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THE IMPACT OF INTERNATION-ALISED PRODUCTION ON THE DOMESTIC GROWTH OF FIRMS

Data from a panel of companies covered by the WIFO Investment Surveys between 1989 and 1998 indicate several empirical regularities related to the growth of sales from domestic production in Austria and the amount of foreign production: Firms with a high share of foreign production are more export-oriented than the average firm, suggesting – from a static point of view – a complementary relationship between foreign and domestic production. The econometric analysis confirms that larger firms grow, on average, more slowly and that internationalised firms, despite their above-average size, maintain and sometimes even expand their growth potential at home. In particular, firms which pursued a strategy of exports and foreign production achieved above-average growth in Austria.

The increase of foreign production by domestic firms can be understood as part of a firm's growth process. Especially when exports are impeded by rising marginal costs of production or transportation (see *Scherer et al.,* 1975, *Buckly – Casson,* 1981, *Pfaffermayr,* 1997) firms tend to gradually shift at least part of their production abroad in the course of their growth process.

ECONOMIC THEORIES ON THE GROWTH OF FIRMS

Theoretical and empirical studies examining the determinants of growth of firms (see, e.g., *Hay – Morris*, 1991, *Geroski*, 1998, for an overview) have mainly limited themselves to empirical regularities with respect to the evolution of market structures. They started out from the observation that many markets show an extremely skewed distribution of firm size: a small share of larger firms, a somewhat greater share of moderately sized firms and a very large share of small firms. According to Gibrat's Law of Proportionate Growth, this skewed size distribution emerges when firms grow according to a random walk so that firm size (measured by sales, em-

ployment or assets) is determined by the cumulative sum of independently distributed past stochastic growth rates. Specifically, Gibrat's Law assumes an independently normal distribution of growth rates, implying a log-normal size distribution in the limit[1]. It implies that convergence to a long-run optimal value does not take place (see *Steindl*, 1965, *Hay – Morris*, 1991, *Sutton*, 1997, *Geroski*, 1998).

Many empirical studies on firm growth reject Gibrat's Law and find that the growth rate of a firm declines with its size – although usually only to a small degree. *Geroski* (1998) summarises the empirical evidence by observing that "corporate growth is really very random". While empirically persistent differences in terms of size and profitability are evident across firms (between-variation), growth rates (e.g., growth in sales or employment) are predominantly characterised by within-variation (i.e., the variation of a variable over time for a given firm). This implies that variations in sales growth for an "average" firm (i.e., adjusted for its long-term average growth rate) do not tend to persist over time and therefore firm-specific structural determinants remaining constant over time are of minor significance for the growth rates of firms.

In particular, the hypothesis that the optimal size of a firm in the long run depends on technological factors (minimum efficiency scale, cost structure) and endogenous sunk costs (research and development, advertising) receives little support from empirical evidence. Organisational constraints are considered in the Penrose Hypothesis (*Penrose,* 1995). It states that, as firm-specific knowledge can only be passed on to a limited group of new managers, managerial capacities are likely to limit potential growth and, in turn, the size of a corporate organisation. Since such restrictions are, in effect, similar to variable costs of adjustment, they can also be expected to lead to systematic differences in the short-run growth rates. In the presence of adjustment costs, firms would attempt to adjust to exogenous shocks in small steps over the course of several periods, so that over time autocorrelation and thereby persistent differences in growth rates would evolve. In contrast, random growth rates imply that the adjustment costs of adapting productive capacities tend to be fixed rather than variable.

From an empirical as well as theoretical point of view, the findings of Gibrat's Law of firm growth refer to a representative sample of firms that covers the entire firm popula-

tion including start-ups and existing firms. In a fixed sample of surviving firms, it has regularly been found that firm growth decreases with firm size (*Cabral*, 1995, *Sutton*, 1997). The age of a firm also plays an essential role. *Evans* (1987), for example, finds that in a sample of U.S. firms the growth rate declines with the age of a firm.

In the following discussion, foreign production by domestic firms is interpreted as part of a firm's growth process. When export growth is impeded by rising marginal production or transportation costs, firms are likely to switch gradually to foreign production in the course of their growth process. Using a panel of Austrian manufacturing firms in a partial adjustment framework (see box), it is examined whether and how the growth rates of firms with production facilities abroad differ from those of exporting firms without foreign affiliates. Since the study concentrated on the growth rates of firms at their domestic location in Austria this framework implicitly provides information from a dynamic perspective of domestic and foreign production, i.e., whether foreign production is a substitute or a complement to home production.

Although a number of previous theoretical studies have examined the factors which most influence the growth of firms, economic theory offers no comprehensive approach to explaining the growth of multinational enterprises (MNEs). However, it is possible to hypothesise on the relationship between firm growth rates in foreign and domestic markets on the basis of standard models of industrial economics (see box). Simple models of partial adjustment (*Ginsburg – Michel,* 1988), as assumed in the discussion in the box, provide an explanation of the regression of firm size towards a long-term mean. Furthermore, as MNEs can simultaneously adjust production capacities at home and abroad, they are able to react faster and more flexibly to changes in the market without incurring additional adjustment costs. Multinationals are therefore capable of converging to their steady-state size more quickly than non-multinationals. They should thus exhibit a more strongly pronounced regression of firm size to the long-run mean. Both hypotheses will be tested econometrically using panel data of Austrian manufacturing firms.

EMPIRICAL RESULTS – DESCRIPTIVE EVIDENCE

The empirical investigation uses data supplied by the Spring Investment Surveys of 1989-1998, which WIFO conducts annually in co-operation with the EU's DG II (see *Czerny – Kratena – Pfaffermayr*, 1999, for the results of the most recent survey, and *European Commission*, 1998, for details of the design of these surveys). The In-

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[1] Formally, assume $x_t - x_{t-1} = x_{t-1}\, \varepsilon_t$, i.e., $x_t = x_0\, (1 + \varepsilon_1)\, (1 + \varepsilon_2)\, \ldots$ $(1 + \varepsilon_t)$ and $\varepsilon_t \sim iid\ N\, (\mu,\, \sigma^2)$. Taking logs and approximating $\log (1 + \varepsilon_t) \approx \varepsilon_t$, one obtains $\log x_t = \log x_0 + \varepsilon_1 + \varepsilon_2 + \ldots + \varepsilon_t$, which is distributed log-normal with mean $\mu\, t$ and variance $\sigma^2\, t$ in the limit and thus follows a random walk.

Some Hypotheses on the Growth of Multi-plant Firms: A Simple Theoretical Approach

Although economic models for the growth process of multinational firms have yet to be developed, we can still arrive at a few hypotheses by expanding the simple static models of oligopolistic competition to a two-period framework with partial adjustment. This provides an illustration of some important mechanisms and offers a basis for formulating and testing the empirical hypotheses below (see *Pfaffermayr*, 1999A, for more details). In the simplest case, we assume that a multinational firm operates in an integrated market (domestic and foreign markets) dominated by Cournot-type competition, and that it runs one plant at home and one abroad. Both plants produce within a range of rising marginal costs, so that the size of the plants is limited for given demand. As a first approximation, the costs of adjusting the productive capacities at home and abroad are assumed to be quadratic (i.e., they are rising more than proportionally with respect to investments in new capacities), although this assumption is not unconditionally supported by empirical evidence. The assumption of rising marginal costs at both locations implies that it is not efficient for the multinational firm to shift its entire production to the cheaper location, but rather that it should strive towards an optimal mix between home and foreign production, which is characterised by equal marginal production costs. The assumption of quadratic adjustment costs implies that no substantial changes should be made immediately in an effort to adapt capacities to the long-term optimal level. Instead, the multinational firm should adapt capacities gradually over the course of several periods. The following hypotheses can be derived with respect to growth in domestic production:

- In the long run (steady state), the relationship between domestic and foreign production is determined by the slope of marginal cost curves at the respective location. The more quickly marginal costs of domestic production increase compared to those at the foreign location the smaller will the share of domestic production in overall production be.

- The reaction function[1] of the multinational firm is steeper than that of a domestic firm which has the same cost structure but which exports rather than produces abroad. The reason for this is that in the long run multinational firms are able to increase their competitiveness by shifting production when the marginal costs of domestic production rise above those of foreign production. With a steeper reaction function, multinational firms can attain a larger market share than firms which merely export. Nevertheless, exporting firms do achieve higher levels of output in the home country than multinationals do.

- In the case of quadratic adjustment costs, the growth rate of a firm declines, ceteris paribus, in proportion to its size along the path of convergence to a long-term steady-state firm size. The simple model therefore implies regression towards the long-run mean. But the persistence of differences in firm size increases with the costs of adjustment.

- The possibility of simultaneously adjusting production in both domestic and foreign plants enables multinational firms to either reduce their adjustment costs or adapt their capacities more quickly. Therefore, multinationals can react more flexibly and converge faster towards their steady-state size; and the regression to the long-run mean firm size is more pronounced.

- Finally, we must emphasise that, in the case of exogenous demand growth, domestic as well as foreign output will increase. Shifting production abroad exerts a negative effect on domestic activities, since the domestic production of a multinational is always lower than that of an exporting firm of comparable size.

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[1] In this context, the reaction function defines the optimal quantity supplied by a firm in response to a given output decision by rival firms.

vestment Survey includes approximately 1,500 manufacturing firms, of which an average of 700 supply full answers to most of the questions. The WIFO Investment Survey is not a random sample of firms, but rather follows the development of a fixed "test group" over the course of years. Measured in terms of employees, the survey covers approximately 50 percent of total employment in Austrian manufacturing (according to the old classification of industries by Fachverbände, industrial sectors combined in associations). It should, however, be noted that, due to the small number of newly founded firms included, the panel is not representative of the whole population of firms. In addition, it has not always been possible to obtain a clear picture of the developments related to mergers and acquisitions which as a consequence may be partially hidden in the database and cannot be accounted for in all cases. Furthermore the surveys mostly trace the development of successful, surviving firms while insolvent or dissolved companies are underrepresented in the panel. In comparison to the overall aggregate (i.e., the growth rate for all

firms taken as a whole), this type of sampling is likely to overestimate the growth rates compared to the whole population. The following empirical results must therefore be interpreted with due regard to the assumption that they are based on firms which will indeed be long-term survivors.

The WIFO Investment Survey[2] gathers information on employment, sales, investments, exports, EU market shares, the relationship of foreign to domestic production, and cash-flow. Information on the last four variables is evaluated on an interval scale, according to size categories. For example, questions on exports to EU countries as a proportion of sales from domestic production or exports to countries outside the EU are formulated as follows: "No exports, up to 10 percent, 10 to 20 percent, 20 to 30 percent, …, 90 to 100 percent". This wording greatly increases the questionnaire's general acceptance by the firms. On the other hand, it has the disadvantage that these variables can only be scaled in ordinal terms in the aggregate of individual branches.

After eliminating outliers with implausibly high or low growth rates for sales and/or employment, which most likely were either the result of errors in the data or in their collection or due to restructuring (such as mergers and acquisitions), consistent observations were obtained for 384 firms with five or more employees, which between 1989 and 1998 participated at least four times in the Investment Survey and supplied information on their foreign production. The method used for outlier identification[3] excluded most firms which were involved in take-overs as well as firms experiencing short, intense phases of growth: in both cases firms exhibit spurts of growth in a particular year. As far as the quantitative variables are concerned, the average changes over the course of the entire period are taken into consideration. The panel therefore mainly represents firms with a more or less smooth rate of growth. For technical reasons, we have chosen to use the arith-

Table 1: Foreign production by size of firms

	No foreign affiliates	Foreign affiliates' sales as a percentage of sales from domestic production	
		Less than 50 percent	50 percent and more
		Percentage shares	
Employment in domestic plants			
5 to 99	89	10	1
100 to 249	68	28	4
250 to 499	61	29	10
500 and more	49	37	14
Total	69	24	7
Pearson-χ^2 (6)	45.6**		
Pearson-R^2	0.33**		

Figures may not add up to 100 percent due to rounding errors. – ** . . . significant at the 5 percent level, * . . . significant at the 10 percent level.

metic mean in the descriptive statistics below. All qualitative variables have been extracted from the 1998 spring survey and therefore have no time variation.

The WIFO Investment Survey defines the volume of foreign production as the ratio of foreign affiliate sales to sales from domestic production; according to this definition, foreign production therefore encompasses vertical as well as horizontal direct investment. Table 1 illustrates that it is mainly the large firms which have a significant amount of foreign production. The size of a firm is measured by the number of employees, in size categories, in the home country.

At 0.33, the Pearson correlation coefficient between firm size and the amount of foreign production is significantly positive (note that both variables are measured on an interval scale). Whereas of the group of firms with fewer than 100 employees, 89 percent have no foreign investments, only 49 percent of those with more than 500 employees do not invest outside their home countries. Sales by foreign subsidiaries amount to over 50 percent of sales from domestic production in 14 percent of the large firms, compared to an average of just 7 percent for firms in general.

Companies in the chemical industry as well as firms involved in technical engineering are on average more

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[2] The WIFO Investment Survey basically defines the plant (Betrieb) as its unit of measurement. However, some larger enterprises prefer to respond at the corporate level. For the most part, it is the bigger enterprises which participate in the survey. Small firms are mostly excluded from the industry classification by Fachverbände. Note that all averages in the descriptive statistics reported below are unweighted.

[3] The procedure for outlier identification consists of several steps: first, firms which participated in the survey in fewer than four valid observational periods (1989-1998) were excluded from the panel. Secondly, all firms growing by more than 100 percent or shrinking by more than 50 percent were eliminated. The third step excluded firms which were classified as outliers on the basis of the fixed effects regression model (standardised residual bigger than 3.0). This rather restrictive outlier selection procedure rules out data errors, mergers and acquisitions and firms which grew (or shrank) rapidly in short, intense phases with jumps in growth rates.

Table 2: Foreign production by sectors

	No foreign affiliates	Foreign affiliates' sales as a percentage of sales from domestic production	
		Less than 50 percent	50 percent and more
		Percentage shares	
Basic industries	78	20	3
Chemicals	54	36	10
Engineering industries	67	24	9
Construction-related industries	74	19	8
Consumption goods	74	24	2
Total	69	24	7
Pearson-χ^2 (6)	12.7**		

Figures may not add up to 100 percent due to rounding errors. – ** . . . significant at the 5 percent level.

Table 3: Foreign production and EU exports as a percentage of sales from domestic production

	EU exports as a percentage of sales from domestic production		
	Less than 20 percent	20 to 60 percent	More than 60 percent
	As a percentage of all firms		
Extent of foreign production			
No foreign affiliates	55	33	12
Less than 50 percent of domestic production	39	50	12
50 percent and more of domestic production	24	56	20
Total	49	39	12
Pearson-χ^2 (6)	15.5**		
Pearson-R^2	0.16**		

Figures may not add up to 100 percent due to rounding errors. − ** . . . significant at the 5 percent level, * . . . significant at the 10 percent level.

Table 4: Foreign production and non-EU exports as a percentage of sales from domestic production

	Non-EU exports as a percentage of sales from domestic production		
	Less than 10 percent	10 to 50 percent	More than 50 percent
	As a percentage of sales from domestic production		
No foreign affiliates	74	21	5
Less than 50 percent of domestic production	66	32	2
50 percent and more of domestic production	36	52	12
Total	70	26	4
Pearson-χ^2 (6)	19.4**		
Pearson-R^2	0.17**		

Figures may not add up to 100 percent due to rounding errors. − ** . . . significant at the 5 percent level, * . . . significant at the 10 percent level.

likely to engage in foreign activities. In both sectors, company-specific competitive advantages within the own organisation provide an important motive for investing abroad. In the basic goods sector, we can assume that economies of scale operate in favour of concentrating production at domestic locations, while the producers of traditional consumer goods (in particular textiles, leather and clothing) should be more likely to shift production to countries with lower wage levels. This last hypothesis, however, was not supported by the data (see Table 2).

Firms with high amount of foreign production also export a greater share of their output. The share of EU exports is measured by the volume of exports to EU countries in relation to the sales generated by domestic production. The non-EU export share is calculated as the volume of exports to countries outside the EU.

The relationship between foreign production and exports is significantly positive, even though the correlation is relatively weak. Of the firms which produce more than 50 percent of their output abroad, 56 percent have a high and 20 percent a very high EU export share. Both groups are considerably above the total average of 39 and 12 percent, respectively (see Table 3).

Table 4 presents a similar picture for sales generated by exports to countries outside the EU. Firms which produce over 50 percent of their output abroad are more export-driven than the average firm. From the static theory's point of view, this would suggest a complementary relationship between foreign and domestic production. Furthermore, firms which have achieved a high degree of internationalisation and have grown to a critical minimum size are most likely to be in technology-intensive branches and to rely on a strategy of internationalisation based on both exports and foreign production. This result contradicts the simple, static models of horizontal foreign investment derived from strategies of cost opti-

misation. These models imply that firms with extensive foreign production export less than firms of comparable size which run no foreign subsidiaries. One should bear in mind, however, that these relationships are based on simple correlations, so they cannot be interpreted as causal relations.

In an investigation which explores the relationship between foreign production and exports from a dynamic point of view, an essential question is whether and how the growth of domestic production is influenced by the founding of foreign subsidiaries, partly with the intention of shifting production abroad. The positive correlation between foreign production and exports found in a cross-section of the firms as well as in several other investigations at sectoral and aggregate level suggests that there is a complementary relationship between foreign investment (production) and exports (*Pfaffermayr*, 1996, *Altzinger*, 1998, *Altzinger − Beer − Bellak*, 1998). Whether or not direct foreign investment impacts on the growth potential of firms at their domestic locations has not yet been empirically investigated. It should be noted that, as in the static case, the effect that shifting production away from the home country depends on the counter factual, that is how the firm would have developed in case of no foreign production. Simple descriptive comparisons cannot answer these questions, although they can reveal important developments and stylised facts. For this reason, an econometric approach will also be attempted.

Table 5 compares the growth of firm sales during the period of 1989 to 1998. We see that moderately sized firms (250 to 499 employees) enjoyed above-average growth[4]. They

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[4] Firms were grouped according to size for each period, so that some firms changed categories over time. Qualitative variables are based on the categorisation for 1998.

Table 5: Average growth of sales from domestic production

	Average growth rate 1989-1998 p.a.	Standard deviation	Levene statistic	F test	Kruskal-Wallis χ^2
Total manufacturing	+4.6	0.3			
By firm size					
5 to 99 employees	+4.0	0.5	0.53	1.22 (3, 22)	4.7 (3)
100 to 249 employees	+4.5	0.5			
250 to 499 employees	+5.4	0.6			
500 and more employees	+4.7	0.5			
By sector					
Basic industries	+3.0	0.9	19.20**		30.11 (4)**
Chemicals	+4.9	0.8			
Engineering industries	+5.5	0.5			
Construction-related industries	+6.4	0.7			
Consumption goods	+2.4	0.4			
By extent of foreign production					
No affiliate sales	+4.4	0.3	1.25	0.78 (2, 33)	4.84 (2)*
Less than 50 percent	+4.8	0.5			
50 percent and more	+5.5	1.0			
By EU export share					
Less than 20 percent	+3.9	0.3	10.39**		5.97 (2)**
20 to 60 percent	+5.1	0.4			
More than 60 percent	+5.9	0.8			

Average growth rate calculated as arithmetic mean for technical reasons. The *F* statistic tests for equal means across groups. It may only be used in case of variance homogeneity. The Levene test tests for this and if it is rejected, the non-parametric Kruskal-Wallis test is put to use. – ** . . . significant at the 5 percent level, * . . . significant at the 10 percent level.

achieved average sales growth rates of 5.4 percent p.a., as compared to overall average rates of 4.6 percent. There is, however, considerable variation across firms although these differences are not statistically significant.

When comparing individual sectors we find that firms in the construction-related sectors, in technical engineering and chemicals have grown fastest. The weak performance of the traditional consumer goods and basic goods sectors is a visible sign of the structural change presently taking place, and also corresponds to the assumption that the growth potential of these firms has been most strongly affected by the growing pressure of competition (an outcome of integration within the EU by, e.g., the Single Market Programme, in addition to the integration of Eastern Europe and globalisation in general).

Firms with foreign affiliates also grow dynamically at home. Firms with a foreign production share in excess of 50 percent grow at 5.5 percent p.a. on average, while firms with a foreign production share of less than 50 percent have an average growth rate of 4.8 percent p.a. Sales of firms with no foreign production, on the other hand, grow by just 4.4 percent p.a. The Kruskal-Wallis test (which is used in testing for differences in distributions between the groups) is significant at the 10 percent level. The same picture emerges for firms with high export shares. Since firms with foreign production plants do not grow at lower rates at their domestic location as compared to sole exporters, we can assume that the performance of firms is essentially influenced by firm-specific competitive advantages, while locational conditions

(or cost advantages) appear to be of secondary importance.

RESULTS OF THE ECONOMETRIC ESTIMATION

In this section, we will test Gibrat's Law by estimating a random effects model. All variables in the model are transformed into logarithms. The estimated model is:

$$\Delta u_{it} = \beta_0 + \beta_{1j} u_{it} + \gamma_j + s_2 + \ldots + s_5 + \tau_{90} + \ldots + \tau_{98} + \alpha_i + \varepsilon_{it},$$

where $\alpha_i \sim N(0, \sigma_\alpha^2)$ and $\varepsilon_{it} \sim N(0, \sigma_\alpha^2)$, $i = 1, \ldots, N$, $t = 1, \ldots, T$.

The index i refers to firms, the index t to time. $\tau_{90}, \ldots, \tau_{98}$ are time dummies. They control those influences which over time are the same for all firms, such as the general macro-economic environment. $s_2, \ldots, s_5$ are sector dummies controlling, i.a., differences in exogenous demand growth. The parameter for the size of the firm, u_{it}, is group specific and indexed by j. It varies according to whether a firm belongs to one of six groups with varying export share or share of foreign production (see Table 5). Note that the corresponding parameters are defined as difference to the reference category, which is defined as firms with no foreign production and a low export share. The reference category for the constants is defined similarly, but refers to the basic year.

In addition to random firm effects, the econometric specification also includes time invariant variables (dummies),

Table 6: Factors determining the growth of domestic production

Estimation results from panel regression

	Fixed-effects estimates		Hausman-Taylor estimates[1]	
	β	T	β	T
Explaining variable				
log ($sales_{t-1}$)	−0.24	14.0**	−0.24	−14.0**
log ($sales_{t-1}$) × *EXEU* 20 to 60 percent	−0.07	−2.7**	−0.07	− 2.7**
log ($sales_{t-1}$) × *EXEU* more than 60 percent	−0.04	−1.2	−0.04	− 1.2
log ($sales_{t-1}$) × *NEXEU* 10 to 50 percent	0.04	1.6	0.04	1.6
log ($sales_{t-1}$) × *NEXEU* more than 50 percent	0.01	0.2	0.01	0.2
log ($sales_{t-1}$) × *AUSL* less than 50 percent	−0.05	−1.8*	−0.05	− 1.8*
log ($sales_{t-1}$) × *AUSL* more than 50 percent	−0.10	−2.3**	−0.11	− 2.3**
EXEU 20 to 60 percent	–	–	1.05	3.2**
EXEU more than 60 percent	–	–	0.75	1.6
NEXEU 10 to 50 percent	–	–	−0.46	− 1.3
NEXEU more than 50 percent	–	–	0.19	0.3
AUSL more than 50 percent	–	–	0.85	2.4**
AUSL more than 0 percent	–	–	1.66	2.6**
Chemicals	–	–	−0.25	− 3.3**
Engineering industries	–	–	−0.32	− 4.2**
Construction-related industries	–	–	−0.39	− 5.2**
Consumption goods	–	–	−0.31	− 4.6**
Number of observations	3,333		3,333	
R^2	0.34		0.35	
σ	0.12		0.12	
θ	–		0.88	
Fixed firm effects χ^2 (416)	1,185.7		–	
Fixed time effects χ^2 (8)	–		133.0**	

AUSL . . . foreign affiliate sales as a percentage of sales from domestic production, *EXEU* . . . share of exports to the EU as a percentage of sales from domestic production, *NEXEU* . . . share of exports to non-EU countries as a percentage of sales from domestic production, time dummies and constant are not reported. − ** . . . significant at the 5 percent level, * . . . significant at the 10 percent level. − [1] See *Baltagi* (1995), pp. 116-123.

so that conventional methods for estimating models with fixed effects cannot be used (*Baltagi,* 1995)[5].

The estimation results are largely consistent with the theoretical approach discussed above. There is significant regression to the mean. Sales growth does not follow Gibrat's Law, rather it decreases with the size of the firm. This effect is (significantly) strengthened when a firm has a moderate or high share of exports to the EU and/or a moderate or high foreign production share. With respect to the non-EU export share, there are no significant results (possibly due to problems of multi-collinearity). Differences in the speed of adjustment towards the long-run mean go hand in hand with differing constant terms: for a given firm size, firms with a higher share of exports or a higher share of foreign production are, on average, likely to grow more strongly. The effect of foreign production on firm growth in the home country depends, however, on the actual size of the firm and therefore cannot be clearly derived from the results of the regression but rather has to be analysed for specific cases.

Table 7 illustrates the relationship between firm growth, firm size and internationalisation. Under the unrealistic assumption of equal average firm sizes, the growth differential amounts to 25 percent (in percent of sales growth in the reference category) for firms which switch from the reference category to a category with an EU export share of over 60 percent. If a firm has a foreign production share above 50 percent, its growth differential increases, ceteris paribus, to 40 percent. The growth differential is greatest when a firm has a high share of exports to the EU as well as a high share of foreign production (74 percent). Under the more realistic assumption that internationalised firms are, on average, larger (i.e., when the calculations are based on the group-specific average firm size), this effect decreases. With an EU export share of over 60 percent, the growth differential is 10 percent[6]. In the category with a foreign production share of over 50 percent, the growth differential amounts to only 2 percent. When, however, a firm is not only export-oriented, but has foreign investments as well (export share above 60 percent and foreign production share over 50 percent), the growth potential is considerably higher (53 percent), even though these firms

[5] Furthermore the explanatory variables in the random effects model are likely to be correlated with the random firm effects. If this is the case, the random effects estimator will be inconsistent. The Hausman-Taylor estimator which uses proper instruments can be used to solve both problems (*Hausman − Taylor,* 1981; for details see *Pfaffermayr,* 1999B).

[6] This means that the average growth rate will be 10 percent higher for firms of average size within their specific group and with an EU export share of over 60 percent.

Table 7: Simulations of firm growth, export share and foreign production ratio

	Average firm size	Growth difference as a percentage of the growth rate of firms in the basic category	
	Sales in million ATS	Based on average firm size	Based on group-specific average firm size
Basic category	151		
EXEU more than 60 percent	358	25	10
AUSL more than 50 percent	476	40	2
EXEU less than 60 percent and *AUSL* more than 50 percent	670	67	7
EXEU more than 60 percent and *AUSL* less than 50 percent	727	60	37
EXEU more than 60 percent and *AUSL* more than 50 percent	789	74	53

AUSL . . . foreign affiliate sales as a percentage of sales from domestic production, *EXEU* . . . share of exports to the EU as a percentage of sales from domestic production, *NEXEU* . . . share of exports into non EU countries as a percentage of sales from domestic production.

are, on average, larger and firm growth decreases with size. With respect to the relationship between foreign and domestic production, it is therefore decisive that firms internationalise according to a specific strategy, which provides for both export and foreign production. The substitution of domestic activities by foreign production is only relevant when firms concentrate solely on shifting production to more favourable foreign locations, stop exporting, and as a consequence achieve only average rates of growth at home.

CONCLUSIONS

Based on a panel of Austrian firms which participated in the WIFO Investment Survey between 1989 and 1998, the present investigation reveals several empirical regularities related to growth in sales from domestic production, which are also of relevance for economic policy. Firms with a high share of foreign production are more export-driven than the average firm. From a static point of view, this observation seems to suggest a complementary relationship between foreign and domestic production.

Firms which have attained a critical minimum size and which exhibit a high degree of internationalisation are more likely to be in technology-intensive industries. In addition, there is evidence that firms with foreign affiliates also grow more dynamically at home. Sales from domestic production by firms with a high amount of foreign production grow at rates above the industry average, while sales by firms with no foreign production grew at just average rates. The same picture emerges for firms with high shares of exports. The above-average growth enjoyed by firms which have expanded strongly into international markets – either through exports or by foreign production – suggests that the performance of a firm is essentially determined by firm-specific competitive advantages, while

the advantages or disadvantages of location seem to play a secondary role.

The econometric analysis confirms not only a significant regression to the mean (i.e., in the test group of firms studied, the larger firms grew on average more slowly) but also that, despite their above average size, internationalised firms maintain and sometimes even expand their growth potential at home. In particular, firms which followed a strategy of high exports and foreign production achieved above-average growth at their domestic location in Austria. Since internationalised firms in general achieve higher levels of productivity than the industry average, we cannot conclude that the above-average development of sales can be translated directly into an above-average performance with respect to employment.

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The Impact of Internationalised Production on the Domestic Growth of Firms – Summary

The increase of foreign production by domestic firms can be understood as part of a firm's growth process. Especially when exports are impeded by rising marginal costs of production or transportation, firms will tend to move their production gradually abroad in the course of their growth process.

This paper uses data supplied by the Investment Surveys of 1989-1998, which WIFO conducts annually in co-operation with the EU's DG II among approximately 1,500 manufacturing firms, of which about 700 supplied complete answers. The study found several empirical regularities related to growth in sales from domestic production and a firm's volume of foreign production. Firms with a high share of foreign production are more export-oriented than the average company, suggesting a complementary relationship between foreign and domestic production from a static point of view. The internationalised firms have attained a critical minimum size and are mainly active in technology-intensive industries. In addition there is evidence that firms with foreign affiliates also grow more dynamically at home. The above-average growth achieved by firms which have expanded strongly into international markets – either through exports or by foreign production – suggests that the performance of a firm is essentially determined by firm-specific competitive advantages, while the advantages or disadvantages of location seem to play a secondary role.

The econometric analysis confirms that larger firms on average grow more slowly (regression to the mean in the studied test group of firms) and also that, despite their above-average size, internationalised firms maintain and sometimes even expand their growth potential at home. In particular, firms which followed a strategy of high rates of exports and foreign production achieved above-average growth at their domestic location in Austria. Since internationalised firms in general achieve higher levels of productivity than the industry average we cannot conclude, however, that the above-average development of sales can be translated directly into an above-average performance with respect to employment.

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