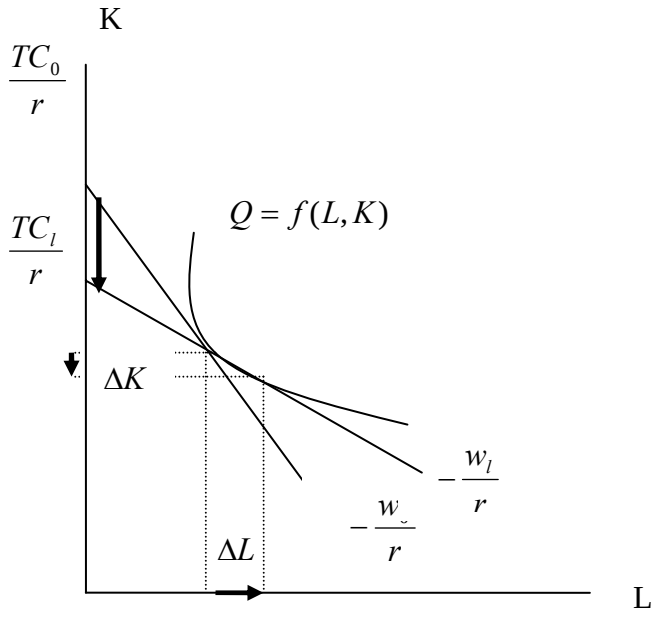
In this section we set up a theoretical model to study the possible impact of firm and industry characteristics on the decision to relocate, downsize or exit. Assume that the firm at time t has a profit $\pi_t(p_t, w_0, r, K_0, L_0)$ when producing in the home country. The firm's profit depends on the price p_t of the good. The neo-classical production function relates a firm's output Q to the amount of labour L and capital K so that $Q = f(L,K)$. The firm's total cost of production in the home country depends on the choice of Home capital (K_0), Home labour (L_0), the wage rate at Home (w_0) and the cost of capital (r). The wage rate w is assumed to vary across locations while the unit cost of capital r is assumed to be equal around the world.

Relocation often follows from an efficiency-seeking strategy where the firm shifts its production to the least cost production plant. Assume the firm has the option to relocate production to n different countries. The wage in each country is given by w_l $(l = 1,...,n)$. If the firm chooses to relocate production abroad at time t, it will choose the location that maximises its expected net return, given a decrease in labour cost from w_0 to w_l and the necessary adjustment cost λ_t^l. The net return can then be written as

$$\max_{l}\left\{\int_{s=t}^{\infty}\pi_s^l(p_s,w_l,r,L_l,K_l)e^{-\rho(s-t)}ds-\lambda_t^l(MNE_t,RINV_{t-1})\right\}$$

π_s^l stands for profit when producing in the foreign country l at time s and ρ is the appropriate discount rate. Under the assumption that relocation is purely aimed at reducing the cost of a given level of production and does not serve any market seeking strategy, relocation leaves total output unchanged (Dewitt, 1998). Figure 1 illustrates the labour cost reduction following a relocation. Due to the lower wage in country l, relocation changes the firm's capital to labour ratio if the firm can substitute capital for labour. The reduction in total cost due to relocation to country l equals $L_l\Delta w + w_0\Delta L + r\Delta K$, where $\Delta w = w_l - w_0$, $\Delta L = L_l - L_0$, and $\Delta K = K_l - K_0$. The cost reduction is visually given by the distance between the two points on the vertical axis $\frac{TC_0}{r}$ and $\frac{TC_l}{r}$ multiplied with the unit cost of capital.

Figure 1: Relocation and the reduction of total production cost in country l



The adjustment cost of relocation $\lambda_t^l(MNE_t, RINV_{t-1})$ depends on two important firm

characteristics: the multinational character of the firm and recent investments in capacity. A multinational firm has access to an international network and therefore its cost of relocation will be lower than for a domestic firm. The variable MNE_t distinguishes multinational firms at time t from firms without a multinational production network. Based on a sample of firms relocating from Belgium, Pennings and Sleuwaegen (2000) found that most relocating firms have access to a multinational network. The significance of the latter variable underscores the fact that the multinational firm takes advantage of its operating flexibility by producing wherever cost is lowest (Kogut and Kulatilaka, 1994). The variable $RINV_{t-1}$, measuring recent (previous period t-1) investments in capacity, reflects the capital committed as a degree of sunkness of tangible assets in the country of origin. Motta and Thisse (1994) demonstrate that sunk costs have a negative impact on relocation.

Downsizing involves the reduction of labour. Since downsizing is measured here in terms of employment, we can consider downsizing as an increase in capital intensity by a further automation of the production process. Assume that the firm can choose between n different techniques which all reflect a different automation process. The capital to labour ratio for each technique $d \in \{1,...,n\}$ is given by $\left(\frac{K}{L}\right)_d$. If the firm chooses to downsize its production at time t, it will maximise its expected net profit depending on the different capital to labour ratio's $\left(\frac{K}{L}\right)_d$ and the adjustment cost λ_t^d, both depending on the technique d. Expected net profit then equals

$$\max_d \left\{ \int_{s=t}^{\infty} \pi_s^d (p_s, w_0, r, L_d, K_d) e^{-\rho(s-t)} ds - \lambda_t^d \left(RINV_{t-1}\right) \right\}$$

Figure 2: Downsizing and the reduction of total production cost by technique d

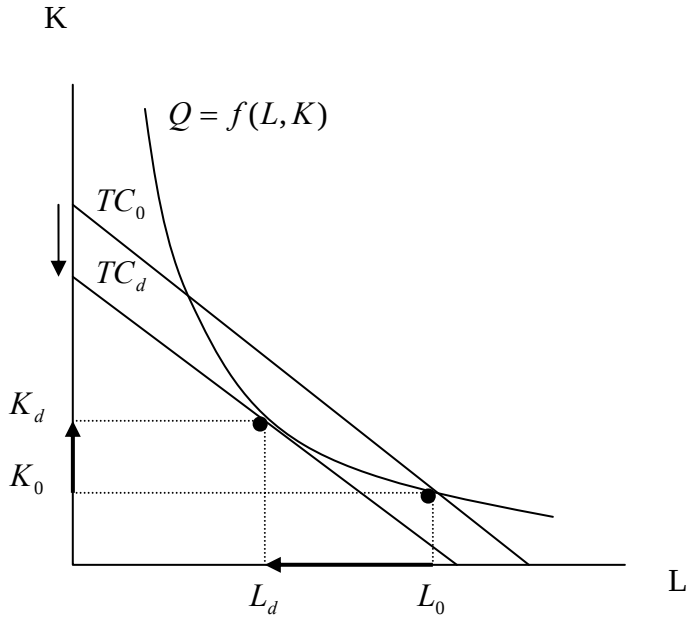


Figure 2 illustrates the cost reduction as a result of downsizing, provoked by a shock in relative factor prices. The firm reduces its total production cost due to an increase in capital intensity[1]. The adjustment cost of downsizing $\lambda_t^d(RINV_{t-1})$ depends on the variable $RINV_{t-1}$. The higher the level of recent investments to obtain a more efficient technique today, the smaller the amount of employees that can be replaced by a new capital-intensive technique in the near future.

Exit is the most drastic restructuring decision. Stopping all activity reflects the failure of the firm to survive profitably in the market. Whereas the net present value of continuing all its production operations in the home country is given by $\int_{s=t}^{\infty} \pi_s(p_s, w_0, r, L_0, K_0) e^{-\rho(s-t)} ds$, exit gives a payoff of zero. The firm will choose to exit if it makes negative profits and other modes of restructuring are not possible or too costly. In this case the adjustment cost is the scrap value and can be expressed as

$\lambda_t^e(RINV_{t-1})$ with $\lambda_t^e < 0$ for positive scrap values. When capital is sunk, more recent investment induces more committed capital, thereby increasing the continuation value of the firm. Caves and Porter (1976) argue that capital-intensive industries and industries with a large average firm size exhibit strong barriers to exit

The firm will choose the mode of restructuring that maximises expected value. The firm has a choice of three restructuring modes indexed by i with sunk capital costs λ_t^i. Assume $i = l$ is the relocation mode, index d reflects the mode of downsizing and permanent abandonment indexed by e, is the third restructuring mode. After the choice of mode i, the firm receives an increase in profit flow $\Delta\pi_t^i(p_t, \Delta w, \Delta L_i, \Delta K_i)$. If the firm chooses restructuring mode i, the net value of this action is

$$V_t^i(p_t, \Delta w, \Delta L_i, \Delta K_i) = \frac{\pi_t(p_t, w_0, r, L_0, K_0)}{\rho} + \frac{\Delta\pi_t^i(p_t, \Delta w, \Delta L_i, \Delta K_i)}{\rho} - \lambda_t^i$$

When exiting the market, the instantaneous profit $\Delta\pi_t^e(p_t, \Delta w, \Delta L_e, \Delta K_e)$ equals $-\pi_t(p_t, w_0, r, L_0, K_0)$.. Continuing all operations will be reflected by $i = 0$ with $\Delta\pi_t^0(p_t, \Delta w, \Delta L_0, \Delta K_0)$ and $\lambda_t^0(MNE_t, RINV_{t-1})$ both equal to zero.

At time t the firm will choose the restructuring mode, including the possibility not to restructure, that reflects the highest value[2]

---

[1] from an inefficient capital to labor ratio $\left(\frac{K_0}{L_0}\right)$ after the shock to an efficient ratio $\left(\frac{K_d}{L_d}\right)$

[2] Following the NPV-rule, a firm will choose one of the restructuring modes at time t when $\frac{\Delta\pi_t^i(p_t, \Delta w, \Delta L_i, \Delta K_i)}{\rho} > \lambda_t^i$ with λ_t^i the adjustment cost of restructuring. A more complete approach including uncertainty, is given by Dixit and Pindyck (1994) where λ_t^i reflects the value of waiting. The higher the uncertainty and the higher the adjustment cost of restructuring, the higher will be the value of

$$V_t(p_t, \Delta w, \Delta L_i, \Delta K_i) = \max_{i \in \{0,l,d,e\}} V_t^i(p_t, \Delta w, \Delta L_i, \Delta K_i).$$

We start from the assumption that due to unexpected changes in input prices, the current amount of labour and capital, L_0 and K_0, are not optimal choices. Per period profit is given by $pQ - w_0 L_0 - rK_0$. As the current inputs are not optimal, the firm can improve its profitability through either downsizing or relocation.

First, consider the firm's options of relocation and downsizing. The firm will prefer to relocate if the profit increase from relocation is greater than the profit increase from downsizing. The condition can be written as

$$w_0 L_d - w_l L_l + rK_d - rK_l > \rho(\lambda_l - \lambda_d) \tag{1}$$

with L_l, K_l and λ_l the input variables and adjustment cost in case of relocation while index d reflects the same variables for the downsizing mode. In order to arrive at some essential results, we assume a standard Cobb-Douglas production function $Q = AK^{\alpha}L^{\beta}$. The firm will choose L_l, K_l for a fixed output Q such that it minimises its production cost after relocation, according to the following first order condition for cost minimisation

$$\beta r K_l = \alpha w_l L_l \tag{2}$$

If the firm opts for downsizing, the optimal choices for L_d, K_d are such that

$$\beta r K_d = \alpha w_0 L_d \tag{3}$$

Substituting K_l, K_d from equations (2) and (3) in equation (1) shows that a firm prefers relocation to downsizing if

---

waiting. Therefore, when profits are uncertain and the firm did recent investments in its production

$$\frac{(\alpha+\beta)(w_0 L_d - w_l L_l)}{\beta} > \rho(\lambda_l - \lambda_d) \qquad (4)$$

The left side of this inequality reflects the reduction in labour cost after a relocation to a lower wage country, scaled by the relative elasticity of output with respect to labour, $\frac{\beta}{\alpha+\beta}$. If the production process is very labour intensive, the scaling factor is close to 1 and firms will relocate if the difference in the reduction in labour costs outweighs the difference in adjustment costs. For technologies where β is low and thus output less responsive to labour, implying higher labour input requirements, the reduction in labour costs is smaller. Equation (4) states that taking into account substitution possibilities and capital cost, it is not just the pure difference in total wage bill[3] that matters.

Taking the analysis one step further, to see how the decision to relocate depends on wage differences and scale, we can express equation (4) in its reduced form, solving for optimal labour L in terms of the exogenous variables Q, w_0, w_l, r:

$$BQr^{\frac{\alpha}{\alpha+\beta}}(w_0^{\frac{\beta}{\alpha+\beta}} - w_l^{\frac{\beta}{\alpha+\beta}}) > \rho(\lambda_l - \lambda_d), \qquad (5)$$

with $B = (\alpha+\beta)(A\alpha^{\alpha}\beta^{\beta})^{-\frac{1}{\alpha+\beta}}$. From Equation (5) we derive the following hypothesis.

Proposition 1: A firm will prefer relocation to downsizing if (i) its production output is sufficiently large, (ii) the cost of capital is sufficiently high, (iii) the wage differential is large, (iv) production is sufficiently labour-intensive, as reflected by a high β relative to α, (v) there are sufficient economies of scale ($\alpha+\beta>1$) and (vi) a firm has

process, a firm will wait to restructure.

[3] See also Konings (2004).

experience in producing abroad and the cost of relocation is sufficiently lower for multinational firms than for firms without an international network.

Proof: (i), (ii), (iii) The left-hand side of Equation (5) is increasing in Q, r and w_0; (iv) The left-hand side is increasing in β. This can easiest be demonstrated by assuming constant returns to scale ($\alpha + \beta = 1$) and taking logs; (v) B is increasing in $\alpha + \beta$; (vi) λ_l is decreasing in MNE, while λ_d is unaffected by MNE.

Large firms, which are labour intensive, can strongly increase their profits if they relocate to a country l where the wage w_l is significantly lower than in the home country. This result is in line with Pennings and Sleuwaegen (2000). On the other hand, firms that can significantly substitute labour for capital, can strongly increase their profits if they adapt to an automation of the production process. However, with economies of scale, cost advantages gain importance and firms will be more likely to prefer to relocate total production to a location with lower production cost. Considering the cost side of both restructuring modes, the difference between $\lambda_t^l(MNE_t, RINV_{t-1})$ and $\lambda_t^d(RINV_{t-1})$ is mainly determined by the multinational character of the firm. The variable $RINV_{t-1}$, which reflect the level of recent investments is assumed to have a negative effect on both the decision to relocate or downsize. However, recent investment in plant and equipment involving important sunk costs would especially render the downsizing and exit decision less attractive (Hopenhayn, 1992; Lambson, 1994).

Considering the modes of downsizing and exit, it can be shown that the firm, producing with the same Cobb-Douglas technology, prefers downsizing to exiting the market if

$$Q(p_t - Bw^{\frac{\beta}{\alpha+\beta}} r^{\frac{\alpha}{\alpha+\beta}}) > \rho\left(\lambda_t^d - \lambda_t^e\right), \tag{6}$$

with B as defined earlier. From Equation (6), we derive the following proposition.

Proposition 2: A firm prefers downsizing to exiting the market if (i) its production output is sufficiently large, (ii) the cost of capital is sufficiently low, (iii) the price of the produced good is sufficiently high, (iv) the exit cost is high, (v) there are no substantial economies of scale.

Proof: Follows directly from Equation (6).

In addition to the neo-classical cost considerations made above, there exists empirical and theoretical literature on the exit decision which emphasize other characteristics of the firm. In the widely acclaimed model of Jovanovic (1982), firms learn their relative efficiency and are forced to leave the industry when they cannot meet the required efficiency. As a result, small and young firms are more likely to exit from the industry. Furthermore, firms will also exit if other restructuring modes are either not feasible or too costly from a resource perspective. Young firms, for example, are often too inexperienced to take the risk to relocate their production process. At the same time, small and young firms will find it difficult and costly to further automate their production process and lack the managerial skills. The exit decision is strongly influenced by the sunkness of their investment. The more recently the firm has invested

in resources, the less depreciated the resource base and therefore the more sunk cost will be involved when stopping all activities. In a review of empirical papers on exit, Siegfried and Evans (1994) find evidence that, as predicted by theory, poor profitability, weak demand conditions, low capital intensity and small firm size have a significant impact on the propensity to exit. In the next section, we will test the impact of these firm and industry characteristics on the decision how to restructure in an econometric set up.

3. Econometric model

The decision to choose among the alternative modes of restructuring is modelled using a multinomial logit model. The log likelihood of the multinomial logit model can be written as

$$L(\beta; y, X) = \sum_{i=1}^{n} \sum_{j} y_{ij} \ln(P_{ij}),$$

where β is the vector of coefficients, $y_{ij} = 1$ if the i-th firm chooses restructuring mode *j*, and 0 otherwise, X is the matrix of explanatory variables, and

$$P_{ij} = \frac{\exp(X_i' \beta_j)}{\left(1 + \sum_{k=1}^{m-1} \exp(X_i' \beta_k)\right)}$$

for $j \in \{l, d, e\}$, and

$$P_{ij} = \frac{1}{(1 + \exp(X_i' \beta))}.$$

for $j = o$ (reference group). Following firm and industry characteristics will be included:

3.1. Firm characteristics

The firm's life cycle is an important factor behind the restructuring decisions. The learning theory of firm's growth as discussed in the introduction argues that young and small firms grow faster if they learn through the market forces that their efficiency compares well with the competitors. However, many small firms find out the contrary and therefore show relatively high exit rates. Older and larger firms facing more competitive pressure and operating in mature markets have to focus on cost reduction. In accordance with the basic theoretical model of the previous section, it is more profitable for larger firms to relocate part of their activity or to downsize. As a consequence, we expect firm size to have a negative impact on exit and a positive impact on downsizing and relocation. We include the firm's value added as a proxy of the SIZE of the firm, as well as the firm's age (AGE) for experience.

The life cycle may also contribute to a mismatch in the allocation of production factors. Due to changing factor prices, output prices and endowments, the optimal allocation of capital and labour may change over time. For example, through its proximity to a mass market and its relatively high wage costs, Belgium has established a comparative advantage in capital-intensive industries (Tharakan and Waelbroeck, 1988; Sleuwaegen and De Backer, 2001). The variable C/L is a measure of the capital to labour ratio. Moreover, high capital intensity also constitutes a barrier to exit and downsizing, because of the important costs that are sunk in specific plant and equipment and intangible investments (Caves and Porter, 1976).

The latter aspect may be better reflected by the variable RINV, measuring recent investments in capacity through the acquisitions of tangible assets. RINV has been hypothesized to limit the firm's ability to exit. The more recently the firm has invested in resources, the less depreciated the resource base, and thus the higher the resale price

required to make exit more attractive than continued operation (Harrigan, 1980). Especially investment in plant and equipment involving important sunk costs would render the downsizing or exit decision less attractive (Hopenhayn, 1992; Lambson, 1994). More recently, Dixit (1989) and Dixit and Pindyck (1994) demonstrated that in exploiting the option value of waiting the extent and timing of exit depends crucially on sunk costs and the degree of uncertainty about future profit opportunities. Lacking good alternative opportunities, firms will persist to operate even if profitability is low, causing a special type of hysteresis.

The most important factor in the decision to restructure seems a lack of profitability as compared to similar firms operating in the same market. Shareholders will require clearly underperforming firms to restructure and to achieve a higher profitability. We include the return on equity (ROE) as a measure[4] of profitability. Kang and Shivdasani (1997) find in a sample of Japanese manufacturing firms that return on equity has a significant negative impact on downsizing.

Together with poor performance, the financial structure of the firm has been hypothesized to affect the restructuring decision. Highly leveraged firms are more likely to restructure. Especially firms in financial distress underinvest in fixed assets (Myers, 1977) and have a higher propensity to restructure. Debtholders will exert pressure to layoff employees, liquidate or sell assets when the firm fails to meet its interest payments. Moreover, debtholders, as being first on the creditors list, will fight against continued operation if the net value they receive from selling assets exceeds their expected proceeds from continued operations (Schary, 1991). The leverage ratio is defined as the ratio of the book value of debt to the sum of the value of debt and equity (LEV). Ofek (1993) shows in a sample of US firms that restructuring measures, such as employee layoffs, are affected by capital structure. The latter finding confirms the

argument by Jensen (1989) that highly leveraged firms will respond faster to a decline in firm value. Whereas the empirical studies by Ofek (1993) and Kang and Shivdasani (1997) use a sample of firms that experienced a substantial decline in operating performance, this sample consists of firms reporting a layoff regardless their profitability. In order to isolate the effect of leverage of firms in financial distress we construct a binary variable DIS which takes a value of 1 if a firm has a negative ROE in the year preceding the collective layoff and interact DIS with the leverage variable (LEV).

Clearly, not all firms have the same option to relocate capacity to another country, especially when setting up a foreign plant involves substantial sunk costs. We therefore expect those firms that already operate a multinational network to benefit from this location flexibility in reducing costs and to prefer relocation to downsizing or exit. The fact that they compare costs comparatively across the different plants makes also reported profitability of one production unit in a particular location, often influenced by transfer pricing techniques, a less good performance measure (Kogut and Kulatilaka, 1994; Pennings and Sleuwaegen, 2000). The dummy variable MNE distinguishes multinational firms (including firms with headquarters in Belgium) from firms without a multinational production network ($MNE = 0$).

Table 1 reports the total number of job losses for the different modes of employee layoffs across major sectors for Belgium during the period 1990-1999. The table suggests that manufacturing industries differ in the mode of restructuring from service industries. As compared to manufacturing firms, firms in service sectors experienced large growth rates between 1990 and 1999. Moreover service sectors are primarily market oriented and need a close connection with customers and hence will

[4] For a precise definition of the explanatory variables and descriptive statistics we refer to the appendix

show a smaller probability to relocate. Variable MAN takes a value equal to one if the firm is in the manufacturing industry.

3.2. Industry characteristics

The theoretical model predicts that troubled firms operating in industries with significant scale economies have a higher propensity to relocate and a lower propensity to downsize as compared to exit. The variable for minimum efficient scale (MES) reflects the size of an average firm in the industry in which the firm operates. As industry concentration and MES should in principle pick up the same effect, Haynes et al. (2000) confirm such a negative effect of concentration on divestment.

Competitive pressure is assumed to be less severe in industries characterised by product differentiation. Product differentiation is assumed to decrease the probability to restructure in general without making a distinction between the decision to exit, downsize or relocate. We include the variable PRODIF of an industry which is proxied the intra-industry trade index of Grubel and Lloyd (1975). The G-L index at an industry level (Marvel and Ray, 1987) can be defined as follows: G-Li = 2min (Xi , Mi)/(Xi + Mi), where Xi equals total exports in industry i and Mi total imports in industry i.

4. Data

In Belgium every firm with more than twenty employees needs to report a dismissal of more than 10% of the employees (a so-called collective lay-off) at the Federal Government. Subsequently, the Federal Planning Bureau (FPB) in Belgium sends a questionnaire to the three Belgium unions. In the questionnaire it is asked if the layoff is motivated by relocation. This way there is a very good sample of all restructuring firms,

the mode of restructuring, and the number of job losses involved. Between 1990 and 1999 a total number of 861 firms reported an amount of 1218 collective lay-offs. At least one questionnaire was answered by 659 firms reporting a total of 827 collective lay-offs. These numbers induce a 77% response rate at firm level and a 68% response rate for each collective layoff.

Within the sample exit, relocation, and downsizing account for 10%, 21%, and 69% of total job destruction, respectively. Though the figures do not include all restructuring within the sample period, it gives some intuition of the relative importance of the different modes of restructuring. The table also indicates that the average number of job losses after restructuring is relatively small for exiting firms, but relatively large for relocating firms. Though job losses from relocation are substantial, it appears that the majority of employee layoffs is due to downsizing (without the subsequent transfer of production abroad).

As reference group, a total number of 2999 firms are randomly selected from a large sample of firms with a VAT number in Belgium[5] and –like the group of firms that need to report a collective layoff- with at least 20 employees. Needless to say, firms that are within the group of restructuring firms are not in the reference group.

Firm specific data are taken from the financial statements of the companies. Detailed data are available for 105 out of the 122 firms that relocated activities, for 97 out of the 123 that exited, and for 339 out of the 616 that downsized through collective layoff[6]. The same data are available for 2068 non-restructuring firms. For the group of restructuring firms, the firm characteristics refer to the balance sheet prior to the year of restructuring. The industry characteristics are averaged over the observation period.

[5] This database is maintained by the National Institute of Statistics (NIS) in Belgium.
[6] We consider the year prior to the largest downsizing or relocation in cases where a firm reported several restructurings. Firms reporting both relocation and downsizing within the sample period are omitted from the sample.

5. Estimation results

Table 2 presents the regression results for the multinomial model. The multinomial model clearly performs better than the consolidated model, indicating that the restructuring modes involve different decisions. Considering the estimated parameter values and the estimated marginal effects on probability, the results show a clear distinction in the effect of firm size and firm age on the form of layoff. Consistent with the theory of selection effects associated with passive learning about initial conditions, the impact of firm size and age on exit is negative. In line with previous empirical results on downsizing and relocation, large firms have a higher propensity to relocate or to downsize. This result confirms the first part of propositions 1 and 2, suggesting that larger firms in particular benefit from relocation and downsizing. The effect of age on relocation is not significant. This result together with the fact that multinational firms tend to layoff employees through a relocation more frequently than firms without a multinational network is in line with the recent literature on the exit of foreign firms (Görg and Strobl, 2003). Production plants that are part of a multinational network are often found to be footloose. The firm characteristics of such local production plants that typically explain the exit behaviour of single-plant firms, are subordinated to the global strategy of the multinational firm.

Firms and especially multinational firms that have this relocation option, will execute it if wage or other costs become unfavorably high in a particular location (Kogut and Kulatilaka, 1994; Slaughter, 2000). Labour-intensive firms do not exploit Belgium's comparative advantage in capital-intensive industries and are forced to exit or, if possible, to relocate part of its labour-intensive activities abroad. Consistent with this reasoning, the capital to labour ratio is significant and has the expected sign for

relocating firms. Downsizing firms likewise try to increase their profitability by increasing the ratio of fixed capital to the number of employees through layoffs. This way they profit more from Belgium's revealed comparative advantage.

The effect of stickiness of capital, RINV, on the decision to restructure is most apparent through its effect on exit and downsizing. The marginal effect of RINV on the probability to relocate is small, notwithstanding the higher rate of recent investments made by relocating firms (see appendix). This finding suggest that in being able to reemploy investment goods in another location, relocating firms are less constrained in their restructuring decisions than other firms. This result is in line with Hopenhayn (1992) and Lambson (1994) who found that investment in plant and equipment involving important sunk costs would especially render the downsizing and exit decision less attractive.

The variables measuring the firm's profitability both indicate that firms which lay-off employees are not among the most profitable ones (see Appendix). The coefficient measuring the sensitivity of restructuring to profitability losses is not significant for exiting firms. The rationale for this finding lies in the hysteresis phenomenon, described above. On the contrary, firms that downsize or relocate are sensitive to deteriorating profitability. Since the descriptive statistics in the appendix suggest that relocating firms are the most profitable among the restructuring firms, firms having an option to relocate will do so when profitability significantly decreases.

As a control variable we have included the firm's financial leverage. Though theory predicts a positive sign between a firm's restructuring decision and financial leverage, Schary (1991) surprisingly finds a negative sign of leverage in the cotton industry. Kovenock and Phillips (1997) do discover a positive relationship between leverage and exit, but significant only in highly concentrated industries. In the trucking industry,

Zingales (1998) also finds a positive effect of leverage. For downsizing, there are also mixed empirical results for the leverage variable. Using a sample of US firms Ofek (1993) reports a positive effect of leverage, while Kang and Shivdasani (1997) find a negative sign for a group of Japanese firms. In our study the estimated parameter for the interaction variable LEV*DIS provides evidence that employee layoffs by poorly performing firms are positively linked to financial leverage.

Manufacturing firms are more likely to layoff employees through downsizing or exit. The positive effect of the manufacturing variable is most prominent for downsizing firms. We don't find any evidence that multinational firms downsize or exit more than firms without an international network.

In line with proposition 1, economies of scale appear to be significant for relocating firms. Though proposition 2 predicts a negative relation between economies of scale and downsizing, the hypothesis is not supported by the data. Studies (Hennessy, 2003**)** have shown that due to the rise in global competition, firms specialise production on their core activities and divest in activities where they are not able to achieve a significant position in the market. Non core activities are contracted to other firms. Through the bundling of resources on their core business, downsizing firms are able to profit from possible scale economies in these main activities.

Considering the impact of product differentiation, the results show that PRODIF has the expected sign. The results are in line with the assumption that product differentiation decreases competition in general, also between multinational firms. Furthermore, the strong negative effect of product differentiation on the decision to relocate, suggests the importance of specific market conditions in the location decision. The possibility of occupying a strategic niche in the market requires close market contact and renders a pure efficiency seeking strategy through relocation less attractive.

6. Conclusions

The empirical results show a clear distinction in the effect of firm and industry characteristics on the form of layoff, in line with our theoretical model. Large firms have a higher propensity to relocate or to downsize. Exiting firms are less profitable, smaller and younger than downsizing firms while relocating firms are most profitable among the restructuring firms. Furthermore, firms that downsize or relocate are most sensitive to deteriorating profitability. Labour-intensive firms do not exploit Belgium's comparative advantage in capital-intensive industries and are forced to exit or, if possible, to relocate part of their labour-intensive activities abroad. The effect of stickiness of capital on the probability to relocate is small, notwithstanding the fact that relocating firms have invested more in the recent past. This finding suggest that in being able to reemploy investment goods in another location, relocating firms are less constrained in their restructuring decisions than other firms. The results support the concept of operating flexibility enjoyed by multinational firms. In line with the theoretical model, economies of scale appear to be significant for relocating firms. For downsizing firms, the scale economy effect reflects a specialisation of production in core activities, inducing the divestment of activities for which firms are not able to achieve a significant position on the market. Product differentiation decreases competition in general. The possibility of occupying a strategic niche in the market requires close market contact and renders a pure efficiency seeking strategy through relocation less attractive.

7. References

Caves, R. and M.R. Porter (1976), Barriers to Exit, in Essays in Industrial Organization in Honor of Joe Bain, Eds. R. Masson and P. Qualss, Ballinger, Cambridge MA, 39-70.

Dewitt, R.L. (1998), Firm, Industry, and Strategy Influences on Choice of Downsizing Approach, Strategic Management journal, 19, 59-79.

Dixit, A. (1989), Entry and Exit Decisions under Uncertainty, Journal of Political Economy 97, 620-638.

Dixit, A. and R. Pindyck, (1994), Investment under Uncertainty, Princeton: Princeton University Press.

Görg, H. and E. Strobl, (2003), Footloose Multinationals, Manchester School 71, 1-19.

Grubel, H.G. and P.J. Lloyd, (1975), Intra-Industry Trade: the Theory and Measurement of International Trade in Differentiated Products. John Wiley & Sons, London.

Harrigan, K.R. (1980), The effect of exit barriers upon strategic flexibility, Strategic Management Journal 1, 165-176.

Haynes, M., S. Thompson and M. Wright (2000), The Determinants of Corporate Divestment in the UK, International Journal of Industrial Organization 18, 1201-1222.

Henessy,P. (2003), The Future of the Textile and Clothing Industry in an Enlarged Europe, working paper.

Hopenhayn, H. (1992), Entry, Exit, and Firm Dynamics in Long Run Equilibrium, Econometrica 60 , 1127-1150.

Jensen, M. (1986), Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers, American Economic Review 76, 323-329.

Jovanovic, B. (1982), Selection and the Evolution of Industry, Econometrica 50, 649-670.

Kang, J.-K. and A. Shivdasani (1997), Corporate Restructuring During Performance Declines in Japan, Journal of Financial Economics 46, 29-65.

Kogut, B. and N. Kulatilaka (1994), Operating Flexibility, Global Manufacturing, and the Option Value of a Multinational Network, Management Science 40, 123-139.

Konings, J. (2004), Do Wage Differences Lead to Relocation: Comparative Analysis of High and Low Wage Regions, mimeo, LICOS, Catholic University of Leuven.

Kovenock, D. and G. Phillips (1997), Capital Structure and Product Market Behavior: An Examination of Plant Exit and Investment Decisions, Review of Financial Studies 10, 767-803.

Lambson, V. (1991) Industry evolution with sunk costs and uncertain market conditions, International Journal of Industrial Organization 9, 171-196.

Marvel, H.J. and Ray, E.J. (1987), Intra-industry Trade: Sources and Effects on Protection, Journal of Political Economy 95, 1278-1291.

Motta, M. and J.F. Thisse (1994), Does Environmental Dumping Lead to Delocation?, European Economic Review 38, 563-576.

Myers, S.C. (1977), Determinants of Corporate Borrowing, Journal of Finance 5, 147-175.

Ofek, E. (1993), Capital Structure and Firms Response to Poor Performance, Journal of Financial Economics 34, 3-30.

Pennings, E. and L. Sleuwaegen (2000), International Relocation: Firm and Industry Determinants, Economics Letters 67, 179-186.

Schary, M.A. (1991), The Probability of Exit, Rand Journal of Economics 22, 339-353.

Siegfried J.J. and L. Beth Evans (1994), Empirical Studies of Entry and Exit: A Survey of the Evidence, Review of Industrial Organization 9, 121-155.

Slaughter. M.J. (2000), Production Transfer within Multinational Enterprises and American Wages, Journal of International Economics 50, 449-472.

Sleuwaegen, L. and K. De Backer (2001), Multinational Enterprises, Market Integration and Trade Structure: What Remains of the Standard Goods Hypothesis, Weltwirtschaftliches Archiv 137, 379-403.

Tharakan, P. and J. Waelbroeck (1988), Has Human Capital Become a Scarce Factor in Belgium, Cahiers Economiques de Bruxelles 118, 159-179.

Zingales, L. (1998), Survival of the Fittest or the Fattest? Exit and Financing in the Trucking Industry, Journal of Finance 53, 905-938.

8. Appendix

Table 1: Definition of explanatory variables

Variable	Definition
AGE	The logarithm of the age of the firm measured in years up to 1999.
SIZE	The logarithm of the firm's added value.
C/L	The logarithm of the ratio of fixed capital to the number of employees in full time equivalents.
RINV	The logarithm of the sum of 1 and the ratio of the acquisition of tangible assets to the tangible assets at the end of the preceding period.
ROE	The return on equity (x) before taxes in five classes (1: x<-0.16, 2: -0.16<x<-0.08, 3: -0.08<x<0.08, 4: 0.08<x<0.16, 5: 0.16<x).
DIS	Dummy variable which is 1 if return on equity is smaller than –0.08.
LEV	The ratio of debt to the sum of debt and equity.
MNE	Dummy variable, which is 1 if the firm belongs to a group of multinationals with more than one foreign subsidiary.
MAN	Dummy variable, which is 1 for manufacturing industries.
MES	Minimum efficient scale, defined as the log of the median size of firms in the industry in which the firm has its primary activity. The following industries are defined: Primary industries and mining; Food, beverages and tobacco; Textiles, leather and wood; Cokes and chemicals; Rubber and plastics; Other non-metallic products; Metals; Machinery and equipment; Electrical equipment; Transport equipment; Construction; Wholesaling; Retailing; Hotels, restaurants and recreation; Financial and other services.
PRODIF	The level of product differentiation reflected by the intra-industry trade index of Grubel an Lloyd (1975).

Table 2: Descriptive statistics of explanatory variables

Variable	Exit Mean (St.Dev.)	Relocation Mean (St.Dev.)	Downsizing Mean (St.Dev.)	Non-Restructuring Mean (St.Dev.)
AGE	3.11 (0.25)	3.45 (0.23)	3.45 (0.24)	3.38 (0.19)
SIZE	11.07 (1.26)	12.70 (1.79)	12.42 (1.49)	12.20 (1.12)
C/L	6.05 (1.69)	6.70 (1.43)	7.10 (1.28)	7.00 (1.36)
RINV	0.20 (0.58)	0.30 (0.41)	0.23 (0.26)	0.38 (0.36)
ROE	2.77 (0.96)	2.92 (1.31)	2.54 (1.35)	3.39 (1.18)
DIS*LEV	0.13 (0.32)	0.23 (0.36)	0.30 (0.37)	0.12 (0.29)
MNE	0.38 (0.49)	0.74 (0.45)	0.52 (0.50)	0.49 (0.50)
MAN	0.56 (0.50)	0.64 (0.48)	0.68 (0.47)	0.48 (0.50)
MES	2.66 (0.65)	2.93 (0.53)	2.79 (0.67)	2.61 (0.56)
PRODIF	0.87 (0.06)	0.86 (0.05)	0.86 (0.06)	0.88 (0.06)

Table 3: Correlation matrix of the total sample of firms

	MAN	SIZE	MNE	C/L	ROE	RINV	DI*LE	AGE	MES	PRODIF
MAN	1									
SIZE	0.11	1								
MNE	0.05	0.30	1							
C/L	0.09	0.29	0.30	1						
ROE	-0.08	0.14	0.07	0.02	1					
RINV	-0.09	-0.08	0.01	-0.01	0.07	1				
DIS*LEV	0.04	-0.15	-0.03	-0.02	-0.43	-0.06	1			
AGE	-0.05	-0.01	-0.05	-0.02	0.04	-0.08	-0.03	1		
MES	0.24	0.11	0.07	0.06	-0.01	-0.05	0.04	-0.04	1	
PRODIF	0.09	0.01	0.01	-0.04	0.03	0.01	-0.05	-0.03	-0.05	1

Table 4: Number of restructuring firms and layoffs across different sectors.

Industry Sectors (NACE-code)	Exit # firms (%) # of employees in layoffs (%)	Relocation # firms (%) # of of employees layoffs (%)	Downsizing # firms (%) # of of employees layoffs (%)	Totals
Energy and Water (0&1)	1 (11%) 192 (23%)	0 (0%) 0 (0%)	8 (89%) 658 (77%)	9 (1%) 850 (1%)
Steel and non-metallic mineral products Industry (22,23&24)	14 (19%) 1344 (10%)	5 (7%) 685 (5%)	56 (75%) 11338 (85%)	75 (9%) 13367 (16%)
Chemical Industry (25)	5 (9%) 300 (8%)	13 (25%) 1428 (37%)	35 (66%) 2103 (55%)	53 (6%) 3831 (5%)
Metallurgic Industry (3)	18 (10%) 2119 (8%)	23 (13%) 6854 (27%)	140 (77%) 16537 (65%)	181 (21%) 25510(31%)
Other Industry: primarily Food, Textile, Paper, and Rubber (4)	30 (12%) 1640 (11%)	52 (21%) 6641 (43%)	164 (67%) 7296 (47%)	246 (29%) 15577 (19%)
Construction (5)	4 (15%) 131 (8%)	0 (0%) 0 (0%)	22 (85%) 1465 (92%)	26 (3%) 1596 (2%)
Distribution (6)	23 (16%) 1112 (9%)	22 (15%) 1266 (10%)	97 (68%) 10492 (82%)	142 (16%) 12870 (16%)
Transport, communication and financial and other services (7,8&9)	28 (22%) 1259 (15%)	7 (5%) 383 (5%)	94 (73%) 6649 (80%)	129 (15%) 8291 (10%)
Total	123 (14%) 8097 (10%)	122 (14%) 17257 (21%)	616 (72%) 56538 (69%)	861 (100%) 81892 (100%)

Table 5: Results from multinomial logit regression†

	Relocating	Exiting	Downsizing	Consolidated
Intercept	-2.94 *-0.29*	8.64*** *0.91*	0.23*** *-0.05*	
	(-1.46)	(4.19)	(0.19)	
AGE	-0.23 *-0.01*	-0.84*** *-0.08*	-0.24** *-0.02*	-0.37*** *-0.03*
	(-1.18)	(-4.83)	(-2.06)	(-3.72)
SIZE	0.34*** *0.02*	-0.46*** *-0.06*	0.21*** *0.03*	0.14*** *0.02*
	(4.01)	(-4.40)	(3.86)	(3.10)
C/L	-0.32*** *-0.02*	-0.37*** *-0.03*	-0.04 *0.01*	-0.16*** *-0.09*
	(-3.82)	(-4.34)	(-0.73)	(-3.58)
RINV	-1.42*** *-0.05*	-2.89*** *-0.23*	-1.79*** *-0.20*	-1.98*** *-0.34*
	(-2.84)	(-5.17)	(-5.81)	(-7.74)
ROE	-0.20** *-0.00*	-0.15 *-0.00*	-0.36*** *-0.05*	-0.29*** *-0.09*
	(-2.10)	(-1.47)	(-6.36)	(-6.05)
LEV*DIS	2.02*** *0.11*	2.09*** *0.15*	1.58*** *0.17*	1.78*** *0.27*
	(5.70)	(6.07)	(7.14)	(9.28)
MNE	1.03*** *0.08*	0.23 *0.01*	0.09 *-0.01*	0.30** *0.04*
	(4.16)	(0.94)	(0.63)	(2.50)
MAN	0.23 *-0.00*	0.77*** *0.06*	0.62*** *0.08*	0.58*** *0.09*
	(1.02)	(3.18)	(4.61)	(5.12)
MES	0.76*** *0.05*	0.18 *0.00*	0.31*** *0.03*	0.37*** *0.03*
	(4.24)	(0.89)	(2.83)	(3.95)
PRODIF	-4.01** *-0.20*	-1.71 *-0.01*	-4.04*** *-0.51*	-3.72*** *-0.45*
	(-2.32)	(-1.00)	(-4.09)	(-4.44)
Log Lik		-1540.06		-1597.96

*significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. †T-values are between brackets. Marginal effects on the probability are in italics.