Wirtschaftsuniversität Wien
Vienna University of Economics and Business Administration

Working Papers Series:

Growth and Employment in Europe: Sustainability and Competitiveness

Working Paper No. 34

GAINING AND LOSING COMPETITIVE ADVANTAGE

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September 2003

This working paper series presents research results of the WU-Research Focus:
Growth and Employment in Europe, Sustainability and Competitiveness
The papers are available online under: http://www.wu-wien.ac.at/inst/vw1/gee/workp.html

GAINING AND LOSING COMPETITIVE ADVANTAGE

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Abstract

Efficient policies to stimulate the competitiveness of firms require knowledge of future firm-strategies and a proper assessment of the location advantages of a country or region. Therefore, industry comparative advantage analysis needs to be complemented by firm competitive advantage analysis. This yields four hypotheses of firm strategies on the basis of the existing advantage combination. Detailed empirical analysis of a representative sample of Austrian manufacturing firms during 1990-2000 shows that changes in employment, value-added and exports are in line with the suggested development. Three of the 3-digit industries lost their advantages while seven industries gained advantages, yet overall industry distribution has been remarkable stable over the four advantage combinations. In terms of number of firms, however, a large share (30%) of the total population shifts between advantage combinations even during short periods of time. The firm strategies outlined suggest a differentiated policy approach, yet the short-term dynamics revealed empirically imply a high potential for policy failure.

Acknowledgements

Earlier versions of this paper have been presented at WIFO, at the Assistentenseminar of WU, as a competitive paper (Track: Country Competitiveness), AIB-UK Chapter, Leicester 2003 and at EUNIP 2003, Porto (Portugal). I would like to thank the participants for valuable comments and suggestions. The usual disclaimer applies.

Keywords

Comparative Advantage; Competitiveness; Austria; Manufacturing

JEL

F10, F23

Gaining and Losing Competitive Advantage

1. Introduction

There is considerable interest in policies to boost the competitiveness of firms. In the past, quite often governments used to discriminate between foreign and domestic firms in their investment promotion programs, although this is less and less common practice today.

Designing the "right" policies, which effectively stimulate the firms' competitive position in markets requires not only information on the present competitiveness of a country's firms, but also some prediction about the behavior of the firms in different industries in the future. The possibility exists that policy measures render ineffective, if they counteract or do not affect the firms' strategies at all.

It has been argued in various studies that the response of a Multinational Enterprise (MNE) to a deterioration of their market share or the discovery of new market opportunities (e.g. new markets, new product or process technologies) depends on the current sources of competitiveness, but empirical evidence is still scarce. The configuration of these sources firstly determines whether the firm will choose to produce in the same location or shift production to a new location; and / or secondly, whether domestic firms will supply the good / service or whether this is done by foreign firms (either via trade links or via local production).

The resulting International Production Patterns (IPPs) and International Trade Patterns (ITPs) are determined by two sources, namely location advantages on the one hand and firm-specific advantages (FSAs) on the other hand (Hirsch and Meshulach, 1991; Bellak, 2003). While the first source, the comparative advantage (CA) and consequently the location of production have been widely researched, their interaction with firm-specific advantages as well as the role of the latter for domestic or foreign firm-ownership have gained less attention.

This paper discusses the possible strategies of firms depending on four different combinations of the sources of competitiveness. Also, we look at the changes of these sources

of a sample of manufacturing firms over a policy-relevant time span (10 years) and the firms' responses to such changes.

The paper is organised as follows: First, we discuss location advantage and firm-specific advantage as the main sources of competitiveness and resulting location-strategies of firms. Six propositions follow from the theoretical discussion. The subsequent section introduces the data and the operationalisation of both types of advantages. The results are presented. Using the 1990 advantage combinations as the basis for the future strategies (here: 1995 and 2000), the changes of employment, value added and exports turn out to be in line with our expectations. A short concluding section argues for a differentiated industrial policy approach, yet the dynamics of gains and losses of competitiveness revealed empirically increase the risk of policy failure.

2. Assumptions and Definitions

Assume two countries, Home (H) and Foreign (F), and two parent firms, domestic (pd) and abroad (pa) as well as their affiliates abroad (aa, aa*). Firms may invest or trade. (cf. Fig. 1) An important assumption is that FSAs are developed at the location of the parent company.

*****Fig. 1. (The Setting)

Throughout the paper we distinguish three types of home country H firms: (i) Fragmentators (FO(FG)) are those manufacturing firms which are foreign-owned (i.e. which are affiliates) and where the share of exports in total sales is arbitrarily chosen above 90% .[1] This way, we try to account for the increasing fragmentation of production, suggesting that fragmentors react differently to changes in the advantage combination. (ii) The rest of

[1] (gross sales: include VAT – net sales: exclude VAT – total sales: domestic sales + exports)

foreign-owned firms (include sales affiliates, holding companies, production for the local market etc.) is termed “FO(others)”. (iii) Domestically-owned firms (DO) are those MNEs, where the parent company is located in home country H.

An early appearance of the concept of the separation of the sources of competitiveness is Kogut’s article (1985) where different types of firm integration are derived from the various combinations of advantages and disadvantages. Hirsch and Meshulach (1991) further extend the concept to include MNEs explicitly.

Firms combine both sets of production factors. What is relevant for a firm to become a MNE, is therefore not just the possession of a superior FSA, but the fact that most of FSA’s are mobile. (This reflects the difference between a necessary and a sufficient condition.) There are several reasons for the need to consider FSAs and LSAs separately, rooted in the modern theory of international trade and deriving from the concept of nationality:

While in “traditional trade theory, the nation comparative advantage and the firm competitive advantage are synonymous” (Mucchielli, 1998, p. xiii), factor proportion theories based on comparative advantage alone fail to explain IPPs, once factor mobility is introduced. This is best expressed by Caves, who states that ”... in general, the more mobile are factors of production, the less does comparative advantage have to do with patterns of production.” (Caves 1996, p. 43) Thus, the existence of MNEs leads to specialisation patterns, which deviate from those predicted on the basis of pure trade theory (e.g. Helpman 1984). “The failure of the RCA methodology to deliver accurate predictions in the Irish case is accounted for by its inability to take into account the size and nature of the FDI inflows that accession triggered. Most of the jobs in foreign-owned industry were in sectors in which Ireland had a revealed comparative dis-advantage” (Barry, 2002). Also, trade motivated by other factors than comparative advantage (Krugman, 1980) is not accounted for in a pure factor endowments view. (Helpman, 1984; Markusen, 1998) Moreover, the firm-specific nature of FSAs implies that comparative advantage analysis neglects firm-to-firm differences.

Introducing MNEs also implies relevance of the territorial dimension, since "their capabilities become largely independent of a single country's factor endowment" (Ietto-Gillies, 2002, p. 181). The resulting "non-coincidence between ownership and territoriality" (*ibidem*, p. 179) means that only FSAs of purely domestic firms and LSAs of their home country coincide. FSAs of affiliates abroad are developed by the parent firm at home and are transferred to rather than created in the host country. Part of FSAs used by foreign firms in the host country are based on LSAs abroad (in their home country). Examining samples of firms on a nation-based concept without taking the territorial aspect into account, would therefore wrongly attribute a comparative advantage to all firms in a region / country, not taking into account, that part of the FSAs were transferred from abroad. In other words, not all FSAs actually *used* in a region / country have been *created* there. Therefore, it is necessary to treat domestic firms and foreign affiliates as two distinct subgroups. Ietto-Gillies concludes that "for this reason it is useful to keep the demarcation between competitive (of companies) and comparative (of countries) advantages." (ibidem, p. 181) These advantages require further discussion:

Important aspects of FSAs: A variety of terms is used in the literature synonymously to ”firm-specific advantage”, namely ”monopolistic advantages”, ”ownership advantages” (Erramilli et al., 1997, p. 736) or ”proprietary assets” (Caves, 1996). Economists like Caves stress (a) technological advantages, (b) entrepreneurial excess capacity and (c) multi-plant economies. Similarly, international business scholars like Dunning (1996) identify three main kinds of firm-specific advantage, namely (a) monopoly power, (b) scarce, unique and sustainable resources and capabilities, and (c) managerial capabilities.

The common characteristic of firm-specific advantages is that they are mobile between national markets (Anand and Delios, 1997) and they differ in productivity from comparable assets possessed by competing firms (Caves 1996, p. 3). FSAs are “produced” or created by the foreign or the domestic firm, not obtained in the marketplace. Mobility of FSAs is an

important distinctive characteristic of the firm-specific advantage compared to the location-specific advantage. Rugman and Verbeke (1992) distinguish location-bound (e.g., co-operation with local institutions) and non-location-bound (e.g. technological) FSAs as core sources of a firm's competitiveness and maintain that these are managerial-decision variables, while LSAs are largely exogenous.

The *specific-advantage hypothesis* (Koutsoyiannis 1982) explains why firms, possessing FSAs, become MNEs, since FSAs may compensate for disadvantages arising when entering a foreign market. Thus, FSAs determine whether a market is served by domestic or foreign firms (i.e. the "who" question). This points to the relative nature of FSAs, comparable to CA.

FSAs are thus a source of *integration* of activities (e.g. horizontally or vertically), which requires mobility and through their mobility, enable firms to follow *fragmentation* strategies, taking advantage of location-factor cost differentials.

Also, FSAs can be exploited without additional costs within the affiliates of the MNE. This public-good nature of firm-specific advantages provides an important motive for international production.

Besides the asset view of the *exploitation* of firm-specific advantage (static approach), it is the ability of a firm to *learn* which constitutes a firm-specific advantage (dynamic approach). In addition, the global network of an MNE itself brings „significant performance benefits to organisations (...), such as the ability to leverage scale economies, the potential to take advantage of arbitrage opportunities in factor cost differentials across multiple locations and the ability to hasten new product development and introduction" (Gomes and Ramaswamy, 1999, p. 174). Dunning (1999, p. 8) points to the path-dependency in upgrading a firm's core competencies. Anand and Kogut (1997) argue that the path-dependence of FSAs inter alia suggests their *creation* is related to geography.

Important aspects of comparative advantage (CA): Location-specific advantage (LSA) is available to all firms in the same manner ("common basis"), regardless whether they are

owned by domestic or foreign firms but not all firms make the same use of it. These factors are termed universal production factors (like cheap labour) by Hirsch and Meshulach (1991). Anand and Kogut also argue that location advantages are shared among firms from the same locality (1997, p. 449f.), which is a clear distinction from firm-specific advantages.

CA is location-bound, i.e. immobile. Several authors stress the importance of location factors in determining the competitiveness of similar firms in the same industry, but different locations.

CA analysis solves the "where" question and it would be sufficient in a world without factor mobility, where FSAs and CA coincide and only national firms exist. The location advantages are specific to nations or regions, because they are created and changed by governments who have monopoly position within their jurisdiction in shaping these factors (e.g. labour market regulations). Moreover, as long as positive externalities arise, governments do not want to exclude firms from using location factors as inputs.

Dunning uses the term location advantages which comprise resources (tangible, intangible) as well as the institutional environment. Examples are not only the physical infrastructure of a country, the National Innovation System or the general institutional environment, but also factors like distance-related transaction costs, interactive learning, spatially related innovation and technological standards (Dunning 1999, p. 18f.). According to Anand and Kogut (1997) a particularly important location factor is the attractiveness of a location as a source of technology in order to tap into local knowledge (p. 446).

A note on the interplay between the two advantages: LSAs are not only important for the *creation* of FSAs (which is bound mostly to the home country), but also determine the route how FSAs are *exploited* (which is not bound to the home country). Many authors point to the mutual dependence between CA and FSA as e.g., Kravis (1985): "Country-specific advantages [...] may also determine the nature of the firm-specific advantage (FSA) that enables the MNE to produce competitively in a foreign country" (p. 61). Pavitt and Patel

(1997) and Barre (1996) for example discuss the relationship between MNEs' technology strategies and national systems of innovation. The fact that MNEs may tap into various fields of innovation in different locations may also make them more independent of the location advantage of a certain region or nation. For example, Abd-el-Rahmen (1991) suggests that under a given comparative advantage, firm performance with identical products will differ resulting from a firm-based, individual, differentiated exploitation of conditions of imperfect competition.

It has been argued that the interplay of FSAs and LSAs determines the nature of production, of trade and FDI flows. The next section explains how the firm strategies are linked to these advantages.

3. Firm strategies on the basis of competitive and comparative advantage

We start with a description of each cell in the matrix (cf. Figure 2), developing six propositions.

****Fig. 2. (dynamic matrix)

Cell A

Cell A is characterised by the lack of CA, combined with FSAs. Consequently, we expect few exporting activities and primarily defensive outward FDI, since firms exploit their FSAs abroad via horizontal integration. Since CA is < 1 this points to a high import penetration. Also, the lack of CA must be due to the lack of LSAs, since FSAs are given. Therefore, we expect primarily domestic firms, yet with relatively low sales volumes.

Proposition 1. Home country H firms in **cell A** engage in defensive *export-substituting FDI*. They locate production abroad and import back part of it.

Cell B

Cell B includes firms which are strong exporters, based on their FSAs and at the same time the favourable location advantages will attract some foreign firms. Here we expect typical multinational industries, characterised by vertical and horizontal integration.

Proposition 2. Home and foreign firms in **cell B** invest in reorganisation and rationalization FDI in home country H and set up sales-oriented FDI in host country F.

Cell C

Trade and production occurs despite a lack of comparative advantage. As we will see below, a substantial part of value-added and employment is located there, similarly to the scenario of Belgium reported in Sleuwaegen et al. (1998). Firms in cell C contain relatively weak domestic firms with firm-specific disadvantages. Therefore, exports and outward FDI should be low and import penetration high (comparative disadvantage). The pure comparative advantage hypothesis ("HOS") suggests there are no firms and no trade in cell C. Thus, if firms are located in cell C, they are either producing at a comparative disadvantage and will be outcompeted e.g. by imports or the production is based on other factors like transport costs, home market effect etc.

Proposition 3. Firms in **cell C** exit or divest. Home country H's markets will be served by foreign firms from abroad (pa). Presence of firms in cell C may be due to sunk costs, high transaction costs of dis-investment, the immobility of their FSAs or other factors referred to above.

Cell D

Cell D is predominantly populated by strong foreign firms, taking advantage of the location advantages and the absense of FSAs with domestic firms. Foreign penetration via

inward FDI should therefore be high and primarily fragmentators (*argumentum*: comparative advantage) should be located here.

Proposition 4. Foreign firms (aa*) in **cell D** will expand their production in country H, partly by takeover and export part of their output to their home country F.

In addition to the propositions related directly to the cells in the matrix, we derive additional propositions, which are thought to be relevant for the loss or the gain of advantages of firms and industries:

Proposition 5. Are the shifts of firms between advantage combinations explained by new firms rather than changes in existing firms?

Proposition 6. Given the heterogeneity of firms within industries, the location of an industry in one of the four cells is a firm-specific rather than an industry-specific phenomenon.

4. Data and Operationalisation

Data

Two data sets, one on Austrian trade (exports and imports), the other on Austrian manufacturing firms, are merged on a three-digit NACE level. (see Appendix table) According to the conceptual discussion, the first is used to calculate CA, while value-added, taken from the firms' balance-sheet data is used to calculate relative FSAs.

The degree of representation is shown in Tables 1 and 2. Since multinationality is positively related to size, we think we cover a high share of foreign and Austrian MNEs. By two-digit industry, the degree of representation is over 30% and in only two it is below 10%, by employment.

*****Table 1 (Degree of Representation)

*****Table 2 (Degree of Representation by size class)

While the first data set is standard, the second data set requires more detailed discussion, since it is the limiting factor in the merging process. In order to classify the firms by industry (according to the *Systematik der Wirtschaftstätigkeiten)*, we used the *Firmenbuch* and also checked for changes of the most important industry for each firm in 1990, 1995 and 2000. Since the calculation of relative FSAs requires the availability of foreign and domestic firms in an industry, we lose several industries. Further, we follow the same firms over ten years and compare these to changes in the total sample.

Operationalization

Earlier studies using the concept described above and represented in the matrix Figure 2 reveal, that there is considerable disagreement about the operationalisation of the FSA and location advantage as the two sources of the "kaleidoscope comparative advantage" (Feenstra 1998, p. 31).

For comparative advantage we use a standard formula:

$RCA = (X_i / M_i) / (X / M)$

i … industry i, X … Exports, M … Imports

The operationalization of the FSA is controversial. Hirsch and Cherniawski (1997) use an export ratio in order to measure FSA, but state that the ideal measure would include overseas value-added as well. Sleuwaegen et al. (1998) use a measure where both, domestic and foreign firms are included. This measure, which is adopted also in this paper relates to the relative nature of FSAs, which is the core of the specific-advantage hypothesis referred to above.

$RFSAi = (AF_i / FF_i) / (AF / FF)$

Ratio of value-added[2] by Austrian firms (AF) to value-added by foreign based firms (FF) in

industry i relative to total value-added by Austrian firms to value-added by foreign firms in Austria

Ideally, FSA should be calculated "by function" (R&D, production, marketing etc.) in order to be consistent with RCA.[3] This suggests that using the firm as the unit of analysis is not fully appropriate, yet, it can be interpreted as an "average" FSA.

5. Results

Figure 3 shows the actual distribution of industries across cells during 1990, 1995 and 2000. Let us look at each cell in turn.

*****Fig. 3a and 3b

Cell A

The fact that firms located in cell A loose value-added at home as well as exports not unexpectedly points to re-location of production abroad (vertical integration). The firms "escaped" a set of location factors which did not meet their demand for the exploitation of their FSAs. Since relative FSA dominates here, this has been a defensive strategy in order to secure overall competitiveness.

*****Table 3a, b (Balanced Panel Effect)

Cell B

Firms show strong employment losses, yet they also loose value-added and exports, despite having both advantages, which would suggest a growth of the industries located in cell B. While the employment loss may be bound to rationalization investment, an indication being the strong labour-productivity gains over the ten-year period. The loss of value-added and exports could be the result of reorganization investment. Both, vertical and horizontal integration strategies may have been followed by Austrian firms abroad as well as foreign firms in Austria. Another explanation may be that factors like transport costs and distant markets prevented domestic firms from fully exploiting the location advantages.

Cell C

Firms in cell C show a strong loss of employment 1995-2000, yet value-added and export gains, which is mainly an effect of the fact that six firms / industries from other cells shift to cell C, rather than gains of existing firms over time (distributional effect). The importance of cell C, both in terms of industries as well as in employment and value-added share is apparent. The fact that both advantages are lacking either did not prevent foreign firms from acquiring Austrian firms, 5 out of 6 being fragmentators. This is not easy to explain, since foreign fragmentators are especially dependent on location factors (especially cost-related factors at least in mature sectors): Firms shifting from cells A and B to cell C may not have yet exited, since exit or divestment takes time and does not occur immediately. On the other hand, firms may try to shift back to one of the other cells. Also, it points to a parallel deterioration of relative location advantages particularly used by those industries, which move from cell B to cell C, which makes it harder to develop new FSAs. Another explanation would be that even if the domestic firms did not have any advantage, the take-over may have led to the "injection" of FSAs from the new parent abroad, which may explain that the firms have not divested so far.

Cell D

Here, firms show the strongest value-added, export and employment gain. This points to an improvement of relative location factors which obviously has attracted *new* foreign firms to exploit their transferred FSAs or *existing* firms even to develop or improve their FSAs.

The resulting employment, value-added and export effects of the strategies followed by domestic and foreign firms are presented in table 4.

*****Table 4 (Change of various indicators)

The difference between the overall sample development and the balanced panel are shown in Table 5.

*****Table 5 (Overall shift of balanced panel)

The shift of industries across cells shown in Figure 3 is caused by changes in the sample firms, while the balanced panel firms are remarkably stable, even on the 3-digit level (see Table 6). Interestingly, 7 industries gained advantages, while only 3 lost advantages on the three-digit level, while on the two-digit level, all industries lost advantages, which points to the diversity of firms within industries. In terms of number of firms, 30% of balanced panel firms are included in the industries changing cells between 1995 and 2000 (19%). This is a remarkable increase in the second half compared to the first half of the period 1990-2000. It seems that even during short periods, gain or loss of competitiveness across cells in addition to intra-cell shifts affects a high proportion of the firm population. Appropriate policies will therefore be difficult to develop in such a dynamic environment. The risk of policy failure will be high.

*****Table 6 (industries shifting across cells)

Table 6a shows several trade-related indicators. The net trade index varies between -1 and +1: 1 indicates pure exports and the highest comparative advantage, -1 indicates pure imports and the highest disadvantage; and 0 indicates balanced trade. The net trade index is similar across cells and the sign is as expected.

*****Table 6a (net trade index, import and export ratios)

Table 7 sheds light on the question of firm- or industry-specific causes of clustering of firms in cells of the matrix. The evidence clearly suggests that it is a firm-specific phenomenon, if we compare the 3-digit and the 2-digit clustering across cells.

*****Tables 7a-c

Overall, the results are plausible, yet the descriptive evidence does not enable us to draw causal interpretations. Nevertheless, some policy conclusions can be drawn on the basis of the firms' strategies.

6. Conclusions

It has been argued throughout the paper that two types of information are crucial in order to design efficient policies for stimulating the competitiveness of firms: first, the locational strategies of firms on the basis of their existing advantage combination; and second, a proper assessment of the comparative location-quality. While the latter is more often found in economic analysis, only the first approach is able to clarify the question whether FSAs have

been transferred or developed locally. The paper presented a simple approach to deliver the two pieces of information and should thus contribute to a rational location policy (Murtha and Lenway, 1994). The different strategies of the firms across the cells of the matrix suggest a differentiated policy approach, taking into account the four possible advantage combinations. From an efficiency viewpoint firms in industries, where both avantages are lacking (cell C) should probably not be addressed by policy measures, since they will be lost despite policy intervention. Firms in cell B, on the other hand, may not be the primary concern of policy makers, unless their level of activity deteriorates in the home country as was the case in Austria. Yet, firms and industries where either advantage is given (cell A or cell D), may be policy targets due to the complementary nature of both advantages in some fields (e.g. National Systems of Innovation mentioned above and firms' technology strategies). Firms in cell A may be *indirectly* supported by supplying specific infrastructure or affecting cost conditions via (the abolishment of) regulations. Cell D firms may be *directly* supported by R&D-grants, a better local integration into the national innovation system etc. The dynamics described makes it, however, difficult to introduce efficient policies successfully. The main failure may lie in the fact that the wrong firms benefit from the policy measures, because they shift across and within cells rather quickly.

The *advantages* of the analytical approach are its easy application; its simplicity, as to the four advantage combinations being relevant for policy strategies and thus can be easily communicated to decision makers; the limited demand concerning data; the use of value-added instead of sales data; the derivation from the theory of the MNE and trade theory; and the fact that it allows for other factors than just comparative advantage to motivate trade. The major *limitation* in this type of analysis is the unit of analysis, the firm. Classification on the 3-digit level is almost impossible with large firms, which are typically diversified at least across similar 3-digit industries. Therefore, we did not choose the corporate level (holding

company) but the operative level, which are closer to the plant level and thus easier to classify.

The analysis also shows the difficulties still arising in the analysis of international firms, despite many improvements of data, reporting systems etc. Although many problems remain, it is hoped that the approach will be used in other countries as well. This type of analysis has also been fruitfully applied in such fields as strategic alliances (e.g. Sleuwaegen et al., 1998), outward investment of Japanese Firms (e.g. Kimura and Pugel 2001), entry / exit of firms (e.g. Audretsch, 1994), economic geography (Dunning, 1996) and the technological competitiveness of firms (e.g. Patel and Vega, 1997; Herrera, 1992).

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8. Tables

Table 1: Degree of Representation

Year 2000			
2 digit industry	**Employees of total population*)**	**Sample Employees**	**Employees in %**
15	74,993	17,106	22.81
17	20,436	6,607	32.33
18	10,427	6,002	57.56
19	6,177	2,119	34.30
20	34,829	1,599	4.59
21	17,547	14,643	83.45
22	25,726	3,072	11.94
24	26,994	12,550	46.49
25	29,340	7,513	25.61
26	34,113	4,712	13.81
27	32,724	6,744	20.61
28	62,583	8,439	13.48
29	74,308	30,275	40.74
31	28,799	16,264	56.47
32	30,320	19,919	65.70
33	13,490	2,397	17.77
34	28,991	16,988	58.60
36	45,679	2,958	6.48
TOTAL	597,476	179,907	30.11

*) Source: Table 23.06, Statistisches Jahrbuch 2003 and own calculations

Table 2: Degree of Representation by size class

Size classes	**Total Population**	**Sample**	**Sample in % of Total Population**
20-49	71691	337	0.47
50-99	59265	2041	3.44
100-249	111033	24718	22.26
250-499	94760	43529	45.94
500-999	78982	56746	71.85
1000+	102609	48852	47.61
TOTAL	518340	176223	34.00

Table 3a. Balanced Panel Effect 1995-2000

	N			**Employment**			**Value Added**		
	1995	**2000**	**Change**	**1995**	**2000**	**Change**	**1995**	**2000**	**Change**
Total	141	141	0	97,228	91,691	-5,537	86,724,310.00	104,433,220.00	17,708,910.00
DO	74	64	-10	45,448	40,093	-5,355	38,087,116.00	39,645,124.00	1,558,008.00
FO(FG)	11	21	10	8,696	15,055	6,359	7,243,542.00	19,530,105.00	12,286,563.00
FO Other	56	56	0	43,084	36,543	-6,541	41,393,652.00	45,257,991.00	3,864,339.00

Table 3b. Balanced Panel Effect 1990-2000									
	N			Employment			Value Added		
	1990	2000	Change	1990	2000	Change	1990	2000	Change
Total	58	58	0	66,433	49,826	-16,607	48,155,499.00	57,893,496.00	9,737,997.00
DO	31	25	-6	31,817	19,621	-12,196	22,636,646.00	20,063,990.00	- 2,572,656.00
FO(FG)	3	8	5	1,834	4,842	3,008	1,134,525.00	5,196,704.00	4,062,179.00
FO Other	24	25	1	32,782	25,363	-7,419	24,384,328.00	32,632,802.00	8,248,474.00

Table 4. Change of various indicators by cell 1990-1995-2000								
Cell	Number of Firms		Employment		Value Added		Exports	
	1995-2000	1990-2000	1995-2000	1990-2000	1995-2000	1990-2000	1995-2000	1990-2000
A	-11	-7	-7,740	-7,167	-6,876,161.00	- 5,777,586.00	-15,719,180.00	- 11,121,478.00
B	-9	-3	-8,778	-11,690	-6,059,881.00	- 5,822,062.00	-3,039,209.00	- 8,498,448.00
C	-1	6	-4,838	413	1,832,623.00	9,479,849.00	15,943,486.00	21,538,207.00
D	21	4	15,819	1,837	28,812,329.00	11,857,796.00	68,868,623.00	33,264,606.00
Total	0	0	-5,537	-16,607	17,708,910.00	9,737,997.00	66,053,720.00	35,182,887.00

Table 5. Overall Shift (OS) Effect vs. Balanced Panel (BP) Effect (firms with exports only)

Change in	1995-2000 (N=141)		1990-2000 (N=58)	
	OS	BP	OS	BP
Number of firms	78	0	207	0
Employment	28,061	-5,537	62,167	-16,607
Value Added	55,815,926	17,708,910	99,889,164	9,737,997

Table 6. Industries and Firms changing cells

Number of industries 3 digit	Industries changing cells 1995-2000	Industries changing cells 1990-2000	Number of industries 2 digit	Industries changing cells 1995-2000	Industries changing cells 1990-2000
153	C to A		17	B to A	
211	B to D		21	B to D	
241	A to C				
244	C to D				
251	C to A				
274	A to B				
294	B to C				
295		D to B	26		B to D
321		D to B	28		B to A
341		C to D			
Sum of number of firms changing cells	42	11	Sum of number of firms changing cells	22	7
Sum of number of industries changing cells	7	3	Sum of number of industries changing cells	2	2
Sample n	141	58		141	58

Table 6a. Import and Export ratio and Net Trade Index across cells in 2000			
2000	Import ratio	Export ratio	Net Trade Index
Cell A	0.226	0.153	-0.173
Cell B	0.232	0.311	0.163
Cell C	0.239	0.167	-0.160
Cell D	0.304	0.369	0.114

Import ratio is defined as: M_i / M

Exoprt ratio is defined as: X_i / X

Net Trade Index is defined as: $(X_{t,i} - M_{t,i}) / (X_{t,i} + M_{t,i})$

Table 7a. Clustering of 3-digit industries on 2-digit level in 1990

3-digit industries	FSA	LSA	Cell in Matrix	2-digit industries	FSA	LSA	Cell in Matrix
153	0.342	0.533	C	15	2.191	0.750	A
158	1.325	0.709	A				
159	1691.492	1.346	B				
177	0.204	0.609	C	17	3.238	1.125	B
182	1.821	0.560	A	18	1.821	0.536	A
193	3.921	0.832	A	19	3.921	0.887	A
202	1.347	3.704	B	20	1.638	3.137	B
211	1.204	2.149	B	21	1.356	2.149	B
212	2.431	2.149	B				
241	1.226	0.810	A	24	0.296	0.776	C
246	0.189	0.509	C				
251	0.323	1.259	D	25	0.477	1.120	D
252	1.146	1.057	B				
262	0.538	2.986	D	26	1.758	1.590	B
268	2.240	1.938	B				
272	1.110	2.147	B	27	19.485	1.537	B
281	0.555	1.545	D	28	4.322	1.265	B
282	0.996	1.346	D				
287	3.532	0.873	A				
291	0.754	0.939	C	29	0.571	1.139	D
292	0.465	1.168	D				
295	1.176	1.438	B				
311	2.442	1.226	B	31	0.875	1.054	D
312	0.682	0.834	C				
313	0.024	1.387	D				
315	1.038	0.901	A				
321	0.487	1.086	D	32	0.146	1.243	D
322	0.156	0.582	C				
334	0.396	1.213	D	33	0.374	0.775	C
341	0.288	0.692	C	34	0.339	0.724	C
352	17.528	3.248	B	35	19.778	0.800	A

Table 7b. Clustering of 3-digit industries on 2-digit level in 1995

3-digit industries	FSA	LSA	Cell in Matrix	2-digit industries	FSA	LSA	Cell in Matrix
151	0.724	0.912	C	15	1.8204	0.7600	A
153	0.506	0.707	C				
158	0.961	0.577	C				
159	26.447	1.861	B				
171	1.954	1.217	B	17	3.6641	1.0616	B
177	0.728	0.567	C				
182	2.329	0.443	A	18	2.3290	0.4322	A
193	2.365	0.779	A	19	2.3655	0.8954	A
211	1.454	2.119	B	21	1.4012	2.0318	B
212	1.166	1.810	B				
221	22.811	0.540	A	22	46.4784	0.6094	A
241	1.048	0.806	A	24	0.3575	0.7517	C
243	0.274	0.664	C				
244	0.125	0.835	C				
246	1.789	0.546	A				
251	0.411	0.920	C	25	1.3254	1.0848	B
252	3.046	1.166	B				
261	0.305	1.445	D	26	0.7427	1.2743	D
262	0.702	2.039	D				
265	1.052	0.201	A				
266	0.151	2.929	D				
268	0.752	1.491	D				
272	0.739	1.508	D	27	6.3038	1.2849	B
274	1.264	0.808	A				
281	1.354	1.480	B	28	4.3784	1.1391	B
282	4.684	1.080	B				
286	7.610	1.406	B				
287	1.494	0.831	A				
291	0.688	0.987	C	29	0.7213	1.2358	D
292	0.263	1.233	D				
293	7.070	1.027	B				
294	3.243	1.035	B				
295	1.724	1.864	B				
311	2.399	1.526	B	31	0.9528	1.1047	D
312	0.434	0.889	C				
313	0.306	1.519	D				
315	1.337	0.862	A				
321	1.994	1.476	B	32	0.1702	1.3292	D
322	0.122	0.856	C				
331	1.517	0.714	A	33	1.0075	0.8052	A
332	0.257	0.897	C				
334	2.185	1.069	B				
341	0.157	0.843	C	34	0.2056	0.8555	C
343	0.300	0.875	C				
361	23.411	0.631	A	36	10.9740	0.8266	A
364	3.799	3.131	B				

Table 7c. Clustering of 3-digit industries on 2-digit level in 2000

3-digit industries	FSA	LSA	Cell in Matrix	2-digit industries	FSA	LSA	Cell in Matrix
151	4.023	0.927	A	15	1.7065	0.9493	A
153	2.144	0.830	A				
158	0.785	0.788	C				
159	3.381	2.502	B				
171	3.166	1.201	B	17	3.2941	0.9990	A
172	7.365	1.407	B				
175	2.489	1.224	B				
177	0.618	0.371	C				
182	1.285	0.458	A	18	1.2852	0.4490	A
193	2.760	0.724	A	19	2.7602	0.9047	A
201	0.950	3.606	D	20	4.0939	2.4004	B
211	0.729	1.716	D	21	0.9760	1.7055	D
212	2.508	1.679	B				
221	3.453	0.851	A	22	7.3578	0.9161	A
241	0.433	0.803	C	24	0.2500	0.8191	C
243	1.587	0.707	A				
244	0.082	1.006	D				
246	2.889	0.555	A				
251	0.840	0.691	C	25	1.5565	1.0035	B
252	2.525	1.143	B				
262	1.434	1.863	B	26	0.6499	1.2266	D
265	2.078	0.283	A				
266	0.674	1.096	D				
268	0.175	1.698	D				
272	1.132	1.934	B	27	9.1539	1.3447	B
274	2.939	1.076	B				
281	1.422	1.035	B	28	7.2501	0.9969	A
286	12.991	1.451	B				
287	3.816	0.758	A				
291	0.371	0.846	C	29	0.6455	1.2287	D
292	0.647	1.214	D				
293	2.935	1.335	B				
294	1.055	0.992	A				
295	1.412	1.787	B				
297	0.056	0.913	C				
311	2.509	1.633	B	31	1.0506	1.0376	B
312	0.513	0.882	C				
313	0.938	1.057	D				
315	11.719	0.886	A				
316	1.829	0.830	A				
321	0.837	1.269	D	32	0.3064	1.0012	D
322	0.190	0.469	C				
331	0.768	0.713	C	33	0.7979	0.7658	C
334	1.786	0.888	A				
341	0.360	1.142	D	34	0.3180	0.9956	C
342	0.691	0.805	C				
364	0.380	1.737	D	36	1.9995	0.8790	A

9. Figures

Figure 1: The Setting

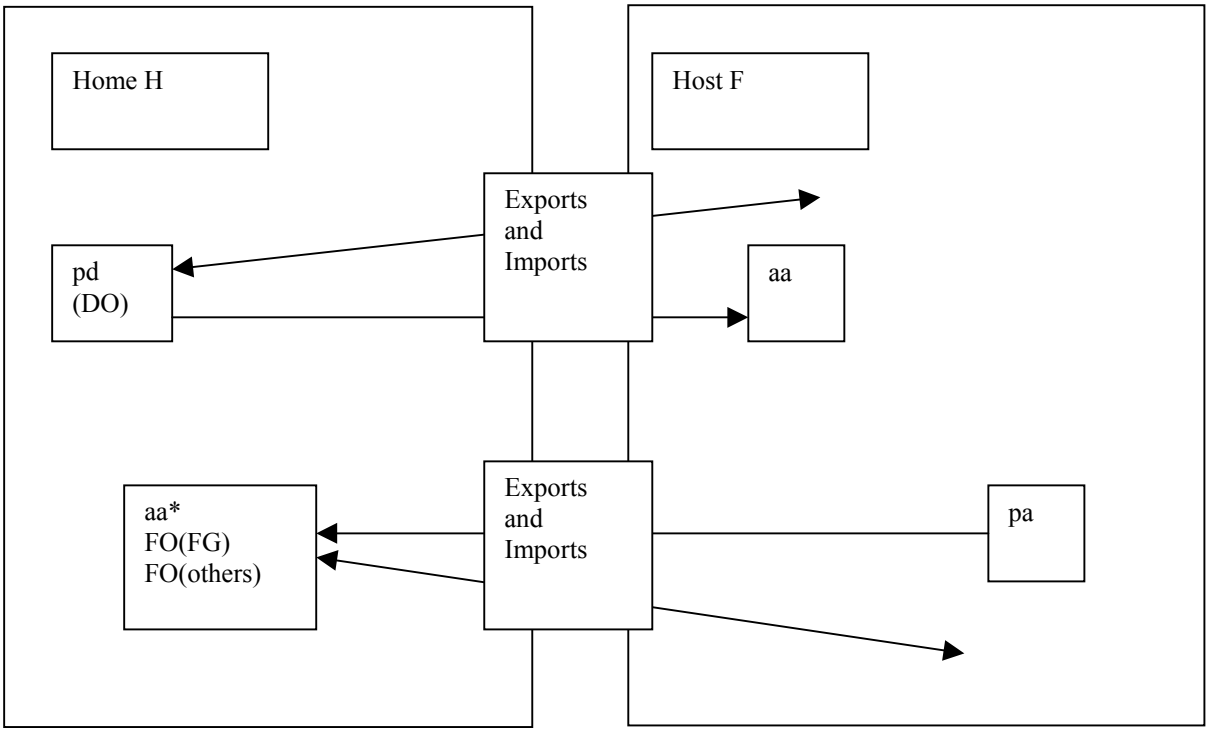


Figure 2: Dynamic Matrix (Home country view)

Firm-specific Advantage			
	high	***Cell A:*** ***Firm-specific advantage dominates*** (1) Firm strategy: defensive export-substituting FDI; firms are forced to become MNEs (2) Location of production: abroad (3) Direction of trade: imports from aa	***Cell B:*** ***Impossible to distinguish advantages*** (1) Re-organization investments by home and foreign firms (2) inward FDI by pa and outward sales-oriented FDI by pd. (3) exports
	low	***Cell C:*** ***Both advantages lacking*** (1) Home firms (pd) divest or exit (2) abroad (3) imports from pa	***Cell D:*** ***Location Advantage dominates*** (1) aa* engage in rationalization investment (2) pa invest in Home (3)exports
		low	high
		Comparative Advantage	

Figure 3a: Dynamics 1990 - 1995 - 2000

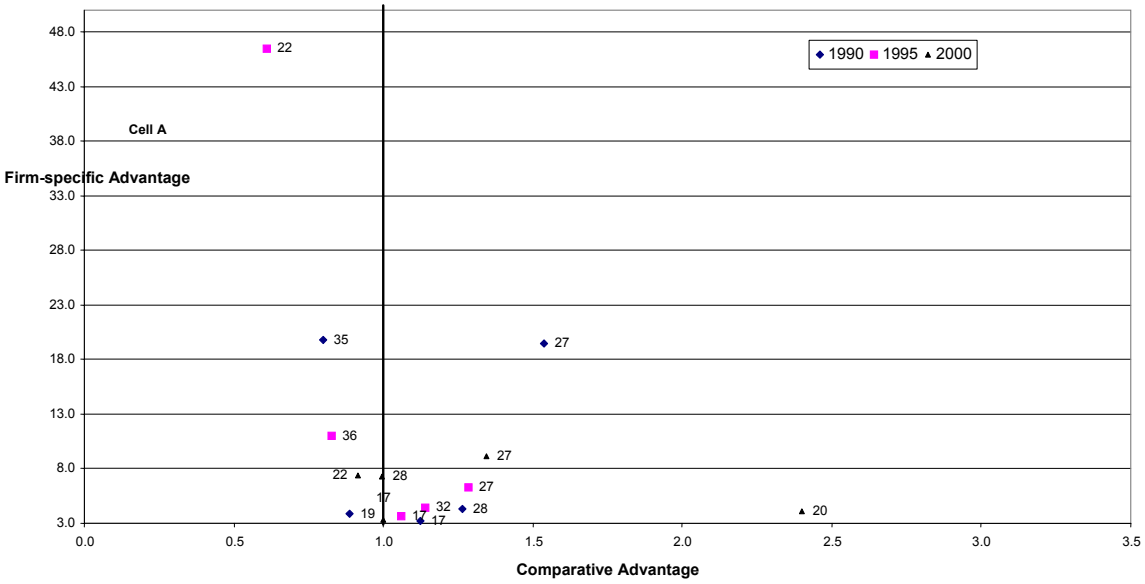
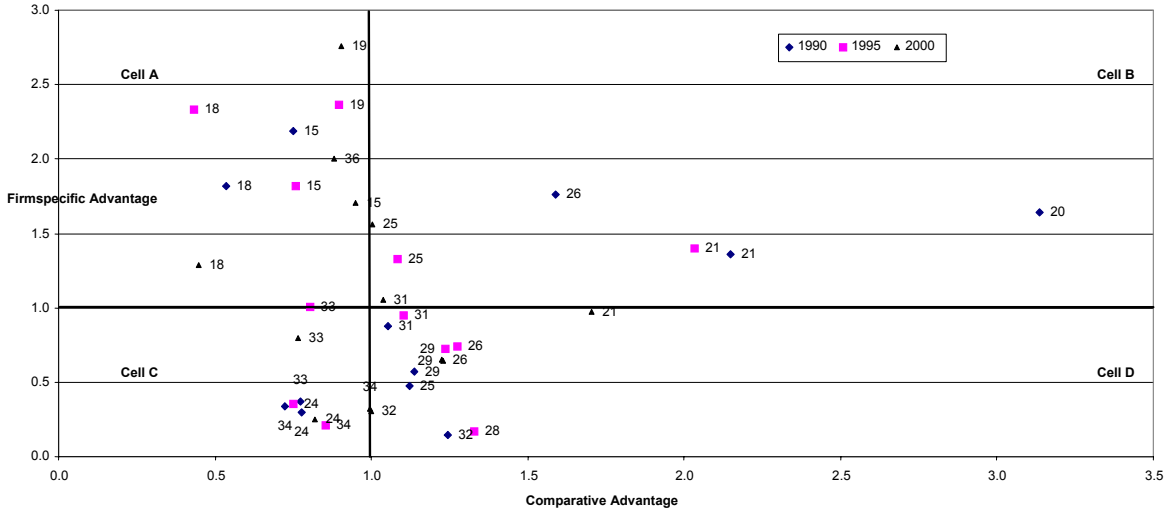


Figure 3b. Dynamics 1990 - 1995 - 2000 (cont'd)



10. Appendix Table

1990

A	B
Manufacture of other fruit products Manufacture of other wearing apparel and accessories Manufacture of footwear Manufacture of basic chemicals Manufacture of other fabricated metal products Manufacture of lighting equipment and electric lamps	Manufacture of beverages Manufacture of veneer sheets Manufacture of pulp, paper and paperboard Manufacture of electric motors, generators and transformers Manufacture of railway and tramway locomotives and rolling stock Manufacture of articles of paper and paperboard Manufacture of plastic products Manufacture of other non-metallic mineral products Manufacture of other special purpose machinery
C	D
Processing and preserving of fruit and vegetables Manufacture of knitted and crochetted articles Manufacture of other chemical products Manufacture of machinery for the production and use of mechanical power Manufacture of electricity distribution and control apparatus Manufacture of television and radio transmitters	Manufacture of rubber products Manufacture of non-refractory ceramic goods other than for construction purposes Manufacture of structural metal products Manufacture of tanks, reservoirs, and containers of metal Manufacture of other general purpose machinery Manufacture of insulated wire and cable Manufacture of electronic valves and tubes and other electronic components Manufacture of optical instruments and photographic equipment

1995

A	B
Manufacture of other wearing apparel and accessories Manufacture of footwear Publishing Manufacture of basic chemicals Manufacture of other chemical prouducts Manufacture of cement, lime and plaster Manufacture of basic precious and non-ferrous metals Manufacture of other fabricated metal products Manufacture of lighting equipment and electronic lamps Manufacture of medical and surgical equipment and orthopaedic appliances	Manufacture of beverages Preparation and spinning of textile fibres Manufacture of pulp, paper and paperboard Manufacture of articles of paper and paperboard Manufacture of plastic products Manufacture of structural metal products Manufacture of cutlery, tools and general hardware Manufacture of agricultural and forestry machinery Manufacture of machine tools Manufacture of other special-purpose machinery Manufacture of sports goods Manufacture of electric motors, generators and transformers Manufacture of electronic valves and tubes and other electronic components Manufacture of optical instruments and photographic equipment
C	D
Production, processing and preserving of meat and meat products Processing and preserving of fruit and vegetables Manufacture of other fruit products Manufacture of knitted and crochetted articles Manufacture of paints, varnishes and similar coatings, printing ink and mestices Manufacture of machinery for the production and use	Manufacture of glass and glass products Manufacture of non-refractory ceramic goods Manufacture of articles of concrete, plaster and cement Manufacture of other non-metallic mineral products Manufacture of tubes Manufacture of other general purpose machinery Manufacture of insulated wire and cable

of mechanical power Manufacture of pharmaceuticals, medicinal and botanical products. Manufacture of rubber products Manufacture of electricity distribution and control apparatus Manufacture of TV and radio transmitters and apparatus for line telephony Manufacture of instruments and appliances for measuring, checking, testing … except industrial process control equipment Manufacture of motor vehicles Manufacture of parts and accessories for motor vehicles and their engines	

2000

A	B
Production, processing and preserving of meat and meat products Processing and preserving of fruit and vegetables Manufacture of other wearing apparel and accessories Manufacture of footwear Publishing Manufacture of paints, varnishes and similar coatings… Manufacture of other chemical products Manufacture of cement, lime and plaster Manufacture of other fabricated metal products Manufacture of machine-tools Manufacture of lighting equipment and electric lamps Manufacture of electrical equipment n.e.c. Manufacture of optical instruments and photographic equipment	Manufacture of beverages Preparation and spinning of textile fibres Textile weaving Manufacture of other textiles Manufacture of articles of paper and paperboard Manufacture of plastic products Manufacture of non-refractory ceramic goods Manufacture of tubes Manufacture of basic precious and non-ferrous metals Manufacture of structural metal products Manufacture of cutlery, tools, and general hardware Manufacture of agricultural and forestry machinery Manufacture of other special purpose machinery Manufacture of electric motors, generators and transformers
C	D
Manufacture of other food products Manufacture of knitted and crochetted materials Manufacture of basic chemicals Manufacture of rubber products Manufacture of machinery for the production and use of mechanical power Manufacture of domestic appliances n.e.c. Manufacture of electricity distribution and control apparatus Manufacture of TV and radio transmitters… Manufacture of medical and surgical equipment… Manufacture of bodies for motor vehicles	Saw milling and planing of wood, impregnation of wood Manufacture of pulp, paper and paperboard Manufacture of pharmaceuticals, medicinal and botanical products Manufacture of articles of concrete, plaster and cement Manufacture of other non-metallic mineral products Manufacture of other general purpose machinery Manufacture of insulated wire and cable Manufacture of electronic valves and tubes and other electronic components Manufacture of motor vehicles Manufacture of sports goods