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THE SIZE OF FIRMS AND ECONOMIC PERFORMANCE

INDUSTRIAL ECONOMICS IN BETWEEN RENAISSANCE OF SMALL FIRMS AND MERGER-MANIA

The relative advantages and disadvantages of small and large firms are a topic discussed over and over again in Industrial Economics. The results, nevertheless, are far from unequivocal. This may be due to the fact that the relative advantages of specific classes change over time, due to the given state of technology and organization as well as the nature of demand. A general superiority of large firms, however, has not been detected in this field of research, rather the contrary. Therefore the prevalent merger mania, originating in the U.S. but increasingly spreading out to Europe and Japan, fundamentally challenges the results of traditional size class research. Apparently the market itself demonstrates the superiority of large firms. Managers and politicians quickly (and frequently gladly) received this message and acted accordingly. Research on mergers and acquisitions, however, has produced markedly diverse results: An enthusiastically positive evaluation of takeovers in the event studies of share prices and in the corporate-control literature, a very sceptic stance in the outcome studies of merging firms' performance.

A closer investigation reveals that these different lines of research and their differential results need not contradict each other. They use different samples - size class research e. g. deliberately exludes growth by merger - , different time horizons and different indicators. Posing identical questions and applying the same methodology reveals a chance of consistent answers. Trying to do this job, this paper first reviews size class research, then event studies and outcome studies of takeovers. Some hypotheses summarizing the respective results are proposed. Thereupon it is investigated how these hypotheses fit together.

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1. Superior performance of small firms in size class research

1.1. Survey on small versus large firm performance

Since the late seventies articles and books on the performance of small firms have been booming . The majority of the studies conclude that small firms are superior according to some performance measure ("strong mainstream result"). However, there are some differences according to indicators, methods and countries so that we prefer the "softer" version of the hypothesis, namely that there is overwhelming evidence that smaller units in general are not inferior to larger units. Even the softer version is a surprise for economists trained to believe in economies of scale and scope, for technicians who supply engineering estimates of economies of scale (Pratten 1988) and for politicians and laymen reading day after day about the necessity for large firms to grow even larger in order to remain competitive (see the discussion about the Common European Market) and the merger and takeover mania happening as a proof of this notion.

The relative performance of firms according to size classes refers either to "shares", to "efficiency" or to "profitability".

Shares

The share concept whose advantages and disadvantages are dicussed in the industrial organization literature under the heading of survivor concepts, compares the share of a given size class at different points of time. Employment, value added or sales are most commonly used as indicators.

The increasing number of *employees* working in small units is the single most powerful "proof" for the superiority of small firms. The study by Birch (1979) which demonstrated (using a Dun & Bradford sample) the outstanding employment performance of firms with less than 20 employees in the U.S. stands at the beginning of the booming literature. The study had many followers (Armington/Odle 1983) and critics (Eckart/Einem/Stahl 1987). Questions remained as to the extent and the reasons for the employment gains, not as to the tendency. Similar results are available for Great Britain (Burns/Dewhurst 1986), Germany (Irsch 1988; Bade 1987), Denmark (Madsen 1986), Italy (Agenzia Industriale 1986), Ireland (Gowan et

al. 1986), Switzerland (Pleitner 1986), Europe (Storey/Johnson 1987) and the U.S. (Brock/Evans 1989). Instead of adding more and more studies let us reverse the argument. The authors know of no single study which arrived at the result that in any industrialized country the share of employees working in small firms decreased in the seventies or eigthies.[3]

A similar result usually holds for *value added*. Here the share of small firms is increasing, that of large firms decreasing. This result is available for the manufacturing sector as well as for the total economy (Birch 1979). It is more pronounced in the latter case and slightly less general than the parallel result for employment.

In some studies the share of the very large firms is reported separately. For decades the share of the very largest firms had increased from census to census. For Germany the share of the largest 100 firms - measured by its value added - however, fell from 19,1 % to 18,8 % between 1982 and 1986 (Wirtschaftswoche 37/1988).

Studies reporting an increasing share of large firms as measured by *sales* are partly due to a statistical fallacy, partly they point to an important facette of the picture. Papers reporting that the proportion of firms with sales higher than a fixed nominal value (1 million of some currency) has increased over time forget about price increases as well as real growth and are thus worthless. On the other hand the development of large firms looks relatively best when sales are used as an indicator (Bade 1987). This could have two explanations. The first is the hypothesis that larger firms are manager oriented and put greater emphasis on growth of sales, employment, size etc (at the expense of profits). The other would be that large firms rely on external growth by mergers, acquisitions etc.

One of the major problems with "shares" is that the comparison of shares between two points of time mixes up the development of existing groups of firms (cohorts) with births and deaths, and on top of it with firms changing the reference group (see Storey (1988) for a model of the job generation process, where net job change is the outcome of births, in-moves, expansions etc). Fortunately there are some studies which prove that increasing shares of small firms are not only due to this problem. König/Weißhuhn (1988), investigating employment in 38 branches of manufacturing

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3) *In the fifties and sixties, however, 3 out of 4 U.S. jobs were created by big business or government. This, however, was the era of conglomeration while Birch's study already reflects the phase of deglomeration.*

Table 1

Employment trend in a sample of manufacturing firms (Austria)

size class 1980	number of firms	employees		
		1976	1984	1984/76
0-99	56	3.386	3.564	5,3
100-499	224	55.201	51.878	-6,0
500-999	66	46.071	42.394	-8,0
1.000 and more	55	210.804	183.457	-13,0
all sizes	401	315.462	281.293	-10,8

and services in Germany were able to divide gains and losses into new, abandoned and surviving firms (see tables 2 and 3). Within the survivers small firms increased employment and large ones lost. Aiginger/Bayer (1987) investigated employment and value added for a constant sample of Austrian firms between 1976 and 1983. Employment increased by 4,6 % in firms with less than 100 employees, and decreased by 5,4 %, 10,7 % and 5,6 % in the larger size classes (the same hierarchy held for a constant cohort of manufacturing firms) and for other indicators as value added or sales. Table 1, extending the period up to 1984 shows this tendency even more pronounced.

Efficiency

The "oldest" measure of performance in macroeconomic industry studies is value added per employee. It is assumed to measure technical efficiency (as opposed to economic efficiency which will be represented by the profitability measures). The problem with this measure is that it confronts total output with only one input and the input is measured quantitatively (without consideration of quality or pay differences).

The usual result is that value added per employee increases with the size of firms, though the main acceleration occurs in the lower size classes. We found for Austria in the seventies that value added reached its maximum in firms (on the plant level) with 100 - 500 employees, for EC countries also for the second largest category.

There seems to be an interesting structure of the results over time and across units: It looks as if there were little evidence of a slight relative decrease in value added for the very large firms in the late sixties. This tendency increased in the seventies, pushing down maximum value added per employee to relatively small "medium sized "firms (100 - 499 employees). In the eighties the decline in efficiency of the very large firms evaporates. For Austria (1983) value added per employee reaches its maximum on the plant level in the category of 100 - 499 employees (the decline from here to the largest becomes relatively flat), on the company level the largest companies were the most "efficient" (see table 4).

The statistics for firms and plants had shown a diverse development already in the seventies (Aiginger/Tichy 1984). For firms there was no decline in efficiency for the largest group, for plants it existed. We interpreted this to be due to high synergies for firms consisting of decentralized plants (a similar trend was

Table 2

Employment Gains and Losses in "Survior" Enterprises

size of enterprise by 1980 employment	in thousand employees	in relation to total employment change	in % of 1980 of 38 industries mean	median
1-19	+234,7	0,55	+1,57	+0,92
20-49	-58,8	0,14	-0,22	-0,27
50-499	-260,7	0,61	-1,57	-1,09
> 499	-343,9	0,80	-2,88	-1,75
total change in all sizes	-428,7	1,00	-3,11	2,11
employment 1980	16.662,7			

Source: Own calculations using König/Weißhuhn (1988) table 4 and 5

Table 3

Employment Gains in New and Losses in Terminated Enterprises

size of enterprise by 1980 employment	gains in new divided by total gains in new enterprises		losses in abandoned divided by total losses in abondoned		net of the mean (1) - (3)
	mean	median	mean	median	
1-19	47,96	53,0	41,97	39,4	+5,99
20-49	13,49	14,1	15,66	15,8	-2,17
50-499	26,98	25,8	32,52	30,3	-5,54
> 499	11,54	3,5	9,85	2,7	+1,69

Source: Own calculation using König/Weißhuhn (1988), table 6

found by Armington/Odle 1983 and Fothergill/Gudgin 1979). However, this difference raises the question: Which is the best unit for the performance race, plants, firms, or holding companies? If large companies consisting of small production units represented the optimal organization pattern, the puzzle between profitability of small firms and the merger mania would have an easy rational solution, at least in the absence of control losses.

Profitability

Studies working with data collected by a central statistical office have to use crude profit measures like value added minus wages as percentage of value added. Papers using accounting data can use pre- or after tax profits or cash flow in relation to total assets or equity. Even if they may come closer to a profit concept used by firms, however, valuation techniques and differences between owner companies and manager lead firms may still lead to misleading interpretations (see Scherer 1980).

The majority of recent studies for European countries show that profitability declines with firm size. A strong decline is reported by Irsch (1988) for Germany using a sample of 14.600 firms (balance sheets 1984/85). Aiginger/Tichy (1984) - using census data - show that profitability is highest for the smallest firms, in manufacturing as well as in the total economy. This holds also for 1983 (see table 4) if we adjust for two branches (oil and tabacco), where measured value added includes high indirect taxes).

A similar picture is revealed by the relation of profits to sales for the sample of the Austrian National Bank (see table 6), though there are some years in which large firms have above average profit rates. Contrary to expectations the dispersion of profits appears to be higher in the larger size classes. Burns/Dewhurst (1987, 195) report profits to be larger in small firms in France, Italy and Denmark, while in Great Britain they are marginally smaller for this group. Uhlmann/Berger (1985) report a cash flow/sales ratio of 6.5 resp. 6.4 % for German manufacturing firms (census data, 1982) with less than 49 employees, resp. 50 - 99 employees. In contrast to this firms with more than 1000 employees had only 3.8 %. Scherer (1980) using data from the Federal Trade Commission in the USA shows that profits are slightly higher for large firms in 1975-77, but average after tax return is within the range of one percentage point between the largest and the smallest asset size classes (13.2 %

Table 4

Efficiency and profitability in Austrian manufacturing (1983)

	efficiency = value added (per employee)				profitability (=(va-wages)/va)			
	plants	enterprises all	enterprises without oil & tabacco	plants without the very smallest[1)]	plants	enterprises all	enterprises without oil & tabacco	plants without the very smallest[1)]
	in 1.000 AS				in %			
0-99	264,8	252,4	249,6	349,1	33,4	34,0	33,6	35,0
100-499	411,6	341,4	336,4	430,1	36,5	26,6	25,9	39,4
500-999	366,9	372,0	372,0	375,9	26,0	27,8	27,8	27,3
1.000 and more	275,8	451,9	370,6	388,8	14,9	30,7	16,0	19,1
all sizes	333,2	335,1	309,1	-	39,5	30,5	25,9	-

Source: Central Statistical Office; Bereichszählung 1983.
va = value added; in oil & tabacco incl. indirect tax
1) Industriestatistik 1983/II: incl mining, excl. "Gewerbe".

Table 5

Efficiency and profitability in non manufacturing sectors and total economy (Austria, 1983)

	efficiency			profitability		
	construction	retail trade in 1.000 AS	all industries	construction	retail trade in %	all industries
0-99	275,3	235,8	287,3	32,6	47,7	41,8
100-499	323,0	310,7	416,5	21,3	40,0	37,4
500-999	307,0	283,4	404,3	6,6	31,9	29,5
1.000 and more	331,0	331,3	440,9	8,2	39,1	27,9
all sizes	291,2	254,6	348,5	26,7	44,8	36,6

efficiency: value added per employee
profitability: (value added minus wages) 100/value added

Table 6

Cash flow and profits in manufacturing firms (1976/84)

	cash-flow in % of sales				profit in % of sales			
	AM	median	LQ	UQ	AM	median	LQ	UQ
0-99	6,52	6,59	3,57	10,15	3,47	3,63	1,20	6,31
100-499	5,42	5,78	2,93	9,67	2,15	2,44	0,51	4,98
500-999	6,22	6,46	3,47	9,39	3,30	2,94	0,64	5,58
1.000 and more	4,44	4,78	2,44	7,83	0,11	1,42	-0,66	3,41
all sizes	4,93	5,81	3,12	9,16	1,03	2,47	0,50	4,99

Source: Balances of firms, Austrian National Bank

AM = arithmetic mean
LQ = lower quartile
UQ = upper quartile

resp. 12.4 %). He argues that for small firms this rate could be underestimated since probably generous salaries to the owner-manager are included and profits of the large firms contain an element due to monopoly power. The spread of profits had been much larger in 1963-65 and in 1969-71. (For additional studies and critics on the use of accounting profits see Reinganum/Smith 1983 and Goldschmid/Mann/ Weston 1974)

Since firm size is not the only determinant of profits (and probably not the most important one), the question arises which determinants should be controlled for when comparing profitability. Most studies refer to the manufacturing sector, some to total industry. In the later case the positive result for small firms is partly due to the shift from manufacturing to services. But it is stronger than that, and furthermore it remains intact if the manufacturing sector is split into industries (Aiginger/Tichy 1984).

Studies working with data on the firm level have tried to hold many other determinants constant. Hall/Weiss (1967) used data from Fortune's list of large firms and found profits to rise with size, though they really focussed on a comparison of large versus very large firms. Neumann/Böbel/Haid (1979) calculate the influence of size on profitability for 334 German firms holding concentration rate, risk, exports, imports, growth and product differentiation constant and find a negative influence of size on profits. Reports based on MIT's PIMS data base stress the importance of market shares as determining profits. Size itself is not considered an important determinant.

1.2. Reasons for the non-existence of scale and scope economies

There is no comprehensive theory available to explain the good performance of smaller firms. Technical blueprints always suggest declining average costs. Internationalization, research & development competition, entry costs all underline the importance of larger units. Nevertheless, larger units lose shares (in employment, to some extent in value added), are less profitable, efficiency gains are minor even if only compared to labor input. We want to propose a few hypotheses which could explain some aspects of the empirical world. Some of them are related, most are tentative and should be investigated further. Some of them (H 1, H 2, H 3) imply that the higher profitability of small firms can be explained, but is not worth too much (by one or the other implicit standard). H 4 explains the profitability result (but

not the employment gain of small units) by differences in the objective function, hypotheses 5 and 6 can explain the good profitability of small firms under specific circumstances (typical for the eighties) but infer that it may not hold forever.

Hypothesis 1: Sweatshop argument

The higher profitability of smaller firms mirrors lower wages, lower social benefits, less regulation

It is an empirical fact that wages per head increase with firm size. Since large firms are usually located in agglomerations with higher wage levels, attract formally qualified labor, are led by a cast of managers and employ high-wage headquarters, this tendency evaporates if we correct for location, qualification, management, though some differences remain. But is this cost difference not a voluntary strategy aimed at maximizing profits? There is no law that large firms have to pay more. On the contrary, considering the higher individual stability of employment, large firms could pay less. The efficiency wage hypothesis maintains that the firm pays more to increase efficiency, the human capital hypothesis explains that firms invest in qualification and pay more to insure against quits. The higher payment is an investment whose returns should be higher than costs and therefore a profit increasing strategy, not a disadvantage of larger firms.

In a similar way it is argued that large firms are more closely monitored to meet restrictions in working time, emission standards, social standards. On the other side we could argue that large firms have advantages in negotiating with banks and government (over subsidies and orders), obtain cheaper energy, can effectively threaten to dismiss workers if government does not follow their lobbying.

A complete balance of "non-economic" or "unjustified" advantages and disadvantages of sizes for hiring, negotiating etc. is not possible. We know from direct surveys that there is no clear preference of employees to work in a certain size class (at least employees seem weakly to prefer medium firms to large firms despite higher wages in the latter; Aiginger/Tichy 1984).

Hypothesis 2: Heterogenity of demand

Small firms increase employment as demand shifts to sectors with low optimal sizes, service components determine the competitiveness, and demand is more differentiated today

Demand has shifted from manufacturing to service. This explains part of the overwhelming dominance of small firms among *new businesses*. However, the increasing share and profit results hold also within the manufacturing sector. Here many sectors with decreasing unit cost (like steel, non-ferrous metals, oil industry) lost shares especially in the late seventies and early eighties. However, declining profits and decreasing employment with size hold also for a given sectoral structure (see Aiginger/Tichy 1984; König/Weißhuhn 1988).

The increasing importance of services and content of services does hold even within many industrial sectors. For example in the computer industry value added of hardware decreases, software, services and maintainance increase. Production related services (engineering, finance, marketing, research, promotion, after-sales service) nowadays are a major factor of competitive performance. Most of these service components exhibit minor or no economies of scale. This may have counterbalanced economies of scale in the hardware sector.

Hypothesis 3: Financial risk hypothesis

Smaller firms have to earn higher average return, since their individual risk is larger

Risk-averse investors would not invest in smaller firms, if they were not more profitable. The higher individual risk of smaller firms is well documented (Irsch 1988; Neumann/Böbel/Haid 1979). The question is how large these profitability differences have to be, especially since investors can invest in a mix of small firms reducing the variance of the returns. The largest risk difference is given for small and young firms, the difference in risk and the variance of profits is smaller for existing firms. For large firms fixed cost and capital intensity are responsible for a considerable variance of profits.

Irsch (1988) tried to calculate risk adjusted profits, but he applied a method which implied weights for the adjustment which use actual profit differences as yardstick for the adjustment. The fact that the total profit difference is explained by the risk difference therefore is a logical result. Using an off-hand evaluation we would believe that profit differences of 2:1 or 3:1 as reported by Irsch are larger than any sensible risk premium. But we want to keep adequate risk adjustment on the research agenda: Profits should be adjusted only for that part of the risk which cannot be eliminated by portfolio diversification (beta risk).

Two remarks should limit the potential power of this hypothesis. First it cannot explain the profit differences when investors are risk neutral or can diversify their

portfolio. And secondly, the macroeconomic importance of small firms is not impaired by the arguments if the aggregate small firm sector increases its employment and output share, is more profitable, and in the aggregate is also less volatile than the large firm sector. Rather the volatility on the firm level could be used as an argument for subsidization (external benefits parallel to the argument for R & D subsidies).

Hypothesis 4: Profit reducing complexity

Smaller firms are owner managed firms, aiming at profit maximization, larger firms are manager controlled, aiming at maximizing the managers utility function, which includes other elements as well

The body of literature on this topic is large and cannot be replicated. It discusses whether in a competitive world deviation from profit maximization is feasible, whether managers can be effectively monitored and whether profit differences empirically depend on the owner management relation. Deviations from profit maximization may be arguments for takeovers and acquisitions. Difficulties in assessing the potential profits are discussed in relation with the differences between expected and actual profits after mergers. However, again differences in the objective functions cannot explain all features of our picture. They can explain why large firms have lower profits, but not why smaller firms increase employment faster.

Hypothesis 5: Flexibility under uncertainty

Smaller firms can react more rapidly to changing demand

Stochastic arguments were always stressed as one source of economies of scale insofar as larger firms can pool risks. On the other hand large firms have to invest a long time before they know what demand will be, and they often have to produce before demand is finally specified. Smaller firms can wait longer and fulfill demand with less lead time in production, they can switch between related products and specifications. Let us assume that uncertainty of demand (as represented by the flatness of a probability function) is a decreasing function of the lead time, then large firms have to plan production according to an expectation of demand e. g. four quarters ahead and smaller firms one or two quarters ahead. Effective uncertainty of demand will then be lower for small firms. Many implications of this model are fulfilled by empirical data (higher capacity utilization for small firms, less cyclical variation of utilization rates, attempts to shift to production on order, just-in-time strategies etc). The larger costs of idle capacity decrease profits for large firms especially in periods of high uncertainty (late seventies).

Hypothesis 6: Miniaturization of technology

Technical development favored larger units in the sixties (computers were feasible only for them). Miniaturization of chips made electronical devices attractive for smaller units

Computer aided design, computer aided production and flexible automation may favor smaller units above average, since small batches become attractive. On the other hand original outlays are large and human capital becomes very important, so that automation may combine decreasing economies of scale with increasing economies of scope (Aiginger 1988).

These are some tentative hypotheses which could help to explain the surprising performance of smaller units in the seventies. Many of them are open to empirical falsification. They also show that for two reasons the higher profitability of smaller units is no eternal law: Firstly technical trends can change exogenously, maybe next time again favoring larger units maybe with the upsurge of telecommunication or with economic integration (unification of standards in the Common Market, decrease in transport costs). Secondly large firms can react by reforming organization and strategy to fight their problem areas. Actually they have already started to reorganize, divisionalize, increase flexibility, etc. They have also tried to become even larger through acquisitions and mergers, trying to squeeze out remaining technical economies of scale. The trends of the last decades are summarized in table 7.

2. Conflicting evidence of takeover research[4]

According to the size class research reported here the relative superiority of large or small firms depends on the indicator, the choice of the unit (establishment, firm, holding company) and probably on the period of investigation. Surely no general superiority of large units can be detected, but the indicators for a marked superiority of small ones are feeble as well. Large and small firms most likely are designed to fulfill different tasks. So a mix of size classes with a good chance of transition and no barriers neither to entry nor to exit may be optimal. The excessive merger wave of the last decade, however, contradicts this view. Large firms increasingly acquire smaller ones to become even larger. American managers are convinced that this is their only chance to compete with Japanese firms and European managers consider

4 *Takeovers are defined to comprise mergers and acquisitions*

Table 7

A simple summary

	Sixties	Seventies	Eighties
Economic objective	efficiency	quality	flexibility
Important resource	capital	energy	human capital
Firm size	large	small	consensus
Firm organisation	functional	divisional	problem oriented

increasing size as the appropriate strategy to survive in the Common Market and against American and Japanese competition (Geroski/Jacquemin 1985, 171). (American) economic policy considers takeovers as an efficiency enhancing threat to inefficient managements.

Merger research does not explicitely deal with the question of efficiency differences between size classes. It is mainly occupied with the question if takeovers increase the efficiency of the target, so that they can be used as an instrument of corporate control. But as a side-result merger research gives an answer to the question if the combination of two firms to a larger one increases efficiency and profits.

Do takeovers really increase efficiency? Two lines of research appear to give divergent answers.

2.1 Gains from takeovers in event studies

Event studies have spread out epidemically since the seminal study of Mandelker (1974). They hold that on efficient capital markets the share price fully reflects the evaluation of the firm given the available information set. The change of share prices following the announcement of a takeover therefore reflects how the market (the shareholders) evaluates the effects of the merger on the profitability of the firm.

The vast majority of event studies agrees that takeovers primarily effect the *share price of the target*: They had been rising (relative to a control group) for a while in most cases (Mueller 1986, 184), but start to soar by up to 50 % in the - say - 3 weeks around the announcement (Jensen/Ruback 1983, 10ff.; Ravenscraft/Scherer 1987, 4f.; Jarrell et al. 1988, 53). They increase even more when the takeover is motivated by a plan to reorganize the target (Office 1987) or when a wellknown corporate raider pushes the takeover (Holderness/Sheehan 1985). The premia paid by the acquirer average around a quarter to a third (Ravenscraft/Scherer 1987, 205; Jensen 1988, 22) with a tendency to increase over time (Mueller 1989, 5), and are considerably above the price that the usual earnings forecasts propose (Alberts/Varaiya 1989, 141f.). The *share prices of the acquirer* show little abnormal movement in the period of increasing share prices of the target.[5] Given efficient markets and full information this implies that the acquirers' management is expected

5) *There exists a declining tendency, however, from slight positive abnormal returns in the sixties to slight negative ones in the eighties (Jarrell et al. 1988, 53).*

to earn the premia it has to pay by more efficient management of the target and by exploiting synergies.

What's good for the target shareholders is good for the U.S., as the acquirers' shareholders do not lose (at least not much) - that is the conclusion of the proponents of the theory of corporate control: Mergers and acquisitions are gainful. Some argue, however, that takeovers may be gainful primarily for insiders: The rise of share prices *before* the announcement of the takeover can result only from informed managers' purchases (Mueller 1986, 208). Jarrell et al. (1988, 53f), however, argue that the relevant information could have been extracted from financial press: There exists an "active market for information" concerning future takeovers.

Researchers less convinced of the effectiveness of the visible hand of corporate control point to several flaws in this apparently perfect mechanism:

* Outcome studies generally cannot find gains from takeovers but frequently slight to substantial losses (see section 2.2).
* Even event studies investigating the longer run find abnormal negative returns on acquirers' shares: - 6 % over 1 year (Jensen/Ruback 1983) and -42 % over three years after the takeover (Magenheim/Mueller 1988, 177). Similar losses (-17 %, - 25 %) are estimated by Borg et al. (1989, 127) for the 1920's.
* Only a very small part of all takeovers are hostile ones (1986 40 out of 3300; see Jensen 1988, 22) and only one fifth of all takeovers causes an abnormal change in the management.[6] It is not easy to see where the restructuring of the target should result from.
* The managers of the acquiring firms do not appear to have any clear concepts for the reorganization of the target: Newbould (1970) did not find one case (out of 38) where the targets performance had been investigated in detail by the managers of the acquiring firm, where the managers could formulate convincing arguments for the takeover and where they took deliberate steps after the takeover to use synergies. No systematic relation could be detected between takeover premia and the improvement of corporate performance after the takeover (Cosh et al. 1988, 79).

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6) *According to Jensen (1988, 33) 50 % of the top managers change the firm in the three years following the takeover. Normally a top manager changes his company within 11 years anyhow, so that the probability of a change within 3 years would have been 3/11 without takeover compared to 1/2 with takeover.*

* If the targets of takeovers are underperformers at all, the differences are only slight relative to their market (Scherer 1988; Cosh et al 1989), so that the potential for additional gains via takeover and reorganisation is at least not obvious.

Believers in the steering potential of the market for corporate control consider all this as weak evidence confronting the hard facts of short term share price movements. Longer term projections are considered hazardous (What is cet. par.?), comparisons are considered inadequate as the mere existence of a market for corporate control disciplines managers. Hostile takeovers are not necessary in most cases as underperforming managers normally do not oppose to a takeover.

2.2 Losses from takeovers in outcome studies

Outcome studies deal with the changes in performance of the merging firms. They are more laborious, suffer frequently form the lack of adequate data, and the ceteris paribus problem is much more serious: How would firms have developed without merging?

Resulting from the (short term) event studies' conclusion that mergers raise the combined value of the merged firms, outcome studies concentrate on the *profit performance*. Prior to takeover the profits of acquiring as well as of the acquired firms had not deviated strongly from those of their control group. Acquirers' profits, however, on average had been a little bit higher than the ones of acquirees (Singh 1975; Mueller 1986; Hughes 1989). After the takeover profits decrease or at least remain unchanged according to almost all studies for very different countries (Mueller 1986; Ravenscraft/Scherer 1987; Odagiri/Hase 1989). Evidently the potential for rationalization had been overestimated by the acquiring managers, the premia had been too high,[7] scale economies and synergies had not been realized as envisaged. Similar results are reported from bank-mergers (Tichy 1989).

The studies reveal some differences between countries and types of takeover: Profits fare better when equals merge, tender offers are least profitable (Ravenscraft/Scherer 1987, 94, 75). Horizontal mergers are less profitable than

7 *To justify the premia paid in the period 1976/84 in the U.S., the performance would have to be lifted from average to top decile (Alberts/Varaiya 1989, 143ff.). The high premia do not result from overoptimism and manager hubris only. Systematically always the very one manager will win the takeover competition who is the most optimistic one and therefore prepared to pay the highest primium (Giliberto/Varaiya 1989).*

other ones in the U.K. (Cosh et al. 1980) and in Japan (Odagiri/Hase 1989), conglomerate ones in the U.S. (Ravenscraft/Scherer 1987, 193ff). The importance of these differences should not be overestimated, however, as the results in any one of the studies (which report dispersions) deviate widely from their respective means.

Similar to profits the *efficiency* of firms was influenced negatively by mergers. Mueller (1986, 202ff) cites some positive examples and Newbould (1970) finds productivity gains for half of his sample of horizontal mergers. The (larger) rest of the studies however reveals negative effects: Ravenscraft/Scherer (1987, 202) e. g. estimate a relative loss of total factor productivity of 0,1 % p.a. Conglomerate control delayed or distorted reactions to emerging problems (Ravenscraft/Scherer 1987, 157). A case study of 12 very large British takeovers (market share after takeover 1/3 or more) found only 5 cases of above average productivity increase (Cowling et al. 1980). Similar results hold for the non-manufacturing sectors as well, as Barnes' (1985) study of British building societies revealed. So, far from increasing efficiency as planned, takeovers do not lower it in the best cases.

Some theories of the firm maintain that it is neither profit nor efficiency but *growth* managers are interested in. But the effects of takeovers on growth are not impressive either, even if there exists some evidence that merging firms grow faster than the relevant control group (McGovan 1965; Mueller 1986). Positive effects of takeovers on *international competitiveness* could not be revealed until now (Porter, see Caves 1989, 171). Even *spreading of risks* appears not to have been achieved by (conglomerate) mergers: Mueller (1986, 185, 197f) could not find such effects, and Thompson (1983) surprisingly found even risk increasing effects of diversifying mergers; only a large minority could lower risks.

The failure of the *average* takeover to attain its targets concerning profits, efficiency, growth or risk spreading weighs the more heavily as merging firms *invest* more than the control group (Hughes 1989, 83 f.). Takeovers, however, have a negative impact on *outlays for R & D*. Acquirers on average buy research-intensive firms, but soon cut back R & D expenditures (Ravenscraft/Scherer 1987, 120ff, 203), probably forced by short-term profit maximisation in general or as a result of the lack of success of the merger. One must not forget, however, the large differences between takeovers, revealed by the deviations from the respective means: In Kumar's (1984) sample acquirers who increased investment increased profitability as well, and in Cowling's (1980) case studies productivity increased in firms which increased the amount and/or the quality of investment after the takeover.

2.3 Hypotheses integrating the results of takeover research

The two lines of research on takeovers, event studies and outcome studies apparently lead to different conclusions. Do they really contradict each other? Section 2.1 has already demonstrated that the gap shrinks when event studies pursue the same long time horizon as outcome studies. This solution, however, is not easily acceptable for adherents of the theory of efficient capital markets and of rational expectations, as obviously the market's expectations are *systematically* overoptimistic in the short run (which, however, may not be implausible outside the theory of efficient markets - see hypothesis 8 below). In addition it does not solve the question why managers and shareholders of the acquiring firm engage in takeovers as these tie up management capacity and *reduce* wealth. Attempts to provide an explanation can lay aside all arguments of neoclassical economics (economies of scale, of scope, risk spreading, tax or finance advantages) as all these arguments would have to *increase* efficiency and profits. But the managerial theories of takeovers are not convincing either. They emphasize that managers propagate takeovers as they are in their own interest (growth of the firm, empire building, insider capital gains) or result from their hubris (Roll 1986), their conviction that just they are able to beat the odds.[8] This belief is not completely unreasonable, however, as acquiring firms earned above average profits before merger (Scherer 1988; Odagiri/Hase 1989, 67) and the performance of their shares was excellent. All this may be true. But these theories confront the problem that it is hard to explain why shareholders of acquiring firms do not expel managers pursuing their own interests at a disadvantage to the owners. According to Cosh et. al. (1989) this does not happen even in companies where institutional shareholders dominate. At least shareholders could sell their shares, making acquiring corporations underperformers on the stock market and so could quickly stop any further takeover activities. It is very hard to subscribe to general theories claiming that managers *systematically* and *in the long run* act against the (conscious) interests of the owners.

The two lines of research on takeovers appear consistent, however, if one introduces uncertainty on the side of the managers as well as on the side of shareholders, risk loving behavior (for a small part of the portfolio) and faith of

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8) *"Sucessful in their main line operations and perhaps in early diversification mergers, they overestimated their ability to manage a sizeable portfolio of acquisitions, large and small, related and unrelated. By the time they learned that they had erred, they had already overextended themselves and were unable to cope with the problems emerging from the accumulated acquisitions" (Ravenscraft/Scherer 1987, 212).*

Table 8

Expected Gains and losses from merger

	Gains	Probability	Losses	Probability
A	Economies to scale	Limited by minimum opitmal size	control loss	depends on the quality of management
		Increasing market power	increasing bureaucracy	depends on form of organization
B	Economies to scope, synergy		increasing debt	depends on probability and size of target
C	Better use of free cash flow	High in decling industries	control loss	very likely
D	Improved management	More likely in related business	Differing management styles	
E	no		premia	certain
F	no		transaction costs	certain

A, B, C and D have a certain probability with a positive expected value, E and F are fixed sums, which have to paid with certainty.

shareholders in the managements' abilities. The following hypotheses try to do this job:

Hypothesis 7: Roulette character of takeovers
Every takeover is an independent event, so that averages don't tell much. Most mergers fail (relative to expectations) but a few are highly sucessful

The individualistic character of mergers is revealed by the large dispersion of results in all studies (which report more than averages) and by the small coefficients of determination in Ravenscraft/Scherer's (1987) explanatory equations. *Shareholders* of acquiring companies probably know the risks involved, but hold these shares deliberately as a small, highly risky part of their portfolio. The reasons why *managers* engage in takeover transactions are revealed in hypotheses 9, 11 and 12. In addition one should not forget the managers' insider gains mentioned above.

Hypothesis 8: Optimism as the basis of takeovers
Takeovers are children of optimism. They cluster in stock market booms. Takeovers require a management successful in their mainline operations, confident of being able to deal with additional problems successfully, and shareholders faithfully believing in the management's talents

These preconditions may appear rare, but one should not forget that acquisitions are rare events for an average corporation. As shareholders are able to freely buy and sell shares in the market it is almost evident that the portfolios primarily contain shares of companies with managers whom shareholders consider as very able. They will sell the shares if management engages in activities they consider overly risky. So in general one can assume harmony between acquiring managers and risk loving and confident shareholders. Both may be minorities in their relevant groups, but they find to each other by market transactions. The mood of general optimism is assured as takeovers cluster in periods of stock market boom (Geroski 1984) when stock prices generally represent overoptimism regarding future profits (Shiller 1981; Summers 1986)

Hypothesis 9: Free cash flow hypothesis
Managers and shareholders agree that managers can find better investment projects than shareholders

The free cash flow hypothesis (Mueller 1969; Grabovski/Mueller 1975) revitalized by Jensen (1988) holds that the acquirers are firms with good profits and a high cash

flow but with a limited number of profitable investment projects. So it is wealth increasing for shareholders as well as for society if they acquire firms - even those with average returns - at a premium and so disburse the free cash. This is probably true, but it is not the main part of the story. If it were, it would make more sense for profitable firms with limited investment possibilities to pay higher dividends, giving the shareholders a better chance to use the money according to their own preferences. Therefore one has to add to the traditional free cash-flow hypothesis the conviction of managers and especially of shareholders, that managers can find better investment projects than shareholders, or that takeovers save transaction costs or taxes[9] compared to investments by shareholders themselves. Given hypothesis 8 this does not appear overly implausible.

Hypothesis 10: Equilibrium-takeover hypothesis
If professional takeover specialists continually search for matches and if scale and scope economies are small, the takeover premium will equal expected profit so that the takeover is necessarily unprofitable on average

Mueller (1989, 5) found an increasing trend of premia from 15 - 25 % in the sixties up to 50 - 60 % in the eighties. Parallel to increasing premia the profitability of takeovers vanished, a trend noticed by other studies as well. This can easily be explained by the increasing professionalization of takeovers. Innumerable banks, advisers and specialists continually search for targets and offer them to possible acquirers. So competition in the market for acquisitions quickly consumes all possible extra profits by equating premia with discounted extra earnings.

Hypothesis 11: Mergers feed upon themselves
When merger activity has reached a certain level it is most likely to continue for a good while

Managers actively engaged in acquisitions usually have a good press and they are considered as innovative, progressive, active and so on. Their market value rises. So managers less convinced about the benefits of acquisitions have to keep up with their colleagues hurrying ahead. They must try to keep up for several reasons: For personal reasons concerning reputation and pay, for business reasons and for risk considerations: Managers considered as hesitant, apparently not trusting their own abilities, may have problems to get bank loans or additional risk capital, customers and distributers may prefer to deal with firms appearing more dynamic. And it may

9 *Tax savings are of minor importance according to Caves (1988, 165).*

be risky to stay small in a world of increasing concentration. The probability of becoming a takeover-target increases for small firms (Cosh et al. 1989, 79) - especially when the firm is profitable - and a small firm may suffer from the market power of the giants - even if these giants are less profitable. So some firms may engage in takeovers, not because they think them to be a highly profitable business, but to avoid disadvantages - defensive instead of offensive takeovers.

Hypothesis 12: Management hubris hypothesis
Takeovers frequently fail as management talent is a scarce resource and managers overestimate their talent

The takeover of another firm is a very difficult task for managers as at least two different business styles have to be integrated. Whenever a takeover implies further diversification, additional problems with new products, new production processes, new markets, new customers and new suppliers are put on top of all this. Managers, however, are more likely to see the mistakes occuring in the target company than the problems involved in integrating the new firm into the old one. In addition managers believe to be able to learn from past mistakes: See the Wall-Street man in Mueller (1989, 2) emphasizing the mistakes of "unstrategic" diversification of the sixties compared to the benefits of "strategic" diversification of the late seventies. Ex post studies, however, reveal that the "unstrategic" mergers of the sixties were much more profitable than the "strategic" ones of the early eighties (Caves 1989, 153). Management hubris, however must not be seen as an explanation in itself, it works solely in combination with the optimism of the shareholders and their trust in "their" active management (Hypothesis 8).

3. Some remarks on the integration of size class and takeover research

Two strands of literature have been brought together in this study. They use different data sets: The data set used in the performance and size class literature is the subset of firms which did not change their size, organization and width of diversification. The data set relevant for the merger question is the subset of those firms which underwent mergers and acquisitions. But the economic problem addressed in both lines of literature is the same: Potential economies of scale and scope by increasing production or adding new production lines. And the empirical evidence given by both types of study is also the same at least after some adaptations: that it is very hard to get hold of the potential economies of scale in

practical life.[10] Materialising economies of scale and scope is surrounded by uncertainty. Some firms can realize them, some not. On average the second group is larger. The interesting issue for economists, however, is under which conditions, for which branches and measured by which indicators the probability of success is larger.

Size class research suggests that small firms perform best in creating additional employment; their relative advantage is probably smaller in profits, while in efficiency and sales-growth large firms apparently take a lead. These results of size class research do not oppose the most recent results of takeover research if hypotheses 7 to 12 are accepted as an adequate explanation. In general takeovers neither increase profits nor growth nor efficiency, they rather push down all these indicators. After the takeover the whole proves to be no greater than the sum of the parts, sometimes it comes out even smaller. So both lines of research are consistent with the hypothesis that economies of scale and economies of scope are smaller in the real world than it is usually supposed and control losses are considerably larger. Further evidence in favor of this hypothesis is the rather bad performance of conglomerate mergers where the control problems are especially large. This is the reason for a new trend: back to basics, leading to sell-offs of non-related former acquisitions, usually at a loss (Ravenscraft/Scherer 1987, 164ff). Some recent mergers - bust-up takeovers - do not even intend to increase the firm size but to divide unrelated conglomerates into homogeneous parts (Scherer 1988, 76). These takeovers often correct the results of the preceding conglomerate mergers.

The hypothesis of the dominance of control losses over synergies is consistent with the suspicion of size class research that large firms outperform smaller ones with respect to *sales* and *labour productivity* rather than *to profits*. Casual evidence suggests that control losses manifest themselves in overinvestment, in overpaid staff or in products not perfectly meeting the demand of the customers rather than in inadequate output per worker. In addition the capital intensity of large firms appears to be higher and small firms may be credit rationed so that they cannot invest up to the point where capital costs equal the marginal efficiency of capital. Lastly: Due to the stronger influence of the owner in small firms they are more profit oriented than the manager dominated large firms with their emphasis on growth.

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10) Geroski (1989) presented the washing machine industry as a most interesting example: Even if the minimum optimal size is rather large (around 1 mill. machines/year) the industry is less concentrated as one would expect, and no truly international market exists. Multinational enterprises producing in plants spread all over Europe earn a profit rate of 7 - 8 %, exporters with one national plant and Europe-wide distribution earn 13 - 14 %, while firms concentrating on national markets earn as much as 20 - 35 %.

It is less clear up to now why *employment* grows faster in small (manufacturing) firms, a trend obvious now in almost all industrialized countries. One reason may be the recent concentration of large firms on their core activites. So they lay off personnel and employ more (small) subcontractors, some of which may be sell-offs or spin-offs of the large firm. Some of these small firms may not have splintered off deliberately. In recent years it has become not unusual to fire servicemen or personnel in the delivery department but to offer them an existence as selfemployed contractor, probably with leased tools or trucks. Similarly, several of the management buy-outs were defensive rather than offensive. Further arguments, however, are seriously needed on this point.

The most important reason for the unsatisfactory results appears to be the *high dispersion* of all the indicators around their means: Some large firms are very profitable, others not at all, some small ones employ additional workers, some stagnate, some takeovers improve efficiency radically, others fail completely. The success of a firm or a merger depends on the quality of the management or the owner, the type of the product, the efficiency of R & D, the business-cycle stage, especially on the way the several constituent elements match to each other, on good luck etc. In addition it appears most likely that *small and large firms fit different purposes*. The advantages of smaller firms may be found in their flexibility and their creativity, the advantages of larger firms in their R & D capacity, their longer planning horizon or their risk spreading capacity (see table 9). In contrast the disadvantages of small firms may be found in problems with R & D, marketing, internationalization or training of personnel, while large firms have to fight with their inflexibility, the danger of ossification and with control losses. These advantages and disadvantages of different size groups of firms are of larger or minor importance in the production and distribution of different goods and services. Small firms e. g. have a competitive edge in branches where they produce to order, where they deliver to a limited number of customers, the quality of goods can be proved by inspection, or where output fluctuates considerably (Mills/Schumann 1985; Ungern-Sternberg 1988). Large firms are better designed to produce and distribute mass goods, especially those whose quality can only be detected by use (where the brand is important[11]) or supply the non-fluctuating part of the demand in all industries. If the advantages of large firms are scale economies and the advantages of small firms are flexibility, takeovers cannot improve profitability. Acs/Audretsch (1988) hint that a mixture of a large number of hungry small firms chasing a few

11) *Rodrik (1989) was able to demonstrate that Korean shipments to U.S. had a higher unit value than Taiwanese ones (+ 27 %), because the larger Korean conglomerates were able to build reputation and branch loyalty.*

Table 9

Advantages and disadvantages of large resp. small units

Large units	Small units
+ technical efficiency	+ flexibility
+ long term planning	+ new ideas
+ long term horizon	+ innovativeness
+ research horizon	+ flat hierarchies
+ cooperation with government	+ commitment
- organisational slacks	- formal training
- alienation	- great variance ("sweaty jobs")
- monitoring problem	- employee's rights
- inflexibility	- wages
- bureaucracy	- marketing, internationalisation
- merger problems	

large ones may be optimal for R & D. That may be true for other areas as well. Small and large firms may profit from each other by subcontracting and by offering diversified supply, large firms may profit from small firms as windows on technology and test marketing. So a combination of large and small firms, each group serving different purposes, may prove optimal for a healthy economy.

This, however, is a very tentative result which has to be supported by further research. We therefore add a list of agenda for further research.

Agenda for further research

Profitability-size-pattern

* Does profitability still decrease with increasing size if one takes account of openess of the market, concentration, market structure?
* Does the profitability size pattern differ between declining and promising sectors, between high and low technology sectors?
* Differences between small and large countries, between USA, Japan and Europe (using similar data sets) and over time (sixties as high noon of large firms, seventies as era of small firms, eighties of both sizes coping with their problem areas) would be extremely interesting.
* Are there countries in which mobile capital evens out profit differences, while in other rigid structures help to maintain them?
* Which part of higher employment and profits of small firms is due to higher profits of very young firms? Would more accurate statistics about failures change the picture?

Differences between indicators

* How can the relation between increasing efficiency as measured in value added (with its levelling off in some middle size class at least on the plant level) be reconciled with decreasing profitability?
* Are small firms credit rationed so that they can't invest up to the crossing of marginal efficiency and capital costs? Or is capital more expensive and labor cheaper for small firms so that both work at their best cost combination (efficient point due to this concept)?

* Is there a sensible measure of total factor productivity other than profits to compare small and large firms?

The segment of very large firms

* Concentration ratios show increasing shares of the very largest firms (with some exceptions in the last decade). Is this a contradiction to decreasing profitability or the attempted cure for it?
* Is there a tendency within the large firms insofar as the very largest in each area is also highly profitable, but those following behind not (Hall/Weiss 1967)?

Reasons for the disappearence of economies of scale

* Many of the hypotheses contradicting economies of scale and scope are open to falsification: costs of idle capacity, flexibility, lead time, technical trends.
* Are economies of scale existent more in the dynamic fashion - depending on the time past from the start up of a new product line, in very small and heterogeneous markets?

The effects of takeovers

* As the results of takeovers are dispersed so widely around their means: What distinguishes successful mergers from unsuccessful ones?
* Are mergers to reach a medium size class more or less successful than those forming giant firms?
* Do differences exist between mergers in declining and growing industries?
* The category of conglomerate mergers has to be further investigated as to relatedness. "Related" can imply technological, marketing or other factors, not yet distinguished clearly.
* To what extent do economies of scale, economies of scope and control losses combine/account for to successful or unsuccessful mergers?

Outbalanced coexistence and its political implications

* If small firms have their advantages and their problems and large firms as well does it follow that economic policy has a task in balancing small and large firms? And how should it do this?
* Is the present merger mania creating an imbalance towards too large units?

* Are current subsidies and procurement policy discriminating small firms and should government engage in revere discrimination? Or is the size and performance issue irrelevant for economics and politics?

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