International Comparison of Size Structure of Manufacturing Firms

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This paper seeks to examine the size distribution of manufacturing employment and productivity differential by size in selected Asian countries in manufacturing sector. For this analysis we are confining ourselves to the size distribution within modern manufacturing sector only. The exercise has taken care to exclude household enterprises and tiny establishments employing less than 5 workers. In our earlier work (Mazumdar and Sarkar, 2008) we presented a snapshot of the size distribution of the manufacturing sector of selected countries and compared them with India. The data that we managed to get for Asian countries were quite dated: they referred to various years in the 1980s.

In the present paper we tried to cover more countries and collect data for more recent years. We were fortunate in having a collaborative with the Asian Development Bank who used their good offices to obtain the data on size distribution from the government surveys and censuses of the member countries[1]. For most of the countries data that we managed to collect (with the assistance of the Asian Development Bank) belong to this millennium but for a few countries we had to be satisfied with data for the late nineties. In addition, for several Asian countries we could manage to collect data at two or more points of time. It has given us the opportunity to analyse the changes in size distribution that has occurred over the last two decades.

We begin in section I with the contrasting patterns in two neighbouring countries of South Asia—India and Bangladesh[2]. Sections II and III extend the comparative analysis to include a number of other Asian countries. We are able to check if the three types of manufacturing size structure analyzed in our earlier work are still useful in classifying the Asian sample for more recent years, and if the grouping of countries has changed in any way.

The trend observed in recent Asian industrializing—particularly among the most rapidly growing ones like China—seem to be quite different from that in the major industrialized countries in the developed world in the last quarter of the preceding century. These contrasting trends suggest important changes which are underway in the international spread of technology

[1] We are very thankful to Rana Hasan of the ADB who organized the data collection and made it available to us.
[2] These are the two countries to be studied in some detail in the research project supported by IDRC . Project #-------

and in the international division of labour as reflected in trade patterns in manufacturing. We try to illuminate this scenario by summarizing from the existing literature the recent experience in the changing size structure of manufacturing in selected industrialized countries

I

Comparison of Size Structure Manufacturing Employment of Bangladesh and India

Tables 1 and 2 give the size distribution and relative productivity by size groups in manufacturing for India and Bangladesh respectively.

Table 1a: Percentage Distribution of Manufacturing Employment of India by Size Groups over last Two Decades

Size Groups	1984-85	1989-90	1994-95	2000-01	2004-5*
DME (6-9)	40.3	44.9	41.5	45.4	46.6
10-49	9.5	10.3	10.4	10.2	10.4
50-99	6.1	6.9	8.0	6.6	5.7
100-199	5.7	6.4	7.4	7.0	7.1
200-499	8.3	8.6	9.5	9.4	9.9
500+	30.2	22.9	23.2	21.5	20.3

Note: DME data is for 2005-6 and rest of the data is for 2004-5.
Source: Unit level data of various rounds of NSS and ASI

Relative Productivity (Value Added per Worker) by Size-groups of Manufacturing Enterprises

Size Groups	1984-85	1989-90	1994-95	2000-01	2004-5*
DME (6-9)	19	12	10	9	8
10-49	42	35	37	39	24
50-99	45	38	45	41	34
100-199	62	58	54	58	43
200-499	86	77	84	74	57
500+	100	100	100	100	100

Note: DME data is for 2005-6 and rest of the data is for 2004-5.
Source: Unit level data of various rounds of NSS and ASI

Table 1b: Percentage Distribution of Manufacturing Employment of Bangladesh by Size Groups

Size Groups	1995-6	2001-2	Korea 1975
6-9	12.7	5.3	4.4
10-49	15.4	10.7	13.0
50-99	5.5	6.7	8.7
100-199	10.5	8.5	11.5
200-499	22.8	26.0	18.8
500+	33.1	42.8	43.6

Source: Published data of non-household enterprise and unit level data of CMI (calculated by researchers in BIDS, Dhaka)

Relative Productivity (Value Added per Worker) by Size-groups of Manufacturing Enterprises in Bangladesh

Size Groups	1995-6	2001-2	Korea 1975
6-9*	19	29	31
10-49	36	38	38
50-99	62	72	61
100-199	53	64	69
200-499	65	79	78
500+	100	100	100

* - Reflect relative productivity of all non-household manufacturing sector employing 1-9 workers.

Source: Published data of non-household enterprise and unit level data of CMI (calculated by researchers in BIDS, Dhaka)

India's size structure of manufacturing employment clearly reflects a dualistic pattern. It is characterized by first, the strong presence of both small and large firms and second, the substantial economic distance between small and large firms. This dualistic pattern was first widely documented in the case of Japan. Japan had a long history of a dualistic pattern of industrialization. It had its root in the initial surplus-labour conditions prevailing in Japan during its initial industrialization (which contributed to labour market segmentation) and the simultaneous development of a complex system linking large industry, the state and financial conglomerates, which accentuated capital market dualism (Mazumdar and Sarkar, 2008). This pattern of dualistic development is markedly exaggerated in the Indian case. India has an exceptionally large proportion of employment in the lowest size-group of 6-9 workers and an exceptionally low relative value added per worker in this group. Further, India's size distribution is characterised by a large presence of the 500+ group of firms with a conspicuous 'missing middle'. We can see that in the last two decades there is no trend towards a reduction of the characteristics of this dualistic structure. The only discernible fact is that the lowest size class (6-9) has gained in employment share in the manufacturing sector at the cost of large firms (500+) with hardly any increase in the employment share in the mid segment. The 'missing middle' phenomenon has been extremely persistent. Rather we can observe a strengthening of this dualistic pattern as the economic distance between smallest and largest size class has been widening in the last two decades. The relative productivity of labour in the smallest size class with respect to the largest has fallen from one-eighth to one-twelfth from the late eighties to the present. This has occurred in spite of an increase in labour productivity of all size groups over the years. The major factor in this trend is the faster increase in labour productivity of the largest size class (500+) relative to all other size classes.

The size distribution of manufacturing enterprises in Bangladesh presents a different picture altogether. The size distribution of employment is distinctively skewed to the right with the modal size group employing 500+ workers. It reflects a withering away of traditional firms in the smallest size class and lack of development of small and medium sized firms. From the late nineties to the early years of this century the lopsided size structure of manufacturing employment has become even more skewed, with the 500+ size group increasing its share substantially along with an increase in employment share of the next large size class of firms employing 200-499 workers. All other smaller size classes have lost share of employment with an absolute decline in employment in firms employing <50 workers. The size distribution of manufacturing employment of Bangladesh in 2001-2 resembles the Korean size distribution of employment of the mid-seventies which was equally skewed. But by the mid-eighties the Korean size structure had become far more equitable as its government made a vigorous attempt to develop small and medium sized firms[3]. Similar to the Korean case, the economic distance between the smallest (6-9) and the largest (500+) size classes is much less than in India – the relative productivity of the lowest size class being one-third of the highest. Even the relative productivity across size class of firms looks very similar to Korea of the mid-seventies.

The skewed size distribution of employment in Bangladesh has become even more skewed to the right from the mid-nineties to the early years of present decade. But the economic distance between the lowest and highest size classes has considerably narrowed. The establishment of large number of export oriented labour intensive garment industry (particularly knitwear) in 500+ size class is responsible for it. In that sense, its industrial base is narrower than that of Korea of the mid-seventies.

Bangladesh and India belong to two different types of size distribution of manufacturing employment. India is a clear case of 'dualistic' pattern and Bangladesh is a case of 'distinctly skewed to the right'. Apart from these two distinct types in the literature there is fairly widespread discussion about 'equitable' size distribution of manufacturing employment where employment is spread out across small, medium and large firms in fairly even manner and the productivity difference between size classes is small.

[3] For a brief summary of the Korean policies of SME development see Mazumdar(2003). Cf. the references cited there.

II

Comparison of Size Structure of Manufacturing Employment in South-East and East Asian Countries

We will examine whether the size distribution of other Asian countries can be classified into these three categories. We summarize below the characteristics of these three broad types:

i) Equitable: A fairly even-size distribution in which small, medium and large firms plays more or less equally important roles and the productivity difference between the size classes is small

ii) Distinctly Skewed to Right: The pattern in which the distribution of employment by size groups is distinctly skewed to the large firms. Typically in this pattern the productivity difference between large and small firms tends to be substantial.

iii) Dualistic: The 'dualistic' pattern in which there is a strong mode at both ends of the distribution – a relatively large proportion of employment is found both in the small and the large size groups.

Table 2: Percentage Distribution of Employment by Size Group and Relative Labour Productivity of selected Asian Countries

A. Equitable

Korea 1995

Size group	Employment Distribution (%)	Relative Labour productivity
5-9	9.4	25
10-49	30.3	31
50-99	12.4	41
100-199	10.7	51
200-499	11.4	65
500 & above	25.8	100

Source: ADB

Hong Kong 1982

Size group	Employment Distribution (%)	Relative Labour productivity
1-9	12.2	54
10-49	27.4	61
50-99	15.6	66
100-199	14.5	71
200-499	13.8	82
500 & above	16.5	100

Source: Annual Digest of Statistics

Taiwan 1996

Size Group	Employment Distribution (%)	Relative Labour productivity
5-9	9.9	33
10-49	31.9	41
50-99	13.1	38
100-499	20.4	63
500 & above	24.7	100

Source: ADB

B. Skewed to Right

Malaysia 1995

Size group	Employment Distribution (%)	Relative Labour productivity
5-49	11.9	56
50-199	23.4	80
200-499	19.7	93
500 & above	45.0	100

Source: ADB

Thailand 1996

Size Group	Employment Distribution (%)	Relative Labour productivity
10-49	12.9	39
50-99	8.4	53
100-499	31.8	73
500 & above	46.9	100

Source: ADB

Vietnam 2005

Size Group	Employment Distribution (%)	Relative Labour productivity
5-9	1.1	34
10-49	7.0	69
50-99	5.9	92
100-199	8.6	107
200-499	17.5	112
500 & above	59.9	100

Source: Shaffer and Trung, 2010

China 2005

Size Group	Employment Distribution (%)	Relative Labour productivity
<9	1.8	59
9-19	4.8	50
20-49	13.4	41
50-199	24.8	48
200-499	16.7	64
500 & above	38.5	100

Source: ADB

C. Dualistic

Indonesia 2006

Size group	Employment Distribution (%)	Relative Labour productivity
5-49	36.7	18
50-199	11.3	69
200-499	11.2	98
500 & above	40.8	100

Source: ADB

Philippines 1988

Size group	Employment Distribution (%)	Relative Labour productivity
1-9	21.5	9
10-49	13.6	30
50-99	6.5	56
100-499	8.9	74
500 & above	49.5	100

Source: National Statistical Office

Equitable Pattern

This group is best represented by the case of Hong Kong in the year 1982. We could gather size distribution of employment data for Hong Kong for later years but relative productivity data is available only for much smaller number of size class of manufacturing employment. The Hong Kong data of the early eighties illustrate one of the best examples of what equitable distribution could be. It can be seen from Table 2A that employment is quite evenly distributed among the various size groups, with the small enterprises playing as much a role in the island's manufacturing structure as medium and large enterprises. At the same time, the difference in

labour productivity between the smallest and largest size group is one of the smallest in the sample.

The pattern of distribution in Hong Kong can be compared with the other countries in this category, viz., Korea and Taiwan. They are characterized by a marginally stronger role of small establishments. It can be seen that although the modal size group is the small size class of 10-49 workers, the proportion of employment in large enterprises of 500+ workers is significantly larger in Korea and Taiwan. Further, table 2A shows that the productivity difference between the small and large is much less in Hong Kong particularly in relation to Korea. The wage differential between small and the large units is accordingly much lower in Hong Kong. Avergate earnings in Hog Kong in 1982 were only 55 per cent higher in establishments with more than 500 workers than in those with 1-9 workers. In Taiwan, the similar difference is twice and in Korea it is even more than that.

As discussed in Mazumdar and Sarkar (2008), Hong Kong of 1982 comes closest to the free market model of development of Asia. The inference that can be drawn from it is that left to itself modern industry makes efficient use of small enterprises in a striking manner. In the absence of policy biases that protect both capital and labour in large firms, labour productivity and wage differential can be kept within fairly narrow bounds.[4]

Historically speaking, the Korean case presents an interesting scenario. In Korea the size structure of employment in 1975 resembled the category of 'skewed to the right' when proportion of employment in the largest size group peaked at 45 per cent. But from that time Korea has been consciously trying to develop its small and medium enterprise and now it resembles much closer to the size distribution of traditionally 'equitable' countries of Hong Kong an Taiwan. It is seen that the size distribution in 1995 has become even more even than it was in 1986, continuing the trend which was noticed in Mazumdar and Sarkar (2008).[5]

Skewed to the Right Pattern

The second pattern in our sample of countries represent the size distribution of employment which is 'skewed to the right' with modal size group employing 500+ workers, as in the case of Bangladesh. These countries constitute largest number of countries in our sample namely

[4] Mazumdar and Sarkar (2008), p.205. Cf also the reference cited there.

[5] There has, however, been an increase in the relative labour productivity of the largest size-group (500+) such that the productivity indices (with the 500+ group as base) of all other size groups are lower.

Malaysia, Thailand, Vietnam and China. These countries exhibit one common trend. Malaysia and Thailand in the mid nineties were hailed as success stories of export oriented industrializing countries. In the present era the most successful manufacturing exporting nation is China: Vietnam is also shaping up as a major labour-intensive manufacturing exporting country.

The productivity differences among the various size groups of firms are not as substantial as in the dualistic pattern. One can discern two variants. Thailand and Vietnam show much larger productivity difference between the smaller size classes employing <50 workers and largest size class employing 500+ workers. On the other hand, the productivity differential between the smallest and largest size classes in case of Malaysia and China is similar to that of Hong Kong of 1982, which exhibit the classical case of 'equitable' size distribution. The wage differentials between small and large units in these countries are accordingly much smaller. Average earnings in Malaysia and China are only 50-55 per cent higher in establishment employing more than 500 workers than in those employing 5-49 workers.

One possible caveat to the account given in this sub-section should be noted. We have grouped Malaysia along with the others in the 'skewed to the right' group, But we see that even though the share of the largest size group of employment in Malaysia is as high as in the other countries (close to 50 per cent), Malaysia is distinguished by a having a substantial portion of employment in the medium 50-199 size groups. This presence of successful medium scale enterprises distinguishes it from the more clear cases of the 'skewed to the right' group. The comparison the size distribution of employment in Malaysia at the earlier date of 1981 (as given in Mazumdar and Sarkar 2008) is instructive, and is commented below in section III.

Dualistic Pattern

The 'dualistic' pattern is characterised by strong presence of both small and large establishment and second, the substantial economic distance between small and large firms as can be seen from table 2C.

Unlike India, the modal size group in both Indonesia and Philippines are size class of establishments employing 500+ workers. Still, these countries employ a large proportion of workers in establishments employing <50 workers. In both these countries the productivity difference between small and large sized groups is much larger. Consequently the average earnings of workers is three times higher in establishments with more than 500 workers than in

those employing less than 50 workers. The surplus labour situation in these countries has made the 'dualistic' pattern to emerge. These countries have not been able to establish themselves as successful manufacturing exporting countries compared to countries belonging to the category of 'skewed to the right'.

III
Changes in Size Structure of Manufacturing Industries in East and South-East Asian Countries

Data of size distribution of manufacturing industries for different years could be collected for some of the countries in our sample. These countries belong to the group of 'Equitable' and 'Skewed to the Right'. The data for most of the countries in two most recent years are from the set collected by the Asian Development Bank. We have added the figures for an earlier year from the material presented in Table 9.1 of Mazumdar and Sarkar (2008, p.204), which also gives the original sources for the countries concerned.

Table 3: Percentage Distribution of Manufacturing Employment by Size Groups for Several Countries

A. Equitable

Taiwan

Size Class	Employment Distribution (%)		
	1986	1996	2006
5-49	34.4	41.8	34.8
50-199	41.6	33.5	34.5
500 & above	24.1	24.7	30.7

Source: ADB

Korea

Size Class	Employment Distribution (%)	
	1988	1995
5-9	3.9	9.4
10-49	22.6	30.3
50-99	12.5	12.4
100-199	12.3	10.7
200-499	13.9	11.4
500 & above	34.9	25.8

Source: Korean Statistical Yearbook

Hong Kong

Size Class		Employment Distribution (%)	
	1982	1997	2007
1-9	12.2	22.2	24.0
10-49	27.4	30.2	27.7
50-99	15.6	12.7	10.8
100-199	14.5	10.3	9.5
200-499	13.8	10.6	13.2
500 & above	16.5	14.0	14.7

Source: Annual Digest of Statistics

B. Skewed to the Right

Malaysia

Size Class	Employment Distribution (%)		
	1981	1995	2005
5-49	24.8	11.91	12. 7
50-199	28.9	23.39	23.8
200-499	16.6	19.72	18.5
500 & above	29.7	44.99	45.1

Source: 1981 (Onn Feng Chen) and 1995 & 2005 (ADB)

Thailand

Size Class	Employment Distribution (%)	
	1989	1996
10-49	18.9	12.9
50-99	10.2	8.4
100-499	30.8	31.8
500 & above	40.1	46.9

Source: 1989 (Yearbook of Labour Statistics) and 1996 (ADB).

Vietnam

Size Group	Employment Distribution (%)	
	2000	2006
5-9	2.1	1.4
10-49	7.4	6.5
50 - 199	16.1	14.5
200-499	19.2	16.5
500 and over	55.1	61.1

Source: ADB

Equitable

In the 'equitable' group we have three countries namely Taiwan, Korea and Hong Kong. Korea and Hong Kong show similar pattern of changes. Both these countries depict increase in the share of employment in 5-49 size class of firms and substantial decline in the employment share of large enterprises employing 500 and more workers. In contrast, in Taiwan the large enterprises have increased their share in the manufacturing employment at the cost of small sized firms employing less than 50 workers. This different pattern cannot be ascribed entirely to deindustrialisation. Hong Kong does show strong deindustrialization in the sense that total manufacturing employment in recent decade has been reduced to half. Evidently most of this fall in employment has come from the downsizing or demise of large firms. But Korea which also shows a gravitation of employment to small firms have in fact held its ground or even increased somewhat the absolute number of employment in manufacturing. Taiwan which has had also only a small or negligible growth of manufacturing employment has had the opposite trend in increasing significantly the share of employment in the largest size group, mostly at the expense of middle sized enterprises. Interestingly, in Taiwan the relative labour productivity of large firms (employing >500 workers) has increased from three times to four times of that of lowest size class employing less than 30 workers. A plausible hypothesis which suggests itself is that the export expansion of manufactured goods based on the large scale strategy (exploiting economies of scale of production and marketing) which has characterised the economic development of mainland China in recent years has also spilled over into Taiwan. Hong Kong

has not shred in this trend because its specialization has shifted from manufacturing to services and perhaps also to different types of manufactured goods.

'Skewed to the Right'

In this category two clear trends are observed. Malaysia exhibits a stable size structure over the decade 1995-2005. Evidently the trend towards larger firms, which was exhibited between 1981 and 1995 and increased the share of large as well as medium-scale firms at the expense of the small, had come to a halt. At the end of our period Malaysia is left with a manufacturing sector which has strong mode in the largest size group. But unlike the other countries in the group has a significant share of middle sized firms. By contrast, both Thailand and Vietnam show a clear trend towards further domination of large size class of firms employing 500+ workers at the cost of small sized firms. Both these countries have substantially increased total manufacturing employment, and much of it has been in the largest size class of firms.

The explanation of further strengthening of the largest firms in manufacturing employment can be found in the changes in the pattern of international trade. This category of countries has performed better in the export of manufactured products. In last two decades there has been a large scale shift of manufacturing enterprises from developed countries to developing countries largely belonging to this category. This shift has been most pronounced in labour intensive manufacturing industries. These products are purchased in bulk by large retail chains of developed countries at low prices. The major products in this group are garments, leather products, electronic products etc. Production of garments and leather products and assembly of final electronic items are increasingly undertaken by large sized firms as they have the capacity to deliver large consignments of these products. This aspect is quite clear from our case studies of Bangladesh and India where we found that small and medium sized firms are unable to get large volume order from the major retail chains of developed countries.

IV
Size Structure of Manufacturing in Developed Countries

A contrasting picture

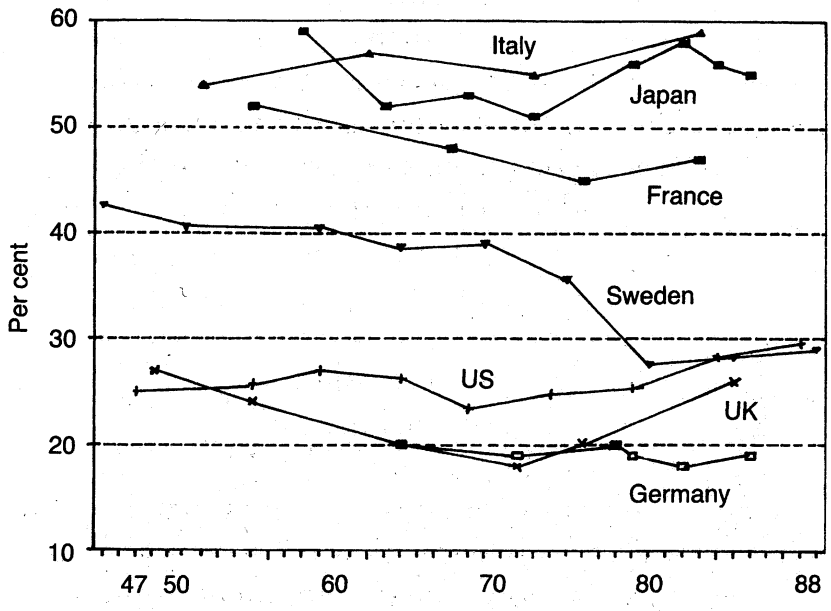
We have seen that the recent experience in the trend in size distribution in manufacturing in developing Asia has not particularly favoured the SME sector. In quite a few cases of the fast growing economies—notable China—the growth process has been driven by a relatively fast growth of larger enterprises in manufacturing. In the two cases in which the small enterprises have held their own – India and to a smaller extent Indonesia—the pattern of size distribution has shown a conspicuous feature of the 'missing middle" with its attendant problems. The classical East Asian pattern with the healthy development of the SMEs, which seem to have supported the striking period of growth with equity, in the later decades of the last century, does not seem to have been repeated.

The recent experience of developed countries has been quite different. There has been a remarkable tilt towards small enterprise development in the size structure of manufacturing in a large batch of developed economies (starting in the sixties, and persisting until at least the end of the eighties).

The Evidence

Figure1 is taken from Carlsson (1996) portrays the trend in the share of employment in small plants (<100 workers) in total manufacturing employment over the 1945-88 period.

Figure 2.1 Employment shares of small plants in manufacturing in various countries, 1945–1988



Small plants are defined as those with fewer than 100 employees. *Sources*: Loveman and Sengenberger (1991); US Bureau of the Census, *Census of Manufactures*, various issues; Statistics Sweden, *Industrial Statistics*, various issues (in Swedish).

Source: Carlsson Figure 2.1, p.65

The diagram shows that the developed countries after the Second World War had different levels of small enterprise (SE) presence. Japan and Italy were exceptional in having more than half their manufacturing employment in SEs with the UK, USA and Germany occupying the bottom of the leagued table at around 25 per cent of total employment, and France and Sweden in the middle. All these countries showed a similar pattern of development over the succeeding decades. After an initial spurt of larger enterprises, the share of SEs started to increase from the beginning of the seventies (the only exception being Sweden which lagged behind this trend for about a decade).

The common experience of these developed countries suggest that there were common factors at play explaining the decline and then the increase in the share of SEs in the industrial economies, with the turning point occurring in then seventies.

The Experience of the USA

We can look a bit more in detail at the case of the USA. There is considerable difference between the size distributions of employment with the alternatives of the *establishment or the firm* as units of observation. Many large firms include several smaller establishments each, and hence the distribution by establishments gives a larger preponderance of smaller units. The distributions according to both definitions are given in Table 4 for 1980.

Table 4: Distribution of Employment by size group of manufacturing in the USA, 1986

Category	1-9	10-19	20-49	50-99	100-499	500-999	1th-5th	5th - 10th	10 th & above
Firms	3.70	3.59	6.95	6.31	14.78	5.63	13.48	5.78	39.78
Establ.	4.57	4.63	10.35	11.46	32.02	11.55	16.92	4.57	3.04

Source: Acs and Audresch Table 4.3. The original source is US Small Business Administration 1988

It is seen that the largest firms with a number of establishments in each are to be found disproportionately in the 10,000 and above size group.

The size distribution in manufacturing is considerably different from that in other sectors. For example, because of the dominance of the tertiary sector in total employment in all American industry its share in small firms (for both firms and establishments) employing less than 100 workers is higher for all industry than in manufacturing (at 35.01 and 54.27 respectively).

Table 5 shows the growth rate of employment as accounted for by different size groups of *firms* over the 1976-86 period.

Table 5: Share of employment growth, percentage of total by firm size group 1976-96

Employment size Group	**Manufacturing**	**Service**	**Finance**	**All Industries**
1-19	64.85	20.76	21.24	26.23
20-99	41.46	15.93	16.15	17.43
100-499	4.00	17.06	14.35	13.57
500 +	-10.91	46.25	48.26	42.77
TOTAL	100.00	100.00	100.00	100.00

Source: Acs and Audressch Table 4.6. Original source as in Table 1.

The table shows the importance of downsizing of the corporate sector in this decade in US manufacturing. The contrast with the other sectors is impressive. The share of the

contribution of SEs in the growth of employment in manufacturing is strikingly brought out in this table.

Factors affecting trend towards SEs

There are broadly four groups of factors which have been discussed in the literature attempting to explain the remarkable tilt towards small units in the manufacturing sector of developed countries. These are:

(i) The change in the nature of world competitiveness;
(ii) Change in the structure of demand for manufactured goods;
(iii) Technological progress affecting the process of production
(iv) The changing nature of entrepreneurship.

While the first group is particularly relevant for the size structure in developed countries, the other three are relevant for understanding the trends in both developing and developed countries.

The Change in the nature of world competitiveness

The intensification of global competition in the post World War II years is manifested in the significant increase in the world trade in manufactures, as exports outstripped production for the domestic markets in most developed countries. A second element pushing firms towards a more competitive environment was the integration of national economies achieved through much larger volume of FDI flows and the growth of intra-firm trade within multinationals. These developments coincided with the breakdown of the Breton Woods system of fixed exchange rates. All this added to the uncertainty facing individual firms which were forced to adopt defensive measures to specialize in increasingly narrow markets and reduce the coverage of a wide spectrum of products at the same item.

One result of this response to uncertainty and competitiveness was the downsizing of corporations and the need to develop the strategy of `flexible specialization`. Firms on the one hand needed to narrow their product specialization to specific areas in which they could achieve niche markets, and at the same time to prepare to switch to other product lines in response to developing pressures in the market.

The change in the structure of demand for manufactured goods

Rising income in the developed countries led to much greater variety in the demand for consumer goods, forcing firms to develop more intense product differentiation. Carlssson writing in the nineties remarks that a glance at supermarkets in the USA showed that these stores stocked roughly twice as many items on the shelf as they did 15 years ago. The implication for the size of firms is this: it is cheaper for a producer to build a new, more flexible line to accommodate the shifting demand than to change existing lines. It is then more advantageous for businesses to aim for smaller production units which would involve much smaller fixed costs than specialized machinery which would be profitable only with large and steady volumes of production over a long period.

This development in markets for manufactured goods in developed countries was accompanied by developments of specialization in international trade patterns. Firms in developed countries found it more profitable to farm out production of more standard consumer products to producers in developing countries with lower labor costs. Similar forces induced the shift of production to the latter of more standard intermediate goods which could be widely used a by producers of a variety of final goods in developed countries. This process of spatial redistribution of manufacturing was of course aide by a trading system which saw an enormous increase in FDIs and expansion of multinationals in the newly industrial countries. This new form of division of labor is surely one of the major differences in the evolution of firm size in the two types of economies. The rapidly industrializing countries in Asia, notably China, have found it more profitable to exploit the economies of production and marketing in large units specializing in standard products with large world demand. The developed countries gravitate to smaller producing units which can provide more easily differentiated final goods through their flexible specialization.

Technological progress affecting the process of production

Carlsson (1984, 1993) has written extensively on the shift in production technology from one which favoured large scale production for the mass market, which dominated modern manufacturing ever since the industrial revolution, to a system based on the discovery of micro-chips involving numerical control and favouring small and medium production units. This major

shift in basic technology affected particularly the metalworking industries—which account for half or more of total manufacturing in industrial economies—but the change is not limited to this sub-sector.

The two major prongs in the older technology were the 'interchangeability of parts' and the 'moving assembly line'. They required vastly improved speed and accuracy in the production of machine tools which supported high volume production. It was subsequently helped along the same path by the introduction of 'transfer machines' (which made it possible to transfer a workpiece automatically from one work station to the next' and the eventual 'Detroit automation' which permitted linking several work stations into a continuous production line. The technology which got a major fillip during the Second World War was extended to a variety of sectors of mass production and became the standard for high volume production in most of the industrial world.

The development in recent decades of 'numerically controlled' production methods involving a shift from mechanical to electronic control devices has by contrast favoured small and medium scale units involved in 'batch production'. "When the Japanese introduced microcomputer based numerical controllers in the mid-1970s two important things happened. First, the programmability and therefore the flexibility of NCMTs [Numerically controlled machine tools] increased dramatically. Second, cheaper and more flexible numerical controllers in combination with other changes led to mass production of NCMTs, resulting in drastically reduced prices" (Carlsson 1996, p.90). For the first time automated technology came both within the technological and financial spectrum of small producers. Taken in conjunction with the evolution of markets for finished goods to more differentiated products (discussed above) this change in technological possibilities gave a major push to the growth of small-medium establishments in the economies of industrial economies.

The changing nature of entrepreneurship

The possibility of technological breakthrough is not the complete story of successful evolution. It needs for success the availability of a growing pool of entrepreneurs who can respond to the possibilities opening up in a substantial way. This is indeed what seemed to have happened in developed economies in the last quarter of the 20th century.

The story of the dynamics of firms by employment size can be illustrated from the research which has been done for the United States. The data on firm dynamics by size groups during the period 1990-95 is presented in table 6. The first point to note is the enormous number of entrants in the small-scale sector. While the birth rate of SEs is three times of that of large corporations, it is not surprising that the death rate of SEs is also much higher—but it is higher by a significantly smaller percentage: a little more than twice as much. At the same time the rate of *expansion* of SEs exceeds its rate of *contraction,* while for the large corporations the relationship is the other way round. Thus the high birth and death rates of SEs combined with lower death and contraction rates resulted in this period in a net increase in employment in SEs while the experience of this period is net contraction of large firms employing 500+ workers.

Table 6: Change in employment by employment change type and firm size US Mfg. 1990-95

Firm Size	1990 establishment Employment	Births	Deaths	Expansion	Contraction	NET
	Millions	As percentage of 1990 employment in size category				
<20	1.35	30.4	-28.7	31.3	-11.7	21.3
20-499	5.86	14.3	-19.4	18.7	-13.1	0.6
500+	11.96	10.0	-12.8	10.9	-16.6	-8.5
TOTAL	19.17	12.8	-15.9	14.7	-15.2	-3.6

Source: Audretsch (2002) Table 5, p.22. Original source is the US Small Business Administration.

While the percentage of employment in SEs with less than 20 workers was still small in 1990 it was increasing at great speed in the next five-year period when the employment in 500+ firms was contracting significantly, as it did in the manufacturing sector as a whole. Most of this increase was contributed by expansion of existing SEs, but the vitality of entrepreneurship is seen in the high rate of new entrants in this size group in spite of the fact that the death rate was also high.

Why do so many firms enter the small scale sector when it is known that the peobability of demise is high? Can we learn anything from a study of the industry groups in which entry of SEs is high?

Audretsch (2002) develops the hypothesis that small firms in today's industrial economy are the carrier of innovations in the form of new product lines and new markets.
The following are the major pieces of evidence;

1. The average small firm innovation rate (controlling for employment) was 0.309 as against 0.202 for large firms.

2. The relative innovative advantage of small firms vis-a vis large ones varies considerably from industry to industry. In fact the innovation rate also varies enormously among industries. But in the industry group with the most innovations in the period studied—electronics computing industry—fully two-thirds of the nearly 400 innovations were in small firms. Another important industry group from the point of view of the number of innovations in the period was Process Control Instruments (165 innovations). The small firms undertaking such innovations exceeded the number of large firms by a third. On the other hand, in industries such as pharmaceutical products and aircraft, large firms generated most of the innovations. But the total number of innovations in such industries was much smaller (see Audretsch op cit., Table VIII, p. 25).

3. The author found it useful to distinguish BETWEEN THE TWO GROUPS OF INDUSTRY: (i) industries best characterized by the model of the conical revolving door where new small businesses enter but exit within a shorter time than large ones (we can call this group the 'routinized regime' of technology) and (ii) the industries best characterized by the metaphor of the forest where the new entrants have a reasonably high probability of displacing existing large firms as they grow. They constitute the 'entrepreneurial regime'. The distinction between the two groups turns on three major factors: the underlying technology; economies of scale and demand for the product.

Ausdretsch and his co-researchers found that entry by firms into an industry is not deterred at all in capital-intensive industries in which scale economies can be expected to play a significant role. Rather, new firm start-ups tend to be substantially more prevalent in industries characterized by the 'entrepreneurial regime' in which the bulk of the innovations are by small firms. This finding suggests a model of entry and survival of small firms which is rather different from the classical model of new firm entry, which stresses that the motivation is the prevalence of 'excessive rents' in the existing industry. Rather, differences of beliefs about the expected values of new ideas play the dominant role. Small firms entering the industries with the 'entrepreneurial regime' have greater likelihood of making a successful innovation, and thus would not exit even in the face of short-term negative profits. The expected gains from a successful innovation and a new regime of profitability are what motivates their survival and possible growth.

The question arises; how is this hypothesis to be reconciled with the older Schumpeterian model which held innovations to be the dynamic factor propelling industrial growth, but implied that only large firms can bear the cost of innovations and have therefore have the advantage in the size structure of industry – rather like Audritsch's conical revolving door. A particular avenue of research has explored the sources of 'new knowledge' about technology and production processes and has pointed to a distinctively larger role of university and research institutions rather the firm's internal R &D investments in generating knowledge at the frontier. Such a shift in industrial economies like that of the USA has been instrumental in making the innovative ideas available more easily to small and new firms.

The conclusion from the set of studies briefly reviewed here is this: The importance of the small firm in the evolution of modern industry depended heavily on the existence of a pool of emerging entrepreneurs who were ready to exploit the opportunities provided by the emergence of new technologies and demand conditions reviewed earlier. This and the institutional support given to the production of new knowledge have been instrumental in the small firm biased development in the USA and some other advanced economies. Equally the absence of these conditions has led to large firm development in the transitional economies and in Sweden (an exceptional case in developed Western countries). In their lack of small entrepreneurs the experience of China and Viet Nam can best be considered to be an extension of the case of transitional economies of Eastern Europe. However, different economic conditions, particularly with respect to the export market, ensured that the former Asian planned economies had a much more rapid growth experience. The difficulties faced by small industries in India have already been analyzed at length. It remains to be seen if the deficiency in the supply of small entrepreneurs would be hindrance in other Asian economies and in India, if and when the particular constraints generating the 'missing middle' have been relaxed.

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