97

PN-AAW-047

ISN-47507

P36529

WHAT DRIVES THE SIZE DISTRIBUTION OF FIRMS IN DEVELOPING COUNTRIES ?

Tyler Biggs
Jeremy Oppenheim

E.E.P.A. Discussion Paper No. 6
November, 1986

Prepared for
Employment and Small Enterprise Division
Office of Rural and Institutional Development
Bureau of Science and Technology
U.S. Agency for International Development
Washington, D.C. 20523
Grant No. DAN-5426-C-00-4098-0

The Employment and Enterprise Policy Analysis Project is composed of a consortium of the Harvard Institute for International Development (Prime Contractor), Development Alternatives, Inc., and Michigan State University (Subcontractors). E.E.P.A. provides technical assistance to USAID missions around the world on problems related to employment and small- and medium-scale enterprise development, and performs research on these issues for AID's Bureau of Science and Technology in Washington. For further information on E.E.P.A. contact:

Robert C. Young
Senior Employment Policy Advisor
Agency for International Development
S&T/RD/EED
Room 622, SA 18
Washington, D.C. 20523

Donald R. Snodgrass
EEPA Project Coordinator
Harvard Institute for
International Development
One Eliot St.
Cambridge, MA 02138

The views and interpretations in this publication are those of the author and should not be attributed to the Agency for International Development or to any individual acting on its behalf.

ABSTRACT

A major cross-country research interest of the EEPA project is the delineation of channels through which economic policies that generate growth affect the competitive bases of small and medium enterprises. This paper is a report of work-in-progress on this complex subject.

Using industrial census data from 85 developing countries, we present statistical evidence on the relationship between the distribution of manufacturing activity across different sized firms and shifts in sectoral composition of output and intra-industry structural change. This is an important first step in tracing the influence of economic policy on the role played by smaller firms in the economy. For the key impact of government policy, we show, comes through its influence on the optimal sectoral output mix (trade policy) or on the first best intra-industry structure of production (credit policy).

The paper finds that in most industries, the composition of output is more important for the prevailing size distribution of enterprise than intra-industry structural changes. Thus, if small firms are under-represented in a particular country, when compared to the average size distribution of other countries at the same stage of development, then a large part of the reason is that the economy-wide composition of output is biased toward those industries where large firms tend to dominate. Hence, economic policies which shape the composition of industrial production, such as policies to promote import substitution, can have profound implications for the size distribution of enterprise in a developing country. The paper also finds that in industry sectors where economies of scale do not foster large firm dominance, policy non-neutralities, as between enterprise size categories, can significantly influence intra-industry firm size distribution.

CONTENTS

1. Introduction

2.1 The Changing Organization of Manufacturing Activity During Economic Development

2.2 The Decline of Cottage-Shop Industry

2.3 Structural Change and Small and Medium Industry

2.4 The Emergence and Predominance of Large-Scale Enterprises

2.5 How the Aggregate Size Distribution of Firms Changes

3. Compositional Effects on the Size Distribution of Firms

4. Structural Transformation and the Size Distribution of Firms

4.1 Reasons for Difference in Labor Productivity

5. The Relative Importance of Composition and Structure

Bibliography

1. Introduction.

The distribution of manufacturing activity across firms of different size is the outcome of an extremely complex economic process. The forces which shape this distribution are the fundamental determinants of the role played by small and medium sized firms.

The main outlines of the story can be told in terms of demand, supply and their interaction with government policy. On the demand side, increases in per capita income result in a shift away from basic commodities toward products which require a more sophisticated organization of supply and division of labor. Changes in the pattern of domestic demand affect the size distribution of firms principally through their influence on the sectoral composition of output. If demand shifts towards those goods which are most efficiently produced by larger firms, then this will be reflected in the aggregate size structure of manufacturing activity.

As the consumption bundle of an economy changes over time, there will be a simultaneous reallocation of productive resources. In addition to the impact of changes in the composition of output, structural transformation of production within each industry tends to reduce the importance of the smaller firms. Structural reorganization on the supply side combines with demand-induced shifts in the appropriate composition of output to increase the share of large firm production in manufacturing GNP.

The third main influence on the aggregate size distribution of firms is policy. Government intervention can have profound implications both for the structure and composition of manufacturing activity. For example, policies which distort trade patterns may result in a "premature" shift of resources into sectors which require more complex capital-intensive production arrangements. Policies which discriminate against small and medium firms in the allocation of credit and foreign exchange will distort the structure of production in every industry. As the examples illustrate, policies affect the aggregate size distribution of firms by distorting either the optimal composition of output (trade policy) or the first best structure of production (credit policy).

The aim of this paper is to analyze these ideas in a more empirically rigorous fashion. Section 2 presents evidence on the relationship between changes in the aggregate size distribution of firms and increases in per capita income. We have already noted that changes in the size distribution are the product of shifts in the mix of output and intra-industry structural upheaval. Accordingly, Section 3 examines the way in which shifts in the composition of output affect the size distribution

of firms, while Section 4 considers the consequences of structural transformation. Finally, Section 5 presents new empirical work on the relative importance of structural and compositional influences, on both the aggregate and industry level.

An understanding of how the size distribution of firms changes over time is an absolutely critical ingredient in good policy making. Without a clear understanding of the economy-wide forces shaping the competitive bases for small enterprise, program interventions to assist this segment of industry can be in direct contradiction to prevailing economic conditions. The result may be a costly misallocation of resources and perhaps an unfair evaluation of program aid to small industry as unwarranted or impotent.

2.1 The Changing Organization of Manufacturing Activity During Economic Development.

In the process of economic development, aggregate industrial structure appears to pass through three stages:

-- A phase in which cottage-shop manufacturing is predominant (50 to 75 percent of total manufacturing employment);

-- A phase in which small and medium workshops and factories emerge at a comparatively rapid rate and act to displace cottage-shop manufacturing in many sectors;

-- A phase in which large-scale production becomes predominant, displacing the remaining cottage-shop activities and large share -- though not the whole-- of workshop and small factory production. The growth of large scale manufacturing can be attributed to:

(a) the growth of once small firms through the size structure, and

(b) the expansion of already large domestic and foreign concerns.

Empirical evidence indicates, however, that none of these phases are distinct. In fact, there is considerable overlap between the three, and the rate of change of the phases can be different between industrial sectors and among different regions of a country. But, if we study a cross-section of countries at different levels of development (levels of per capita income, that is), a general pattern emerges which seems to support the three phases just described. Similar results are derived from historical country studies.

Table 1.
Summary of Cross-Section of Size Distributions of Employment Shares by Plant Size: 29 Countries

1	2	3	4	5	6	7	8	9
			Empl. Shares by Plant Size					
Group by Income/ Capita	GNP Cap (Aver)	No. Coun-tries	Cottage-Shop No. of Workers 1-4	Small+ Medium No. of Workers 5-99	Large No. of Workers 100-more	% Mfg GDP	% urban total	Aver. Pop. (mill)
$100-500	302	6	64.0	10.5	25.5	13.7	21.0	141.9
501-1000	744	7	40.8	21.7	37.2	17.3[c]	44.9	24.9
1001-2000	1331	7	11.2	27.7[a]	61.1[a]	25.8	55.8	38.3
2,001+above	6069	9	10.5 b	28.5[b]	64.1	25.7	73.1	60.4

Table 1b

1	2	3	4-5	6	7	8	9
$100-1000	540	13	68.5	31.5	15.5	33.9	78.9
1001+above	3996	16	39.0	61.0	25.7	65.5	50.7

a. excludes Mexico

b. excludes U.K.

c. excludes Guatemala

Source: See Table 1.2

Table 1.2
Cross-Section of Size Distributions of Employment Shares by Plant Size for Thirty Countries

1	2	3	4	5	6	7	8	9
			Cottage-Shop Industry	Small + Medium Industry	Large Industry			
			no. of workers					
Country	GNP cap 1977	Yr	1-4	5-99	100-more	% Mfg GDP	% urban	Pop. size (mill)
1. India	160	73	60.0	18.0	22.0	16.4	20.7	631.7
2. Tanzania	210	67	55.0	8.0	37.0	9.6	9.2	16.4
3. Kenya	290	69	49.0	10.0	41.0	12.7	11.8	14.6
4. Indonesia	320	75	76.0	12.0	12.0	9.5	18.4	133.5
5. Ghana	370	70	78.0	7.0	15.0	9.4	32.0	10.6
6. Philippines	460	75	66.0	8.0	26.0	24.6	34.0	44.5
7. Nigeria	510	72	59.0	15.0	26.0	8.8	18.1	79.0
8. El Salvador	590	71	39.1	28.4	32.5	14.6	39.9	4.3
9. Peru	720	73	15.0	23.0	62.0	19.2	62.8	16.4
10. Colombia	760	78	42.5	25.6	27.6	20.1	65.5	24.6
11. Ecuador	820	65	48.6	21.5	29.9	16.7	41.9	7.3
12. Guatemala	830	64	45.6	18.7	35.7	—	37.3	6.4
13. Korea	980	75	36.0	17.0	47.0	24.2	49.0	36.0
14. Turkey	1110	73	33.2	14.4	52.3	17.0	42.9	41.9
15. Mexico	1160	75	11.2	26.4	62.4	27.7	63.2	63.3
16. Taiwan	1180	71	3.0	33.0	64.0	30.3	50.8	16.8
17. Panama	1200	71	(4.4)	36.3	59.3	15.9	51.4	1.8
18. Costa Rica	1390	75	(6.4)	27.3	66.3	19.5	41.3	2.0
19. Brazil	1410	75	(5.6)	28.8	65.6	28.0	60.7	11.6
20. Argentina	1870	74	14.9	26.3	58.8	36.5	80.5	26.0
21. Hong Kong	2620	73	11.7	33.6	54.7	25.0	89.9	4.6
22. Greece	2950	73	27.6	30.2	42.2	19.1	57.4	9.2
23. Italy	3530	73	13.5	27.4	59.0	33.3	66.9	56.1
24. UK	4540	73	6.1	5.2	88.7	24.9	89.8	55.9
25. Japan	6510	75	19.1	36.6	44.3	29.6	75.1	113.2
26. Canada	8350	59	2.5	31.9	65.6	18.4	78.0	23.3
27. Norway	8750	73	3.8	28.2	68.1	19.5	47.4	4.0
28. Germany	8620	67	4.8	17.7	77.6	37.5	83.1	61.4
29. USA	8750	73	1.1	22.3	76.6	24.2	70.4	216.7
30. Kuwait	12690	77	20.8	—	(79.2)	5.5	84.0	1.1

Source: Various Industrial Censuses

Table 1.3
Time Series of Size Distribution for 13 Countries

1	2	3		4	5	6	7
					% Employment by Plant Size		
			%	%	Cottage	S + M	Large
					no. of workers		
Country	Yr	GNP cap	A/GDP	M/GDP	1-4	5-99	100-more
1. El Salvador	1961	430	32	16	48.6	21.5	29.9
	1971	526	28	21	39.1	28.4	32.5
2. Peru	1963	573	17	33	18.2	46.3	41.5
	1973	705	14	34	14.8	22.8	62.4
3. Colombia	44/45	—	—	—	66.5	13.7	19.8
	1953	502	—	—	59.2	18.9	20.3
	1964	547	29	25	51.4	23.7	24.9
	1970	646	26	22	53.6	24.7	21.7
	1973	722	27	24	50.4	28.3	21.5
	1978	760	27	24	42.5	24.0	28.7
4. Korea	1958	332	37	17	—	—	—
	1963	356	43	17	17	40	33
	1975	810	24	29	15	42	43
	1977	980	21	30	4	22	74
5. Mexico	1960	540	16	25	18.7	26.9	54.4
	1970	900	11	29	12.6	29.6	57.8
	1975	1000	10	29	11.2	26.4	62.4
6. Taiwan	1954	519	—	—	18	36	47
	1961	603	27	19	18	32	51
	1971	1180	17	23	8	27	66
7. Panama	1961	732	23	15	19.4	39.1	41.5
	1971	1225	19	18	4.4	36.3	59.3
8. Costa Rica	1963	849	24	16	31.9	40.2	27.9
	1975	1287	20	22	6.4	27.3	66.3
9. Brazil	1959	—	18	19	8.6	26.0	65.4
	1970	901	8	24	7.0	27.3	65.7
	1975	1306	9	28	5.6	28.8	65.6
10. Argentina	1964	1454	15	31	19.9	29.8	50.4
	1974	1945	12	32	14.9	26.3	58.8
11. Japan	1955	1496	13	37	20.0	40.2	39.8
	1965	3255	11	38	16.1	37.1	46.8
	1975	6182	5	31	19.1	36.6	44.3
12. Canada	1950	—	—	—	2.9	31.2	65.9
	1955	—	—	—	2.8	30.5	66.7
	1959	5010	6	29	2.5	31.9	65.6
13. USA	1947	—	4	34	1.1	23.9	75.0
	1967	7450	3	30	1.1	22.3	76.6

Table 1. notes the predominance of the cottage-shop sector in low income countries, as indicated by the high share of employment in this size class of establishments (row 1, col. 1). Among the higher income countries (rows 2-4, the share of employment in cottage shop falls from two-thirds to a tenth of the manufacturing labor force (col. 4). By contrast, the share employed in small and medium size enterprises (5-99 workers) rises consistently from 11% to nearly 30%, and the share engaged in large enterprises (100 or more workers) rises from a quarter in the poorest countries to nearly three quarters for the richest. If we group all plants of less than a hundred workers together, and also group the countries into two income groups of less and more than $1000/capita, we observe a simple reversal of importance across the country-span: in the poorer group, two-thirds of the workers are occupied in the small units, and one-third in the large ones. In the wealthier countries, one-third are occupied in the small units and two-thirds in the large ones (see Table 1.b).

Time-series data for thirteen countries in Table 1.3 support these cross-section results. In each case, cottage shop industry declines in importance as per capita income rises and the share of large industry expands. The one outlier, which has been discussed in many small industry studies, is Japan. At levels of per capita income equaling Canada and the USA, cottage-shop industry in Japan continues to employ about 20 percent of the labor force. Notwithstanding its current situation, however, Japan, like other countries, began with about 75 percent of the labor force in the cottage-shop industry in the early 1900s and, by the 1960s, the share of employment in this category had declined to 16 percent. Most interesting is the fact that this percentage has increased in the last twenty years back to about 20 percent.

To explain some of the determinants of these trends and changes let us examine these phases in more detail.

2.2 The Decline of Cottage-Shop Industry (See Figures 1.1a, 1.1b).

The gradual decline, over long periods, of cottage-shop industry is a familiar story in the literature on industrialization in developing countries. The dual economy models of Arthur Lewis and Ranis and Fei and others specified that "modern" sector expansion draws its labor force from the "traditional" segments of society which remains relatively poor by comparison. Further, capital accumulates in the "modern" sector, infrastructure is built, institutions are transformed and new products supplant the old ones. Accordingly, the traditional sector is fully absorbed into the modern. Staley and Morse follow the same line but more specifically outline "the pressures which reshape cottage-shop activities in the gradual development

Figure 1.1-a

Cross Section: Employment Shares in Cottage Industries by Country & Income Level

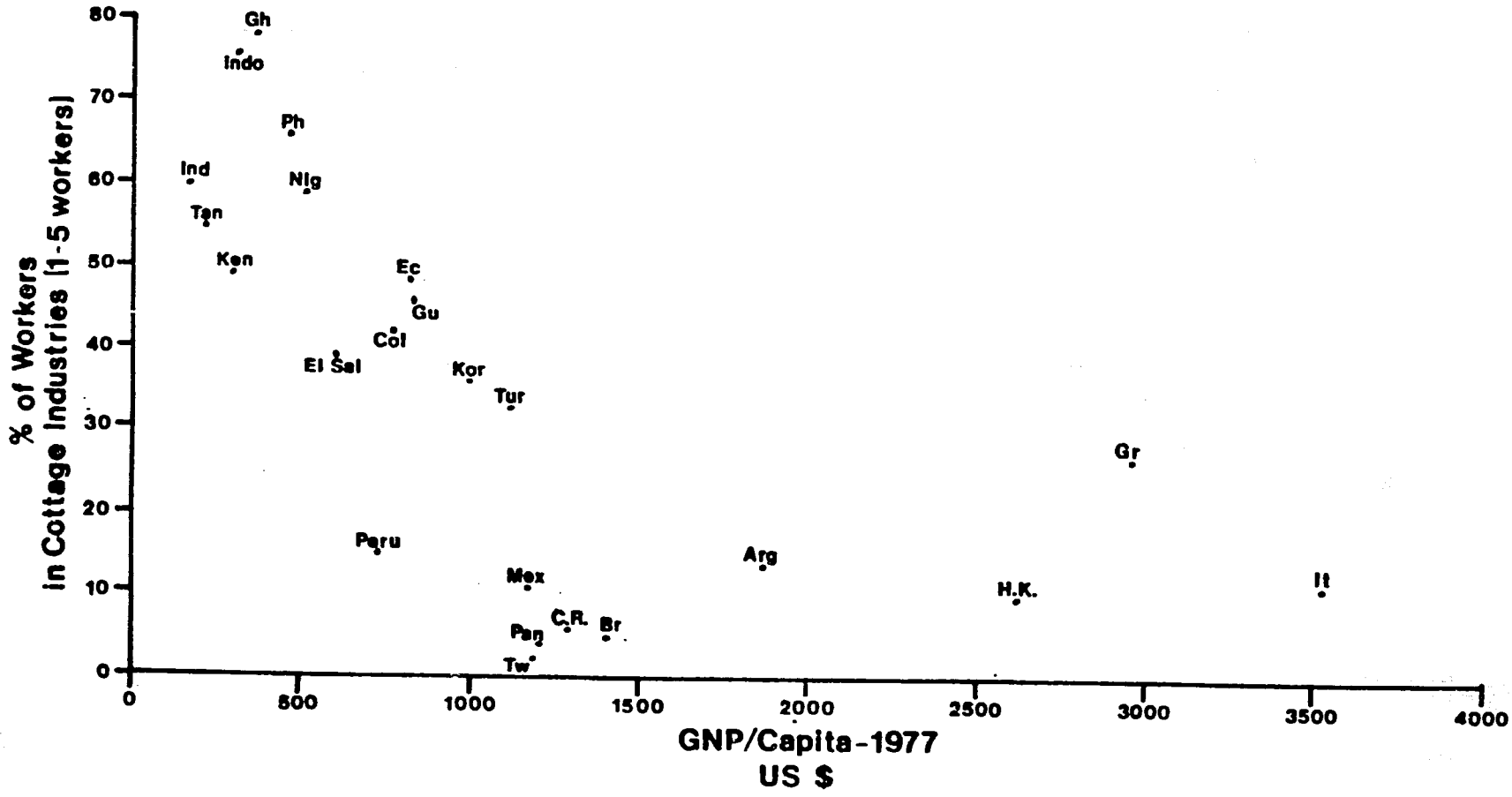
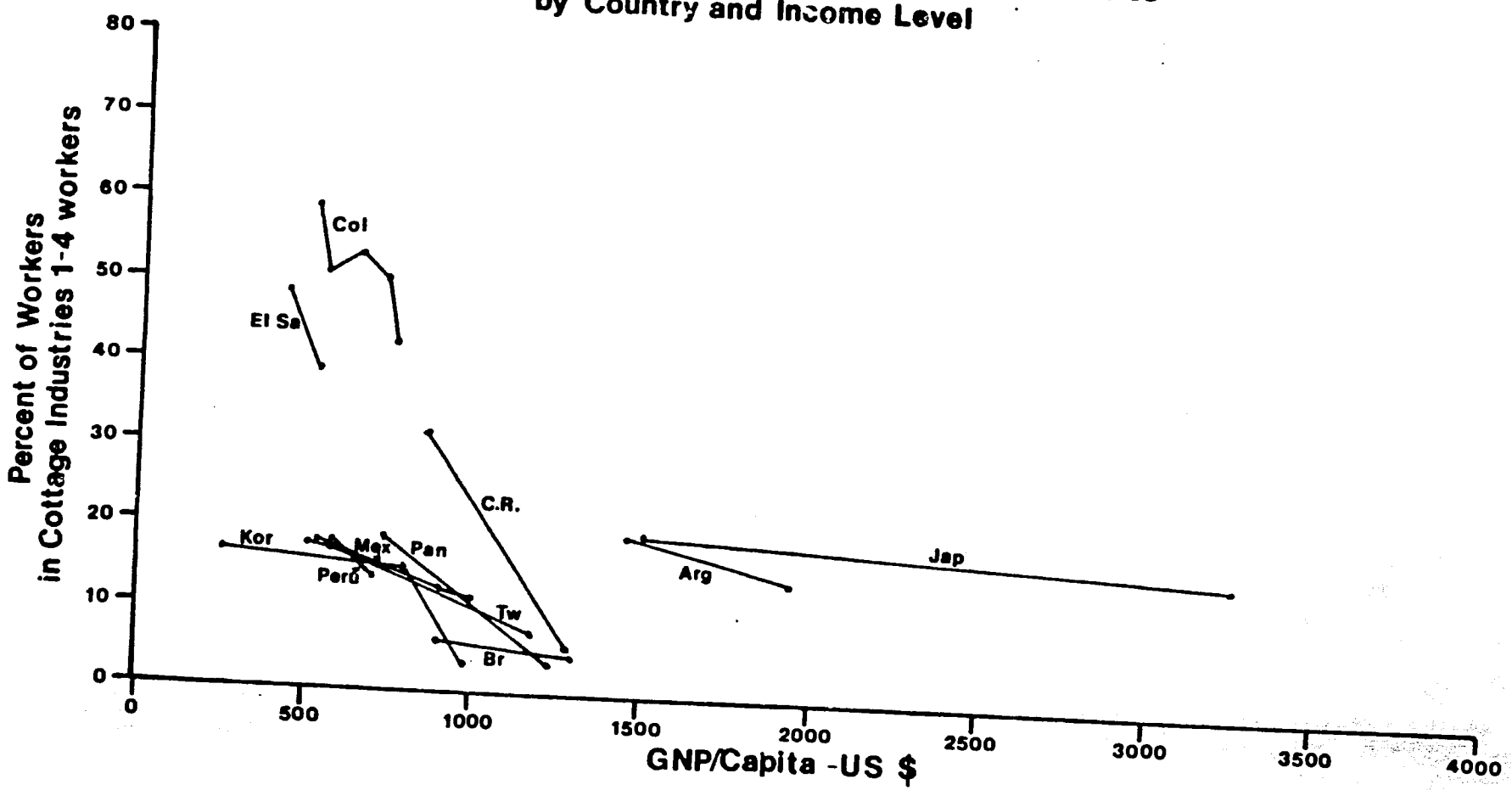


Figure 1.1 b

Time Series: Employment Shares in Cottage Industries by Country and Income Level



of modern economies." These pressures, in their view, have been both negative (loss of traditional markets to new types of competition) and positive (new opportunities). Three types of forces have been particularly important:

1. The impact of the factory has been both to displace traditional artisan workshops, because of its superior productivity in most cases, and to increase employment for cottage-shop activity that complements rather than competes with factory products. The former, however, dominates. Higher pay and better working conditions in factories also has had a pull effect on artisan labor.

2. The emergence of new products (often imports) and new technologies have made some traditional products and crafts obsolete.

3. Changes in social structure and rising income levels reduce markets for many traditional products.

In addition to these dual economy explanations, government policy regimes have been cited as determinants of the speed and direction of change in cottage-shop industry. Birnberg and Resnick and other authors have shown how policies perpetrated by colonial administration to facilitate the extraction of primary exports and to encourage penetration of mother-country imports into the colony often caused the demise of indigenous crafts. In several British colonies, for example, the movement of locally-made cloth was taxed to raise its price above the landed price of factory-made English cloth. Social overhead investment was also used to aid colonial interests and often hastened the decline of traditional industry. But colonial practices have not been the only influences. The domestic economic policies of many developing countries, based upon the premise that all cottage-shop industry is "tradition bound and economically backward," were biased toward modern small and medium and large-scale industry. Investment incentives, government-directed infrastructure development, and price policies have been formulated to hasten the shift to modern sector activity.

Although the decline of most cottage-shop industry is inevitable during the course of development, domestic policies to hasten its decline overlook two important factors. First, cottage-shop industry is an important source of income and employment over a long period at low income levels. To indiscriminately cause its demise can create an enormous labor adjustment problem. Second, a wide range of activities are present in the cottage-shop sector; not all are backward and tradition bound. Evidence indicates that some activities are capable of elementary modernization with the introduction of new technologies and infrastructure development. Furthermore, the rates of transition from cottage-shop to factory-based

12

manufacturing differ greatly between sectors, and in some activities cottage-shop employment may be rising in both relative and absolute terms when industrialization is proceeding rapidly. On the other hand, it is also fruitless to institute program interventions to protect cottage-shop industry on the grounds that livelihoods are being destroyed and traditional ways are being endangered. A great deal of change is inevitable in any growing economy. The central problem that should be addressed is how to facilitate or minimize the costs of adjustment during the process of transition.

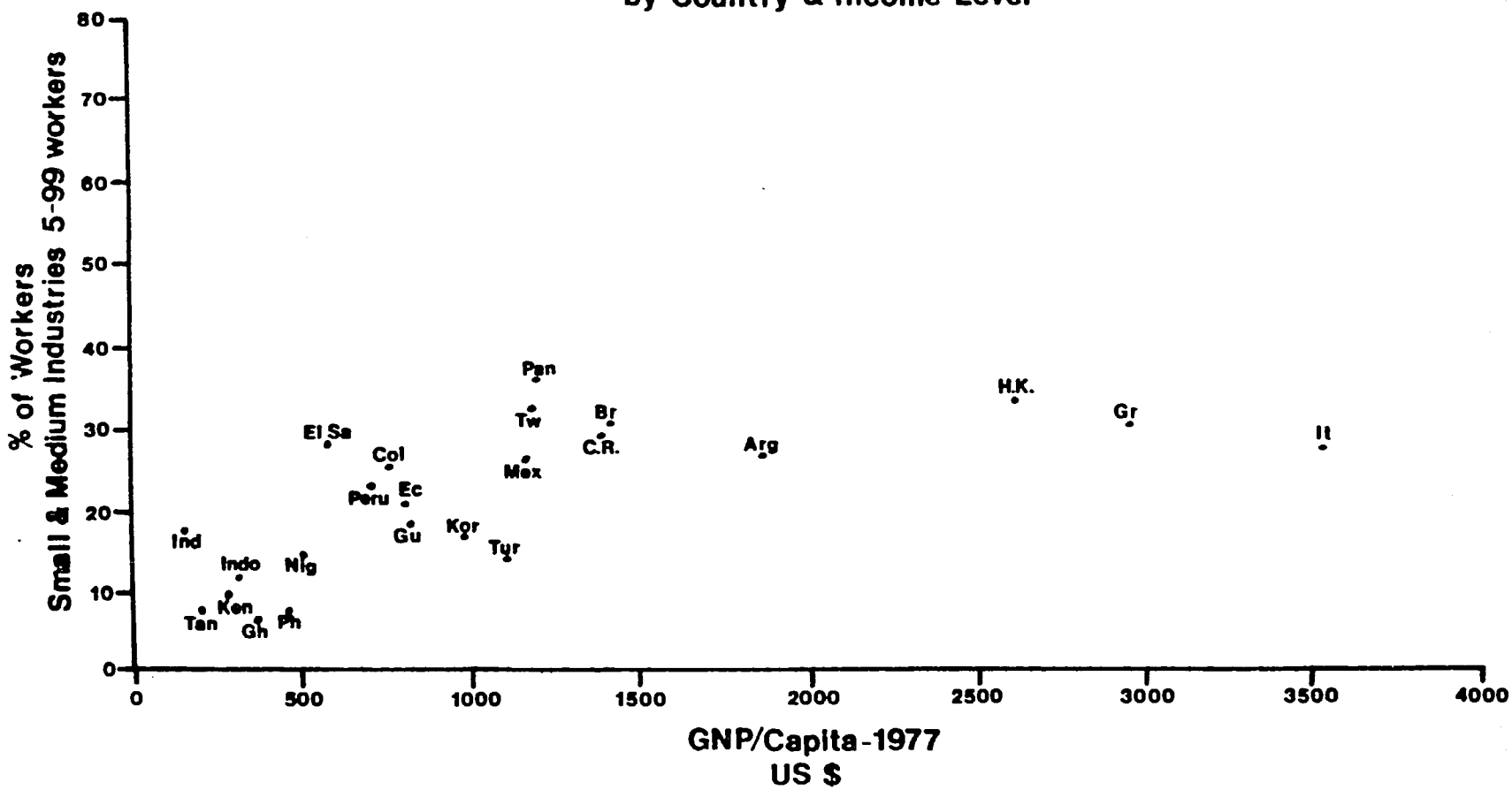
2.3 Structural Change and Small and Medium Industry (see Figures 1.2a and 1.2b).

What explains the comparatively rapid growth of small and medium establishments - over long periods - before their share in total industrial activity begins to give way to larger firms? Staley and Morse, Anderson and others cite three influences: advantage of location, organizational relationships, and market and demand-mix influences. Taking locational advantage first. When the majority of the labor force is still in rural areas and agriculture and rural incomes begin to rise, newly created markets are often highly dispersed. High transport costs lead to a fragmented pattern of production in small scale units. Small industry in this case is protected by high transportation costs, restricted institutional market access, and the need for dispersed raw material processing. The organization of production, on the other hand, stimulates the emergence of small industry through the growth of separable manufacturing operation which allow subcontracting or local assembly. Linkages between small and large enterprises develop when larger firms try to improve capacity utilization for those parts of the production process where work is irregular or where the job cannot be standardized. In addition, larger enterprises often try to diversify the risk and reduce labor costs by subcontracting to smaller firms. Finally, market and demand-mix effects on the extent and growth of small industry generally result from small market size and differentiated products, requiring low scale economies in production.

Although each of these influences on small and medium enterprise potential has been discussed in the literature, no systematic study in quantitative terms has been undertaken to ascertain the magnitude of each influence in explaining the rate of emergence and growth at particular points in the industrialization process. Such research is expected to be an important part of the EEPA project. One conclusion which can be drawn from most of the past analysis, however, is that the rate of emergence, growth, and changing composition of small and medium-scale enterprises are in a continual state of change. The various advantages described may hold over long periods, and may be important, for example, in establishing a regional industrial

Figure 1.2a

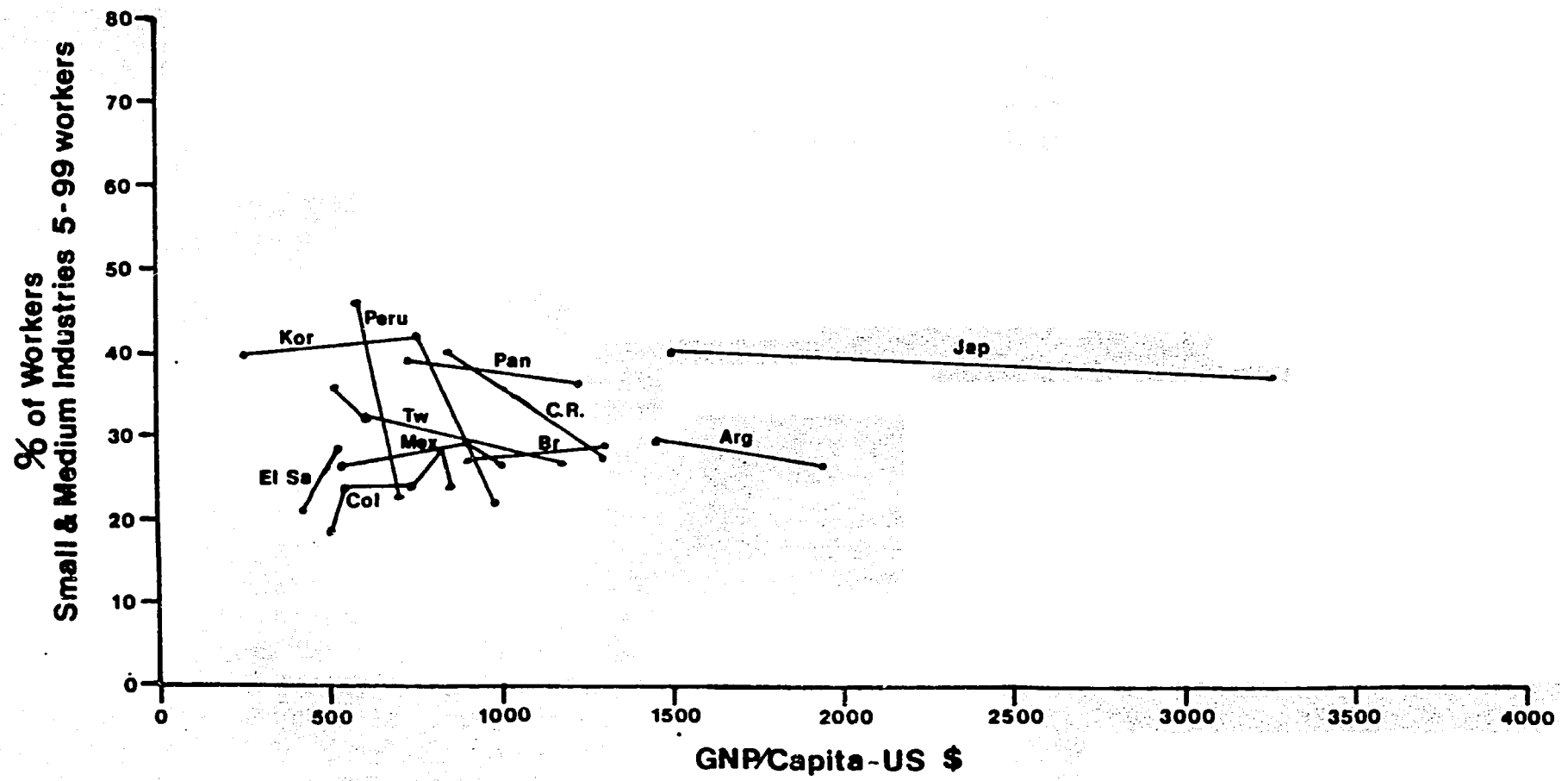
Cross Section: Employment Shares in Small & Medium Establishments by Country & Income Level



14

Figure 1.2 b

Time Series: Employment in Small and Medium Industries by Country and Income Level



base, drawing on markets generated by agricultural growth. But these advantages do not hold indefinitely. As growth and the transformation of productive structure occur and further growth is increasingly subject to competition from and linkages with large-scale enterprises, the competitive bases for small industry changes in many industries.

2.4 The Emergence and Predominance of Large-Scale Enterprises.

An increase in large firms' share of manufactured output seems to be an almost inevitable aspect of industrial development. Four main factors seem to be behind this trend: economies of size, policy, industrial linkages and human capital.

First, economies of size go well beyond a technologically determined "economies of scale" explanation. In almost every industry, enterprise size is directly related to market power - in both the factor and output markets. In particular, asset base is often closely linked to access to external investment finance. Irrespective of the record, small firms are generally regarded as worse risks by the banking sector - not least because of the administrative costs of supervising small firm loans. Size may also affect the ease of technology transfer and facilitates access to the political institutions.

Policy is, of course, a critical determinant of the relative success of different size classes of firms - and not only because state owned enterprises fall predominantly into the large firm category. Aside from direct political nepotism, trade policies carried out in the name of industrial development have an inherent large firm bias. The essence of the "infant industry" argument is that there are static and dynamic economies of scale which can be realized only with the help of restrictive trade practices. While the theory refers to "industry-wide" economies of scale, in practice, protection disproportionately benefits industries where economies of scale internal to the firm are important. In addition, credit, exchange and government procurement policies all have a tendency to favor the larger "better connected" enterprises. Research into the size biases of government policy must play a key role in the EEPA agenda.

Third, the increasing complexity of industrial production in the economy as a whole can work against smaller enterprises. The growing density of inter-industry transactions increases the importance of specialized production at each stage of the manufacturing process. While stochastic fluctuations in demand and legally inspired market imperfections have, in may countries - especially Japan, encouraged contractual relationships between large and small modern firms, many of the inter-industry transactions still take place between large firms. In most countries, large firms have a preponderant share of the market for those intermediate inputs at the heart of the input-output

Figure 2.4a

Cross Section: Employment Shares in Large Establishments by Country and Income Level

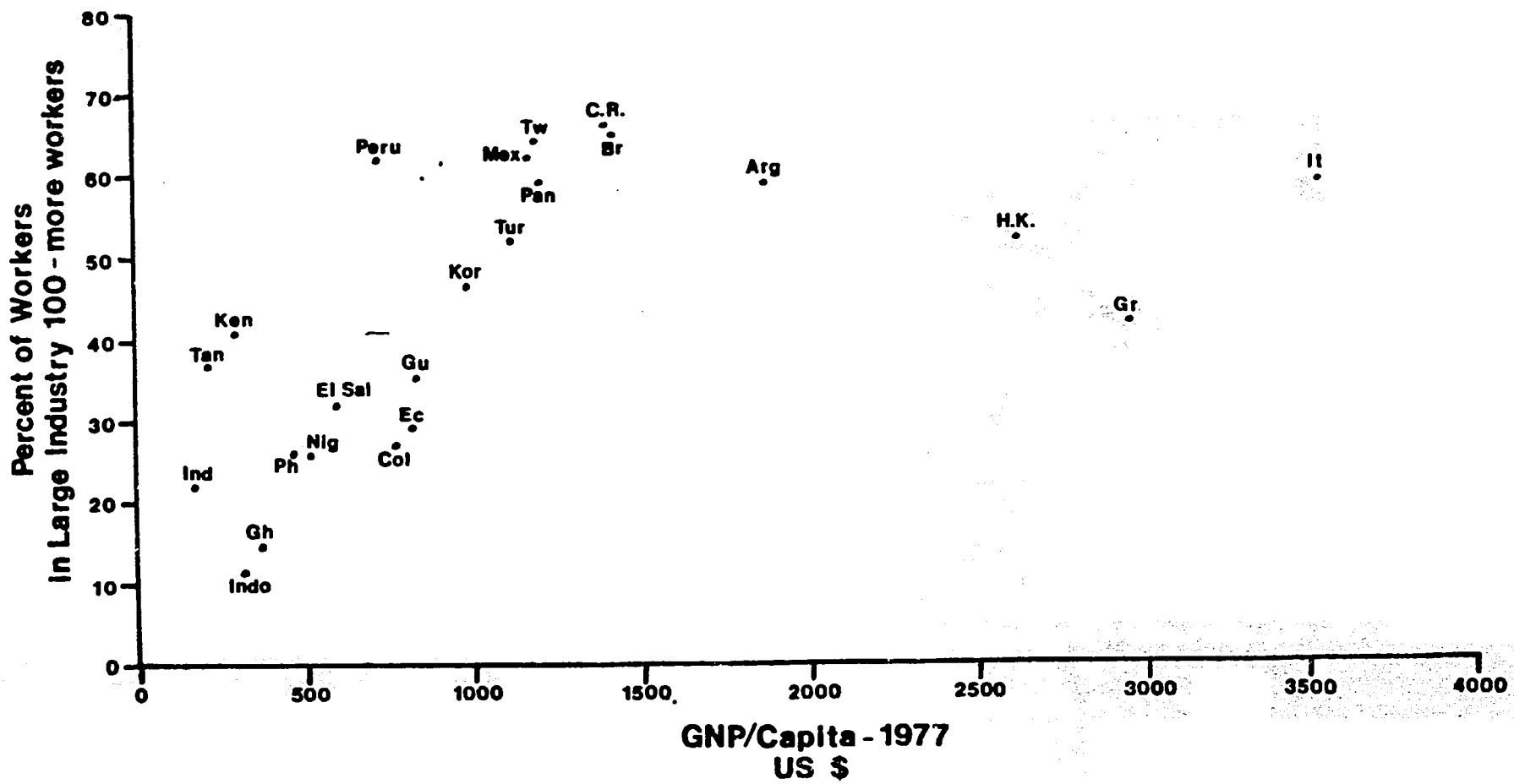


Figure 2:4b

Time Series: Employment Shares in Large Industries by Country and Income Level

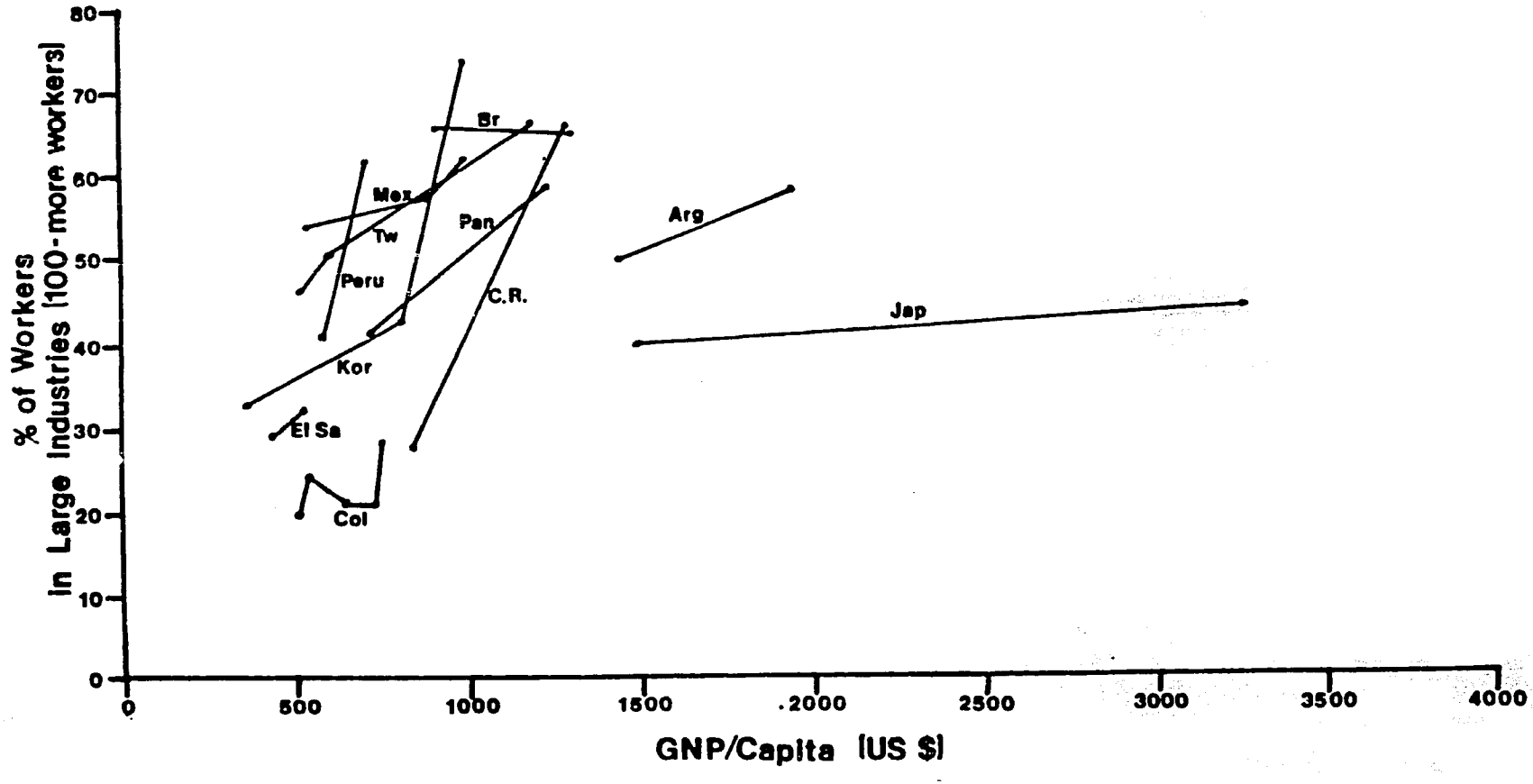


table. It is not only that there are significant economies of scale (and a need for long production runs) in the manufacture of intermediate inputs. The dominance of large firms in these industries may reflect better quality and inventory control, access to more modern technology and, in a general sense, the internal operation of the business community.

A fourth consideration is the increasing concentration of human capital and managerial expertise in larger firms. While little hard evidence is available on this point, the disproportionate access of urban dwellers to education can be regarded as an implicit subsidy to all firms located in the metropolitan areas. To the extent that large firms are predominantly located in the cities and have the financial resources to attract a more highly educated personnel - at every level -they are well placed to capture many of the benefits of a broader educational system.

In spite of the unequal ways in which industrialization and policy regimes have favored large scale firms, the expansion of once small firms through the size distribution may well account for up to 50% of the growth in large firm production. The evidence on this is, however, quite imperfect and points to an area for future research. A major obstacle to obtaining the relative weights of the components of large industry growth is data availability. Industrial censuses rarely document the histories of individual firms, and a number of case-studies might well form a useful part of EEPA field research.

2.5 How the Aggregate Size Distribution of Firms Changes.

One way of representing the relative importance of the different size classes at each stage in development is to plot the size distribution of firms on a log-linear graph. The reason for favoring this form of representation is that research, based on Gibrat's law of proportionate growth, has revealed a correspondence, which increases over time, between the size firm and lognormal distributions (i.e. a bell-shaped curve skewed to the right).

Figures 2.5a through h illustrate this phenomenon quite clearly. The US, Germany and the UK distributions all resemble the shape of the lognormal curve. Figure 2.5b shows how the size distribution in Brazil is looking more and more lognormal over time. There are, however, a number of important exceptions. The Korean manufacturing sector shows the "premature" dominance of large firms. Conversely, among the advanced industrial economies, small and medium sized firms do better than the theory predicts in both Italy and Japan. In Section 3, we will present a more disaggregated explanation for the variations in size distribution between countries and over time.

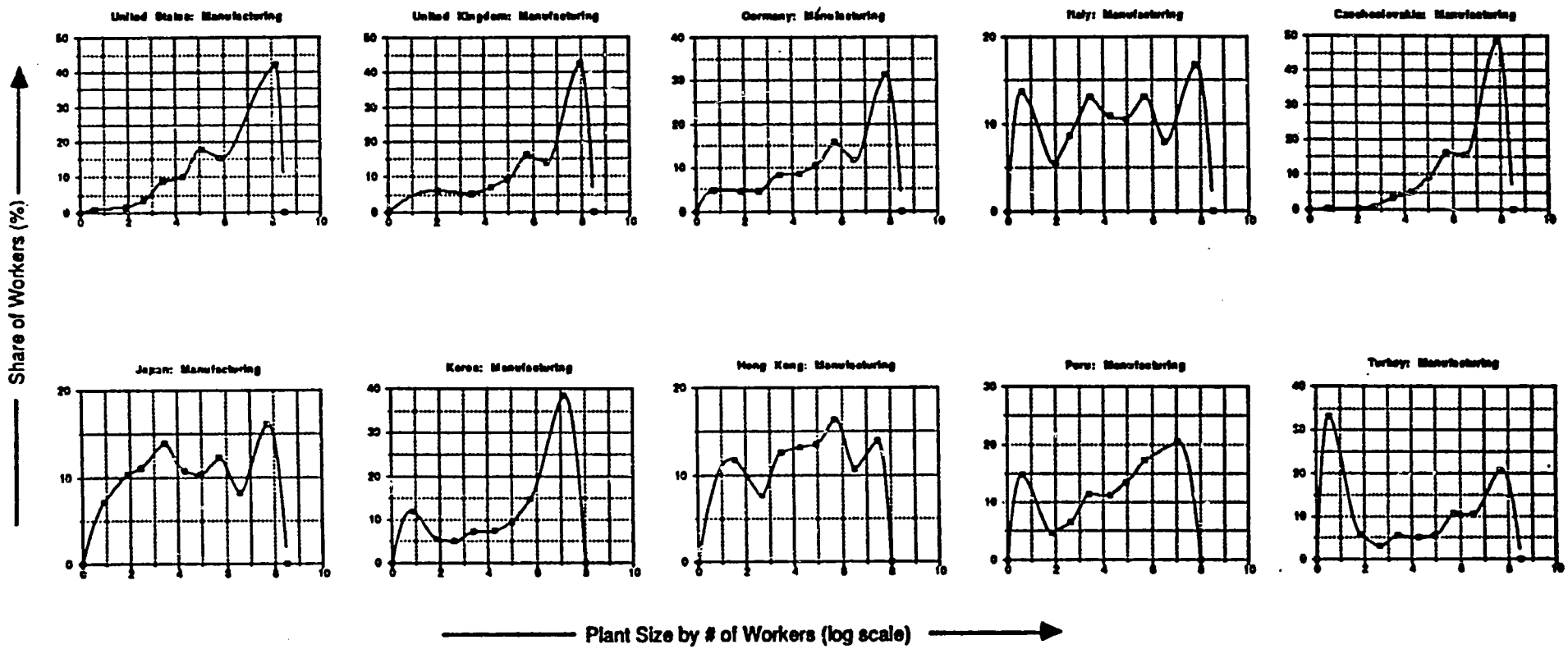


Figure 2.5a

Distribution of Employment by Plant Size:

10 Countries, Manufacturing

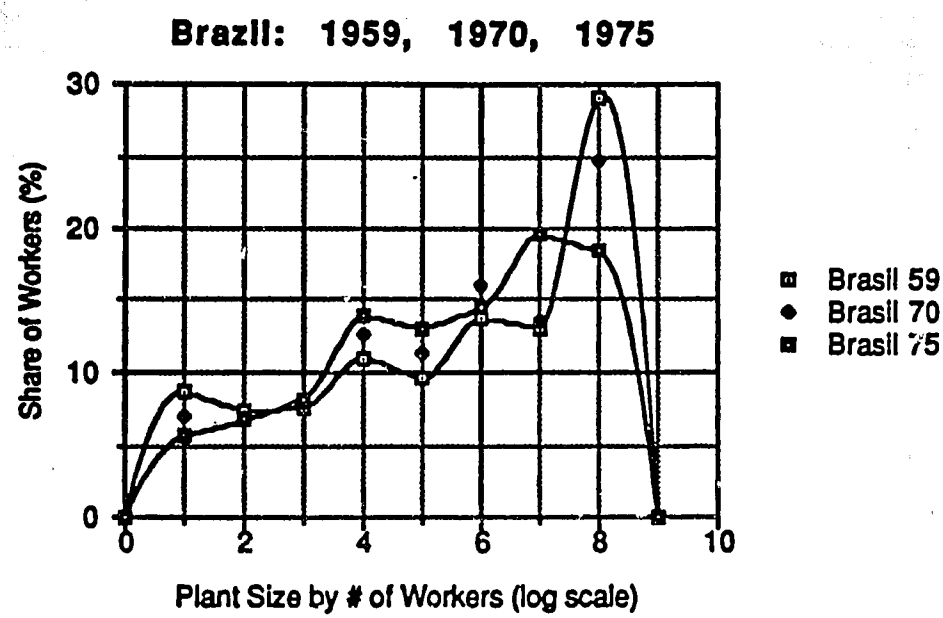


Figure 2.5b

Distribution of Employment by Plant Size:
Brazil 1959-75

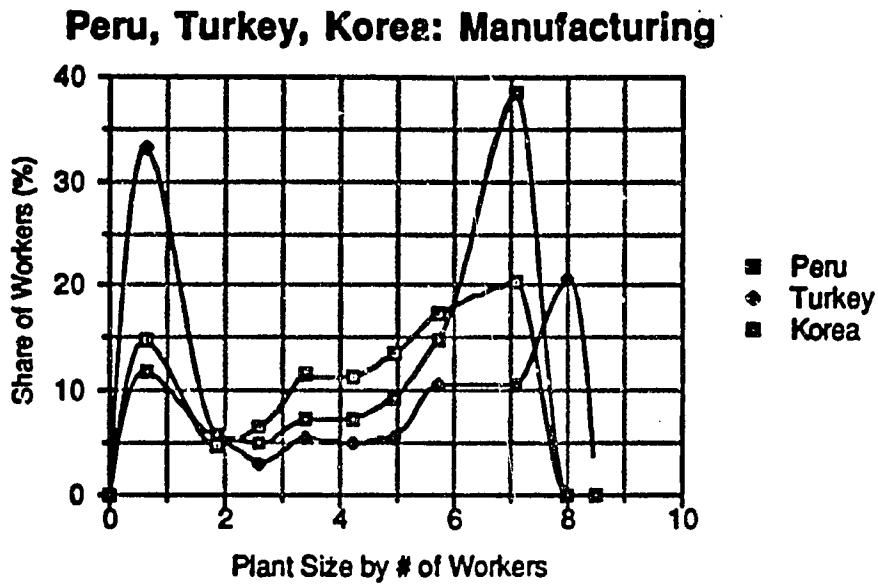

Peru, Turkey, Korea: Manufacturing
Share of Workers (%)
40
30
20
10
0
0
2
4
6
8
10
Plant Size by # of Workers
Peru
Turkey
Korea

Figure 2.5c

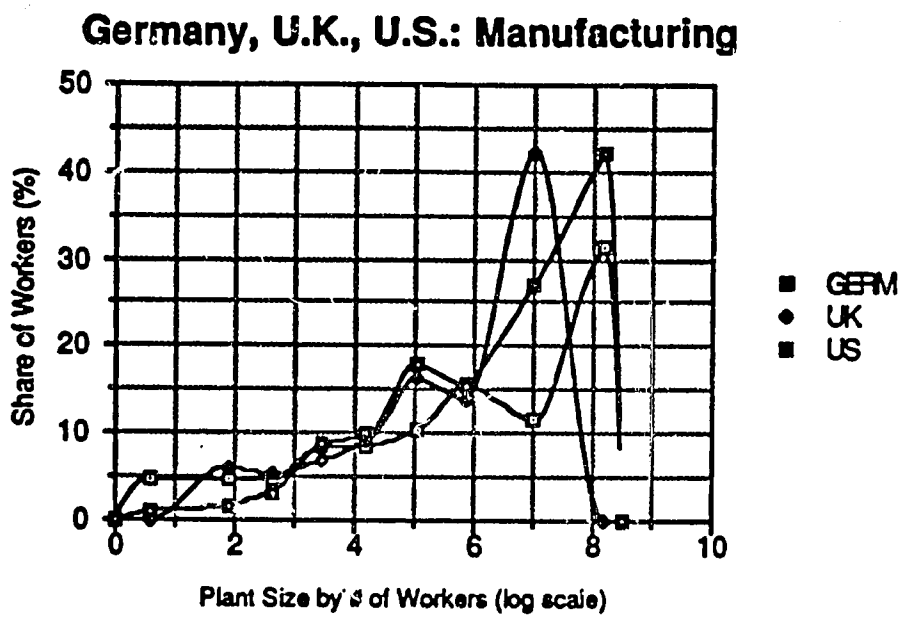

Germany, U.K., U.S.: Manufacturing
Share of Workers (%)
50
40
30
20
10
0
0
2
4
6
8
10
Plant Size by # of Workers (log scale)
GERM
UK
US

Figure 2.5d

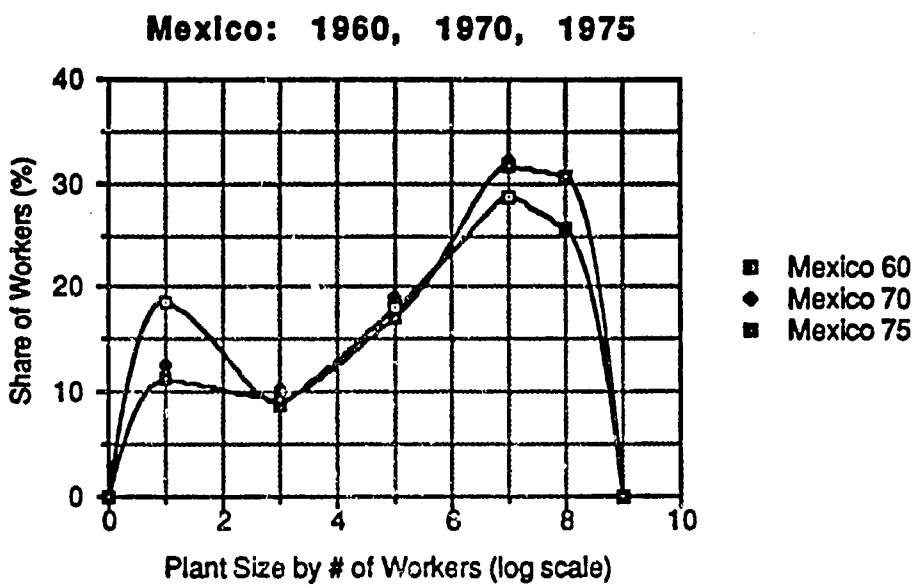


Figure 2.5e

Distribution of Employment by Plant Size:
Mexico, 1960-75

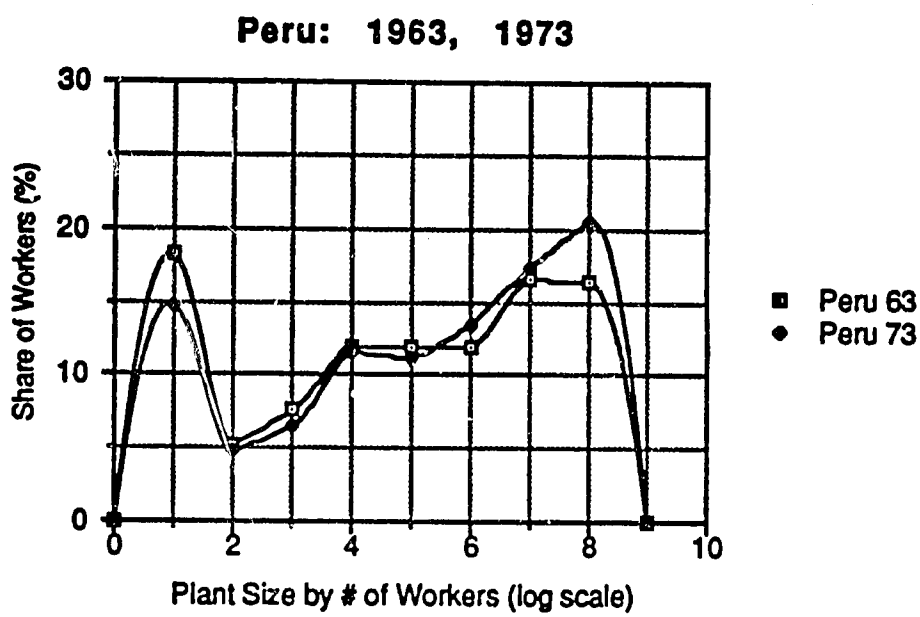


Figure 2.5f

Distribution of Employment by Plant Size:
Peru 1963-73

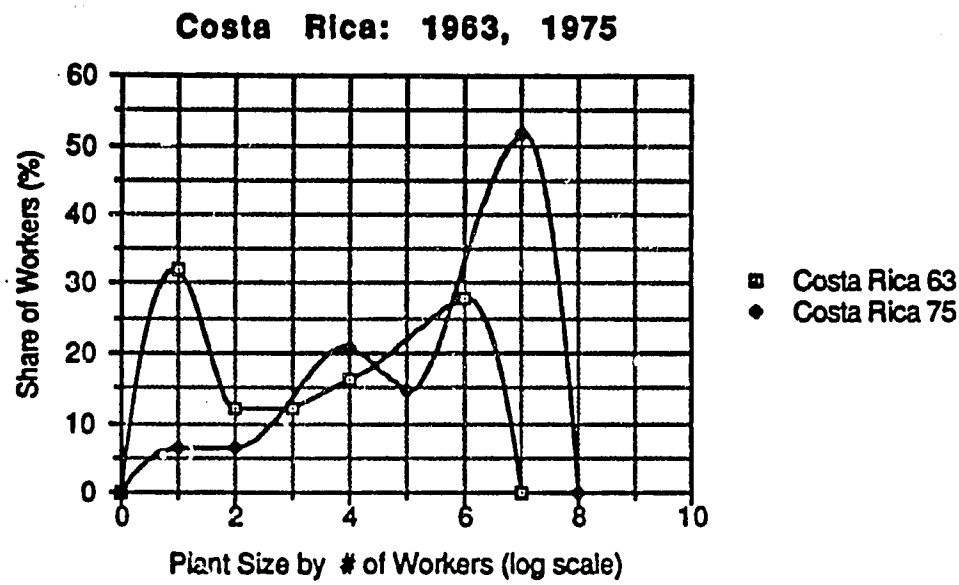


Figure 2.5g

Distribution of Employment by Plant Size:
Costa Rica 1963-75

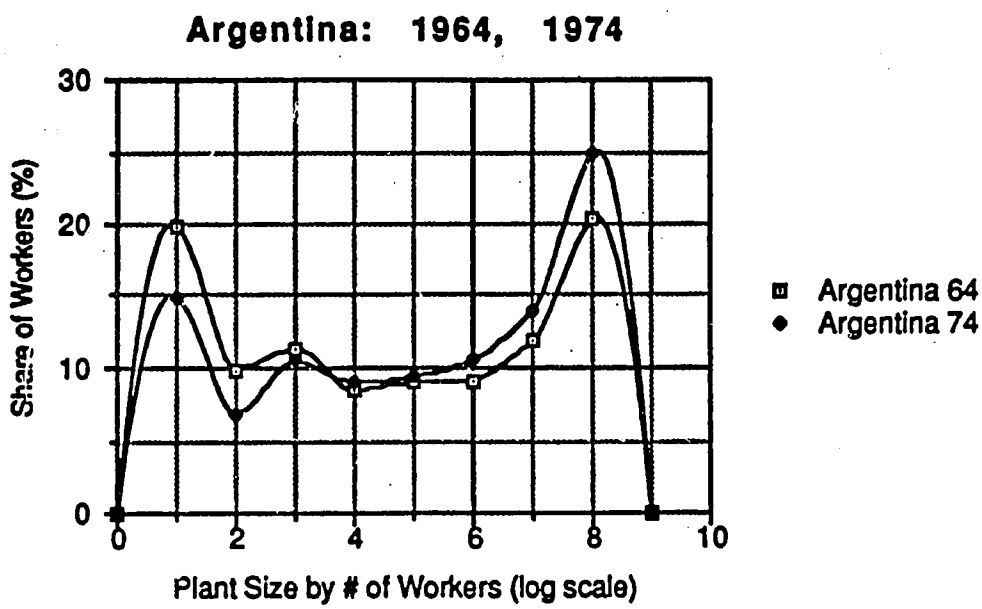


Figure 2.5h

Distribution of Employment by Plant Size:
Argentina 1964-74

Section 3. Compositional Effects on the Size Distribution of Firms.

The reallocation of resources between and within sectors is essentially the result of changes in the relative factor productivity in different economic activities. Shifts in tastes, technology and endowments can all lead to movements of (and not simply along) the basic supply and demand curves of an economy in a way that alters the vector of market clearing prices and the profitability of alternative economic activities. Since the time of Ricardo, the conventional wisdom has been that decreasing returns at the intensive margin of agriculture combine with increasing returns in the manufacturing sector to induce a shift of resources towards industrial production. Simultaneously, the pattern of demand shifts increasingly toward manufactured goods (the Engel's curve effect). The patterns studies of Kuznets, Chenery and Syrquin (1970) all provide a wealth of evidence to support these propositions.

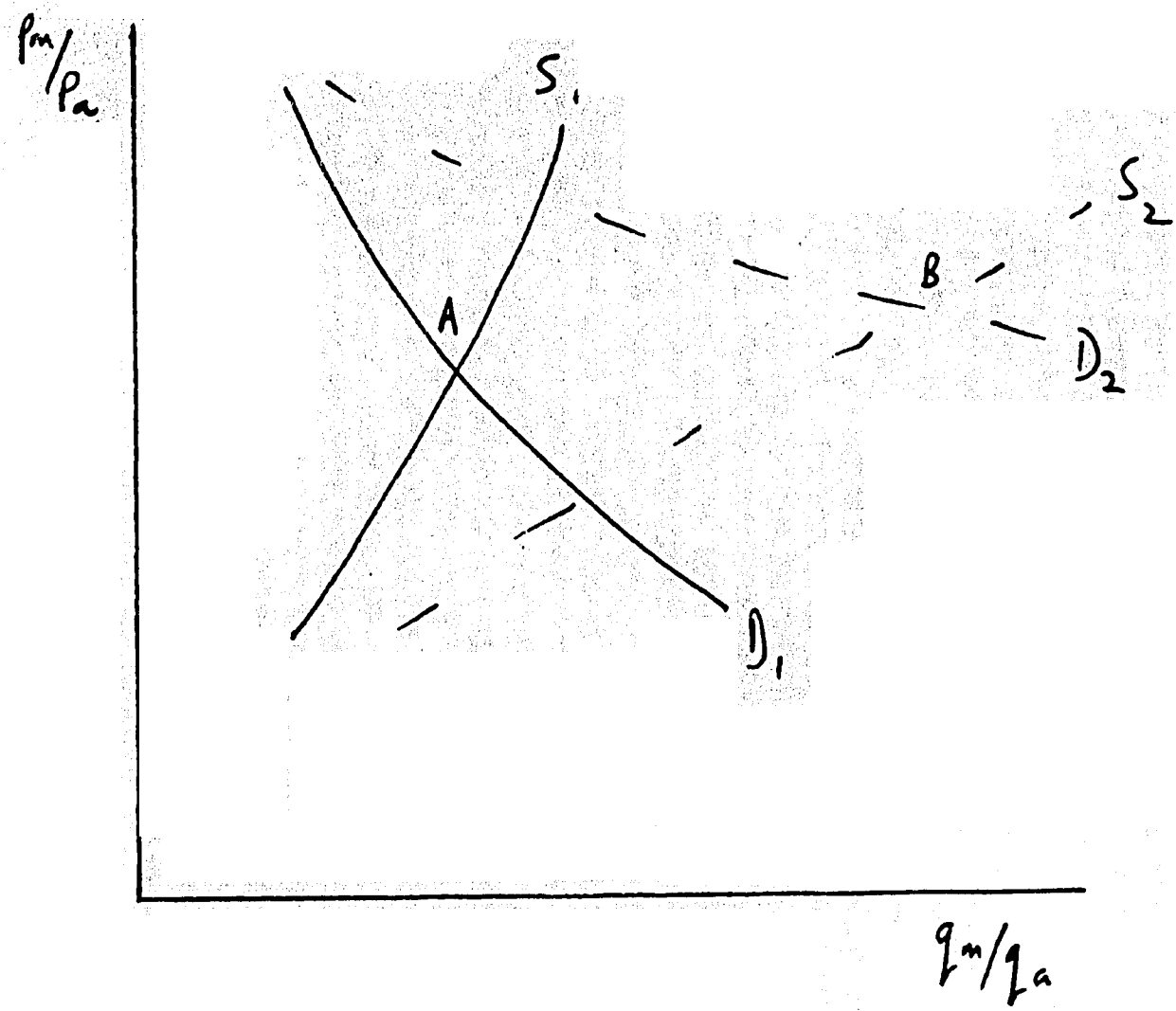
Figure 3a shows the comparative static story. The vertical axis defines the relative price of manufacturing and agricultural goods. The horizontal axis is given by the relative shares of manufacturing and agriculture in GNP. The aggregate supply and demand curves meet at point A in period 1. By period 2, both the supply and demand curves shift out (and also become more price elastic). The net consequence is that the share of manufacturing in total GNP increases at the same set of relative prices.

It is not clear, however, whether this pattern of economic transformation - as resources shift away from agriculture toward manufacturing - necessarily bears upon the size distribution of firms within industry. Rather the influence of compositional change on size distribution will be regulated principally by the relative growth rates of the different industries within the manufacturing sector. To the extent that industries characterized by large firm production grow relatively fast, then cet. par. we would expect the share of large firms in total production to rise.

Changes in the composition of industrial output are the result of four main factors: increases in domestic income which change the pattern of intermediate and final demand; new opportunities offered by international trade; capital accumulation; and government policy. As the nature and relative importance of these factors change at each stage in development, then the conditions for profit-maximization imply a continuous reallocation of resources into new industrial activities.

Increases in domestic income are perhaps the most important initial factor, forcing changes in the composition of output. Early industrialization (Chenery and Taylor, 1968) takes place in simple consumer goods production. These industries "supply

Figure 3.a



essential demands of the poorest countries, can be carried on with simple technologies ... have income elasticities of domestic demand of one or less" (p. 409).

Chenery and Taylor define the middle industries to be wood products, rubber, chemicals, petroleum refining and nonmetallic minerals. These final demand goods "typically have income elasticities of 1.2 - 1.5. The early rise of this group is due to a considerable extent to import substitution, which is exhausted at fairly low income levels" (409). These industries are predominantly based in the agro-processing sector of the economy. As such, they do not require a complex network of industrial input suppliers and are appropriate in economies where most intermediate goods need to be imported. However -for the same reasons - the development of this sector has only limited effect on industrial growth elsewhere in the economy.

Late industries are defined as: clothing, paper, printing, basic metals and metal products. "This group includes consumer goods with high income elasticity ... as well as investment goods and the principal intermediate inputs used to produce them" (p. 412).

As income rises, the composition of manufacturing shifts significantly from the early "light" industries to middle and late "heavy" industries. Within heavy industry, the fastest growth appears in machinery which starts from a very low base. The growth of consumer goods is much lower but, since at low income levels it is by far the largest component, it still accounts for a substantial fraction of the overall increase within the share of manufacturing output.

In a large closed economy, changes in the structure of industrial output largely follow the transformation of domestic demand patterns. Large countries - with an endowment structure that more closely resembles the international mean capital/land/labor ratio - should in theory have more diversified industrial sectors than small open economies. Smaller countries - at least those which take advantage of the optimal consumption and production set at world prices - exhibit more specialization and show a wider range in the sequence and speed of industrialization.

Trade therefore plays an absolutely critical role in the industrialization of small economies. The principle of comparative advantage suggests that poorer labor-abundant economies should delay the domestic production of capital-intensive "heavy" industry goods. Indeed, the success of a number of countries - notably those in East Asia - in pursuing a strategy of industrial growth based on the export of labor-intensive manufactured products - provides a remarkable contrast with the fate of those countries which adopted overly ambitious

import substitution programs.

Trade - and trade policy - critically affects the composition of domestically produced output in the smaller developing countries. Today there is a vast literature (Krueger (1974), Balassa (1971), Corden (1971), Michaely (1975) are classic texts) which describes the often distorting effects of protective trade policies. "Infant industry" arguments ring somewhat hollow when confronted with the reality of severely distorted industrial development. An accumulation of tariffs and quotas - often the first response of the government to periodic balance of payments crises - has for many countries resulted in a composition of output which bears little relationship to domestic resource costs. In many cases, the trade policy regimes have resulted in a premature allocation of resources to the "late" capital-intensive industries where large firms predominate.

Capital accumulation - and the greater availability of domestic savings to finance investment - is the third important determinant of the sectoral composition of output. As the capital - labor ratio rises in a small labor abundant economy (i.e. one facing fixed international prices), then those industries which use capital intensively will tend to expand, while those which are labor-intensive may well shrink in absolute as well as relative terms. The flavor of this idea is contained in Figure 3b.

OA represents the allocation of capital and labor to industry 1, which is capital-intensive. AO' represents the allocation of capital and labor to the labor-intensive industry. The joint allocation to the two industries results in the full employment of both capital and labor. As the capital stock in the country rises, as shown by the increase in the vertical dimension of the box from O' to O'', the allocation of resources to the labor intensive industry (O"B) falls with respect to the first period.

Accordingly, greater capital accumulation encourages an overall shift of resources away from labor-intensive toward more capital intensive manufacturing activities. This in turn suggests a general demise of cottage-shop and small scale manufacturing, and helps explain the growth of a large firm sector, where capital/labor ratios are significantly higher. This is especially true if one extends the notion of capital to include human capital embodied in the better educated employees of large firms.

Policy can work through any number of channels to affect the sectoral composition of output and thereby the aggregate size distribution of firms. We have already noted the pervasive effects of trade policy. In addition, tax, credit and exchange policies will all have an important bearing on the sectoral

Figure 3.b

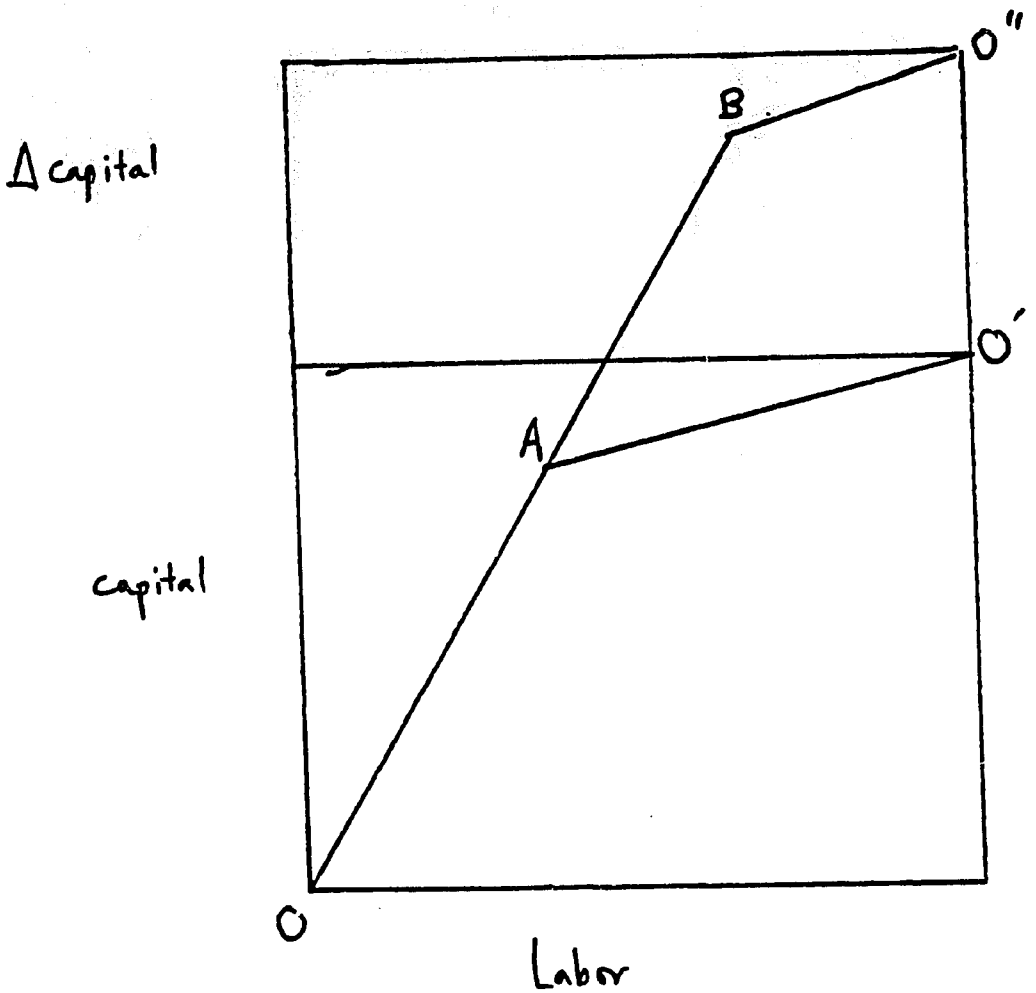


Table 3.1

Structure of Value Added and Employment and Weight of Small Scale Units by Income Group

Income group and industry group[a]	Value Added: Share	Value Added: of which small units:	Employment: Share	Employment: of which small units:
High income countries				
Industry group A	41	33	44	36
Industry group B	59	13	56	15
Total[b]	100	31	100	24
Middle and Low income countries				
Industry group A	62	37	70	50
Industry group B	38	22	30	37
Total[b]	100	31	100	46

[a] Industry group A: 100,200,420,300
Industry group B: 410,700,800,500
Tobacco (22) was apparently excluded.

[b] The share of small units in the totals are computed as weighted averages of the figures for the industry groups. They are slightly different from the figures in Banerji which are computed in a different way. See the original for details.

composition of output within the manufacturing sector. In particular, easy credit policies and special foreign exchange "lending windows" may encourage the premature development of the "late" industries, at a time when the basic industrial input infrastructure is not yet in place. One consequence of these policies has been to foster an import-dependent form of industrialization. "Cascading" rates of effective protection (i.e. ones higher at each stage in the production process) protect final goods producers at the cost of firms in the intermediate input industries. Future EEPA research will need to examine the extent to which trade policies have decelerated the growth of small and medium enterprises in these input industries.

The effect of sectoral composition on the aggregate size distribution of firms can be seen quite clearly in Table 3.1. Two industry groups appear in the table. Group A, according to Banerji (1978), includes the resource-based industries with lower income elasticities than those of the industries in group B: engineering, chemicals and related products. While the identification of group A as resource-based is somewhat tenuous, the broad division between the groups roughly parallels the light-heavy distinction in Chenery (1980) and has a close correspondence to the early-middle-late breakdown of Chenery and Taylor (1968).

The weight of small scale units is distinctly lower in group B than in A, for output and employment and for both groups of countries. This systematic difference is a reflection of the importance of economies of scale in the industries of group B. The lower share of small firms in higher income countries results from the combined effect of larger scale within industries and an industry mix with larger weights towards those sectors where small units are less important. In a simple fixed weights decomposition of the difference in the share of small units in employment between the two groups of countries, the output-mix effect accounts for 85% of the difference and the scale effect within industries for only 15%. While this may exaggerate the relative importance of mix and scale effects (see Section 5 for a more detailed analysis), the result clearly points to the importance of changes in the composition of output for the aggregate size distribution of firms.

Section 4. Structural Transformation and the Size Distribution of Firms.

While changes in the composition of output are the outcome of shifts in both the demand and the supply curves, structural transformation within any given industry, producing a relatively homogeneous good, is above all a supply side story. In the absence of advertising, consumers do not distinguish between the identical products of different sized firms. Differential firm growth rates must therefore be a consequence of efficiency gaps

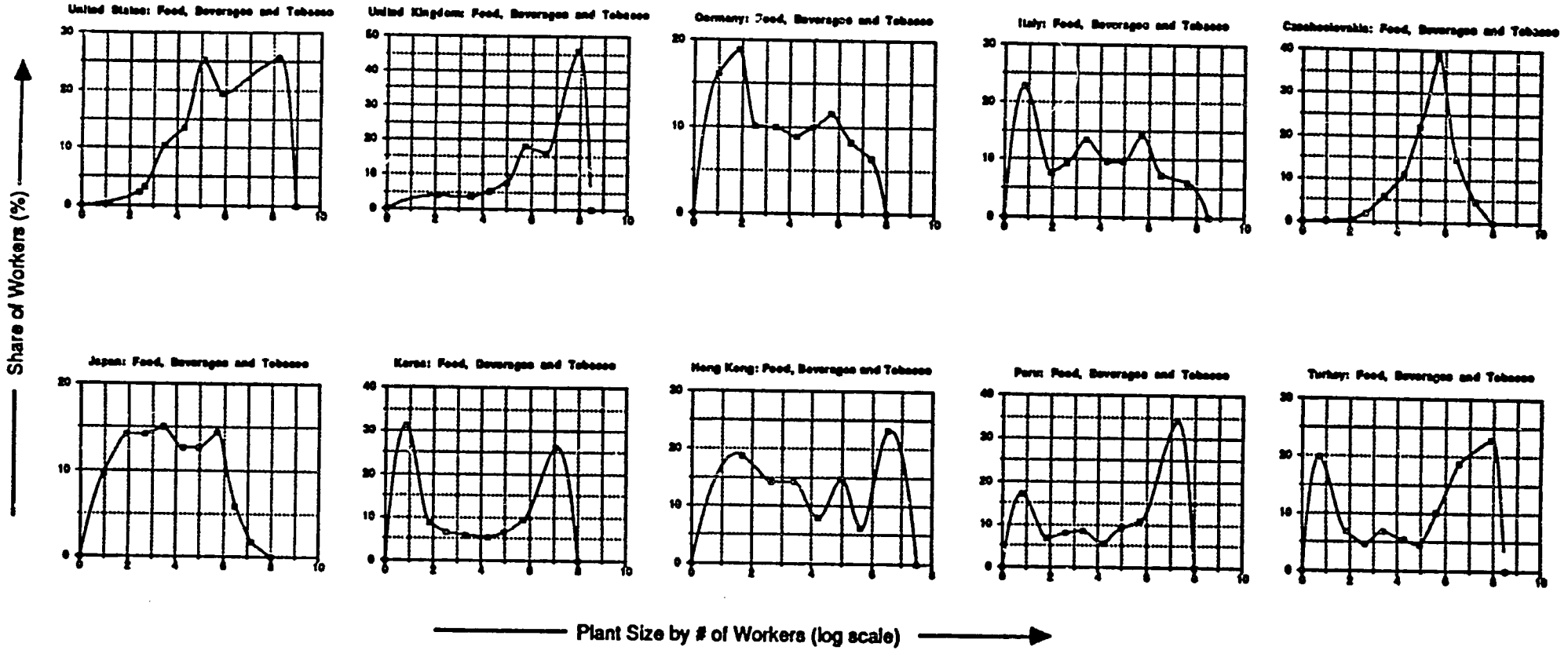


Figure 4.a

Distribution of Employment by Plant Size:
10 Countries, Food, Beverages and Tobacco
ISIC 100

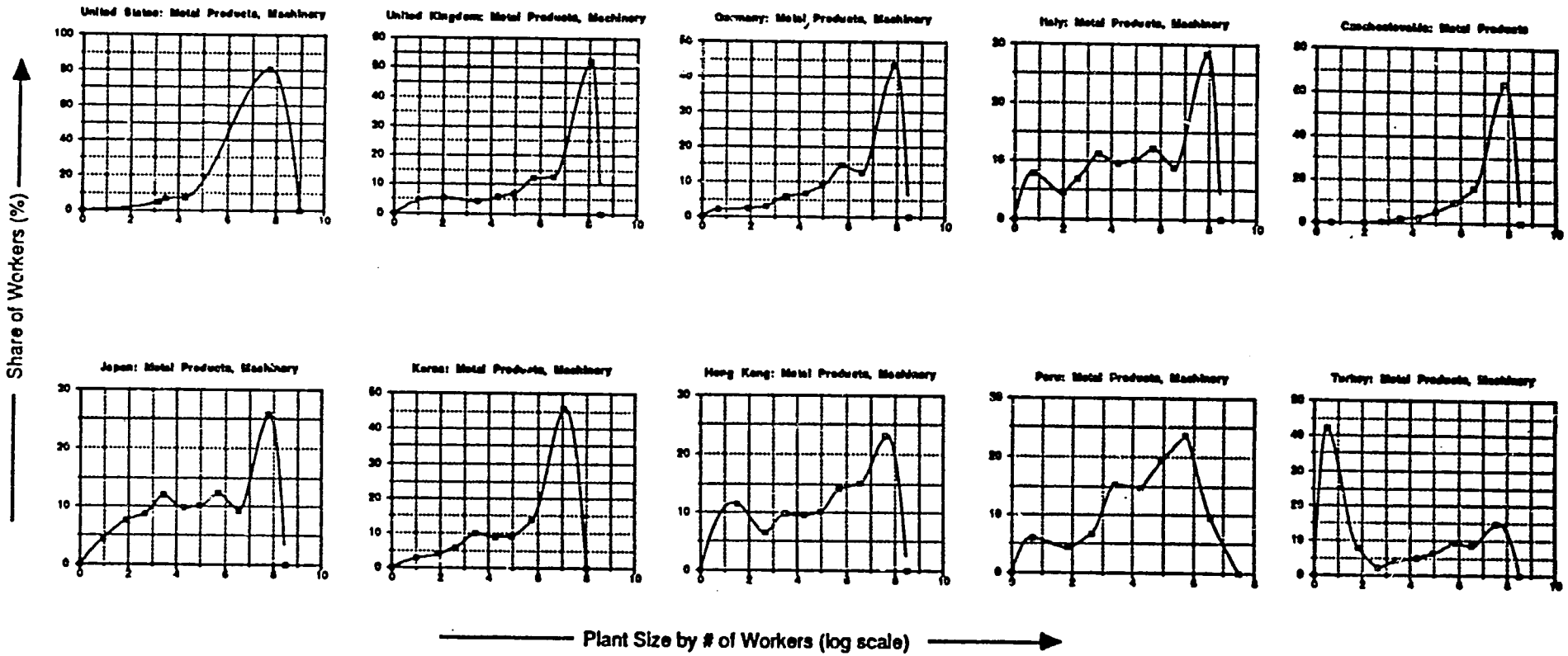


Figure 4.b

Distribution of Employment by Plant Size:

10 Countries, Metal Products

ISIC 720, 730

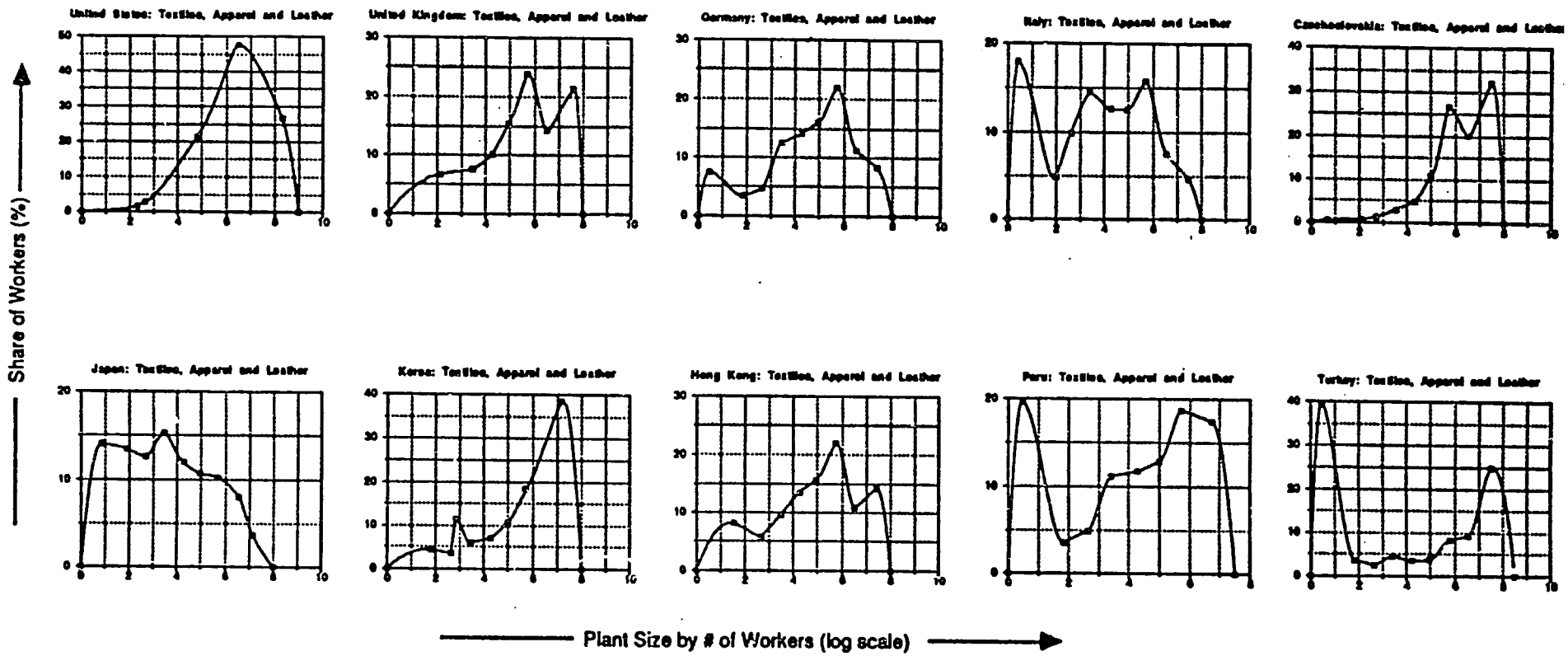


Figure 4.c

Distribution of Employment by Plant Size:

10 Countries, Textiles, Apparel and Leather

ISIC 200

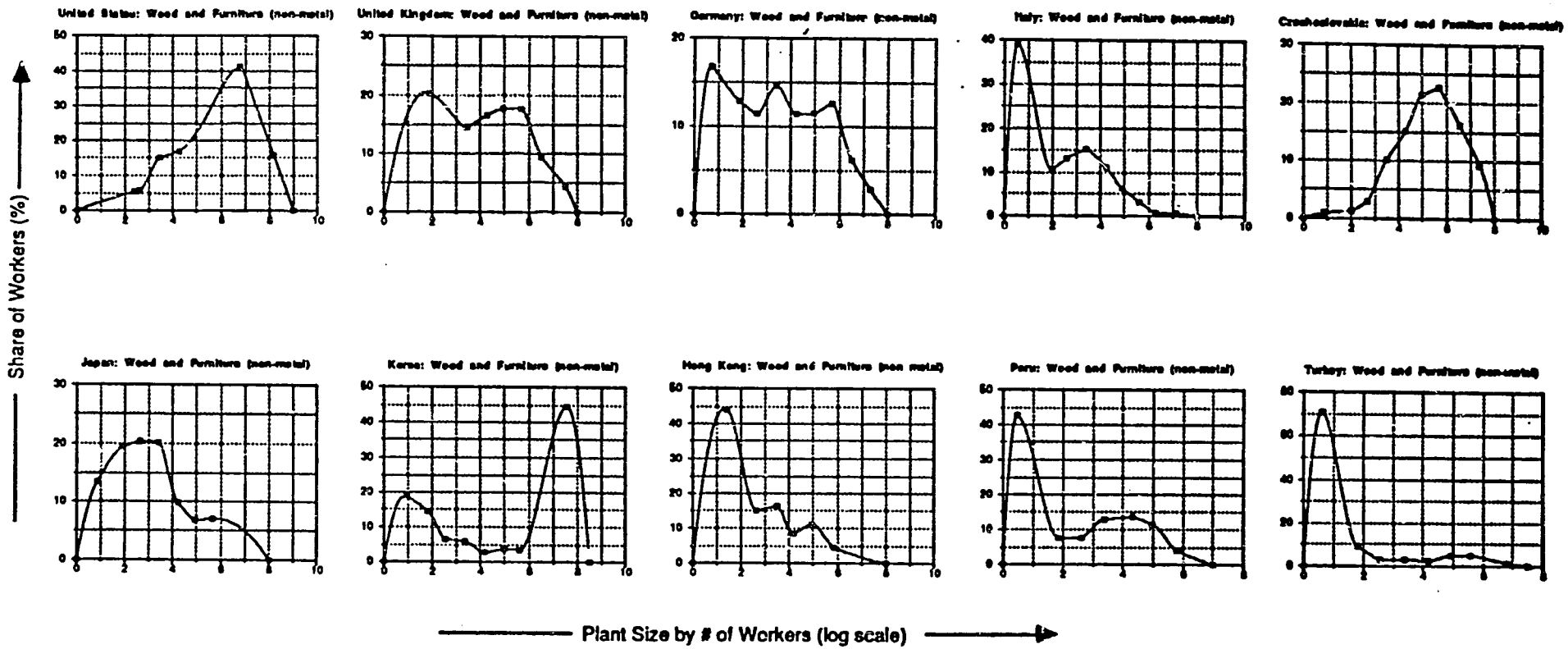


Figure 4.d

Distribution of Employment by Plant Size:

10 Countries, Wood and Furniture (non-metal)

ISIC 300

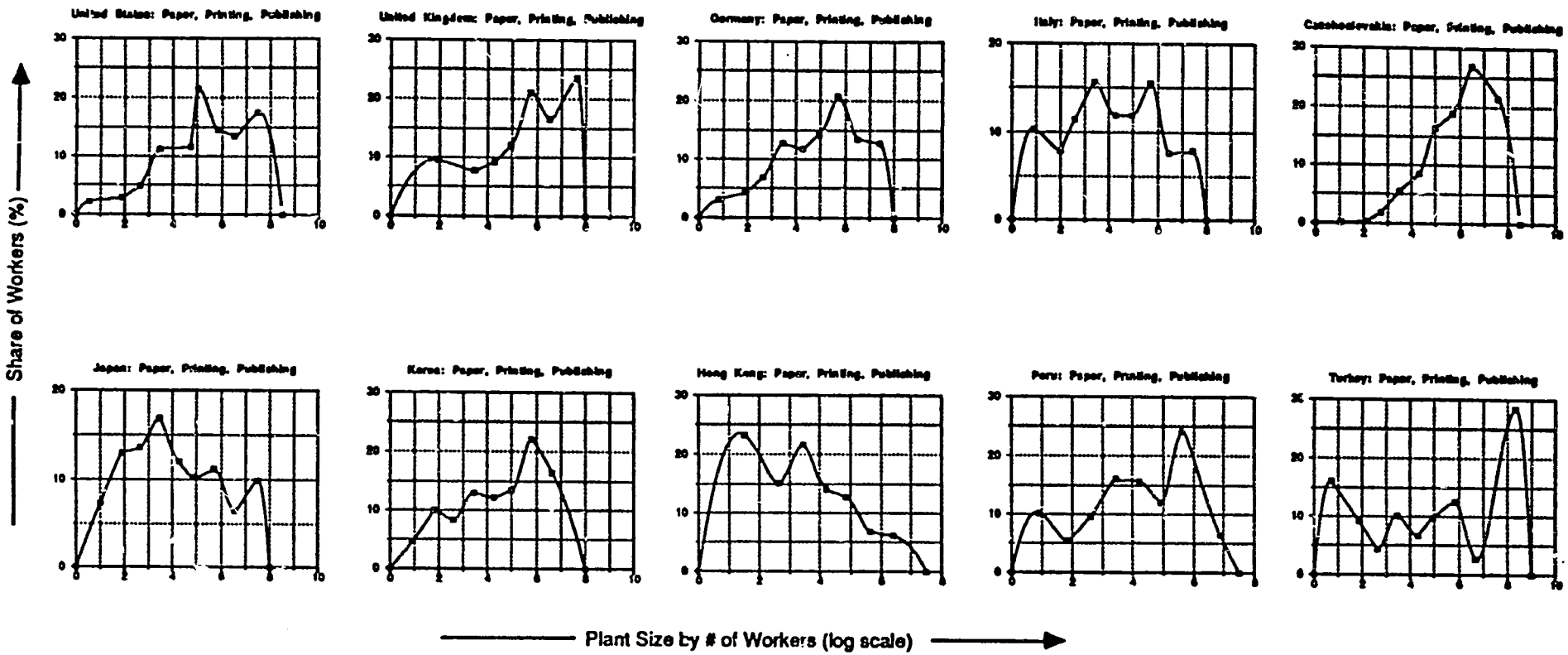


Figure 4.e

Distribution of Employment by Plant Size:

10 Countries, Paper, Printing and Publishing

ISIC 400

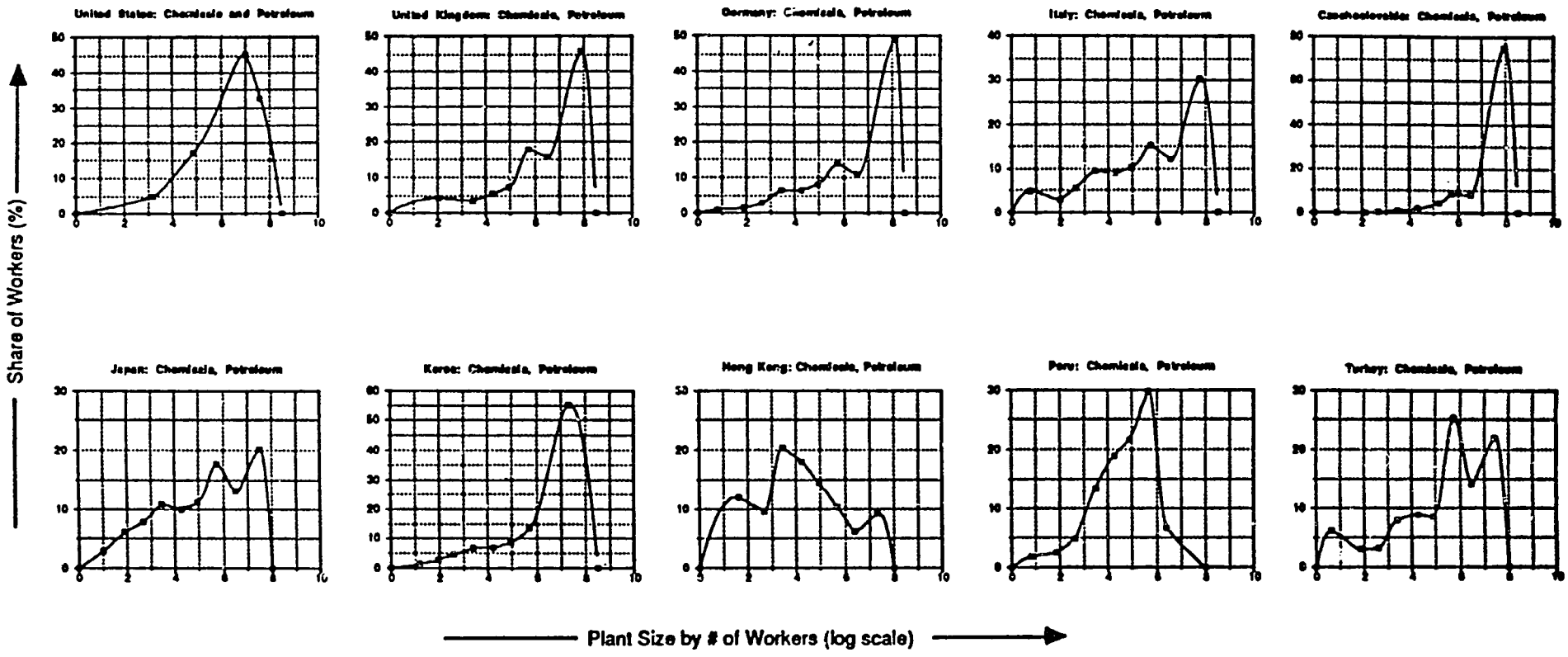


Figure 4.f

Distribution of Employment by Plant Size:

10 Countries, Chemicals, Petroleum

ISIC 500

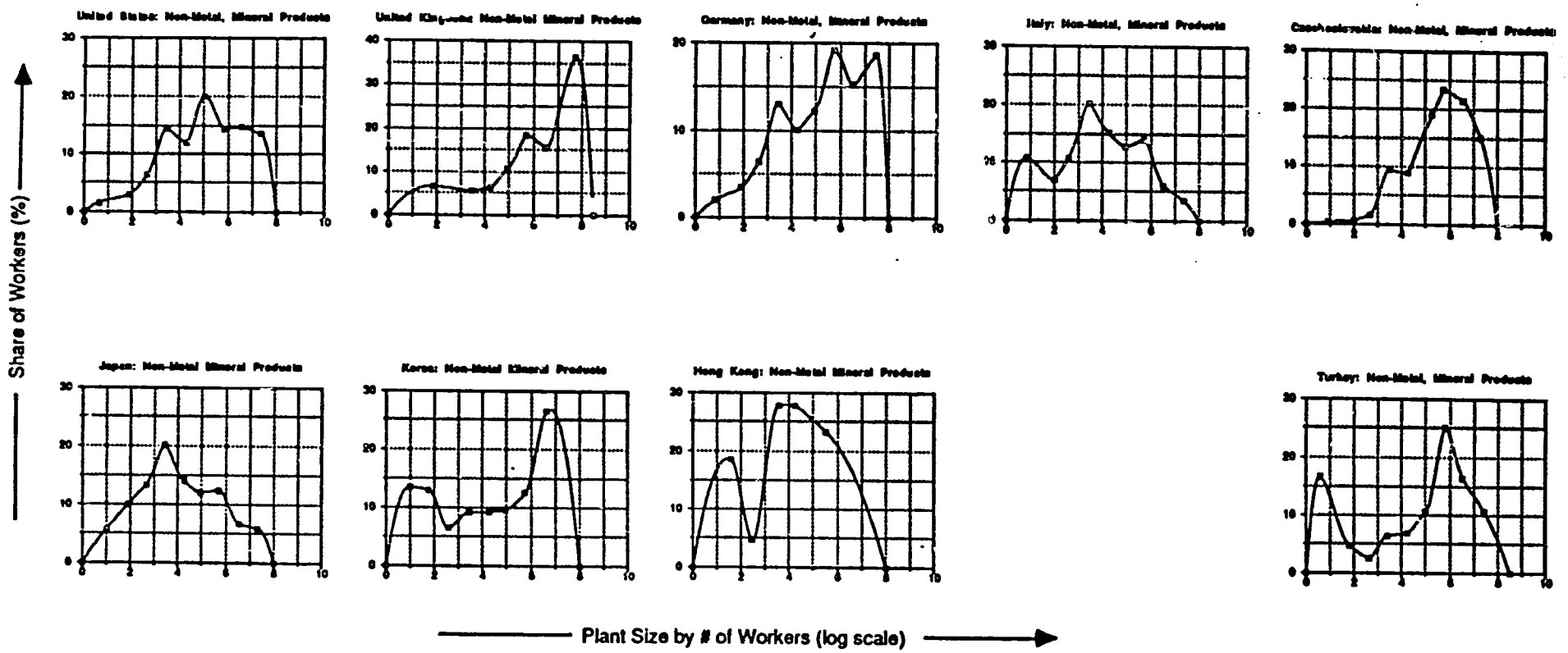


Figure 4.g

Distribution of Employment by Plant Size:

10 Countries, Non-Metal, Mineral Products

ISIC 600

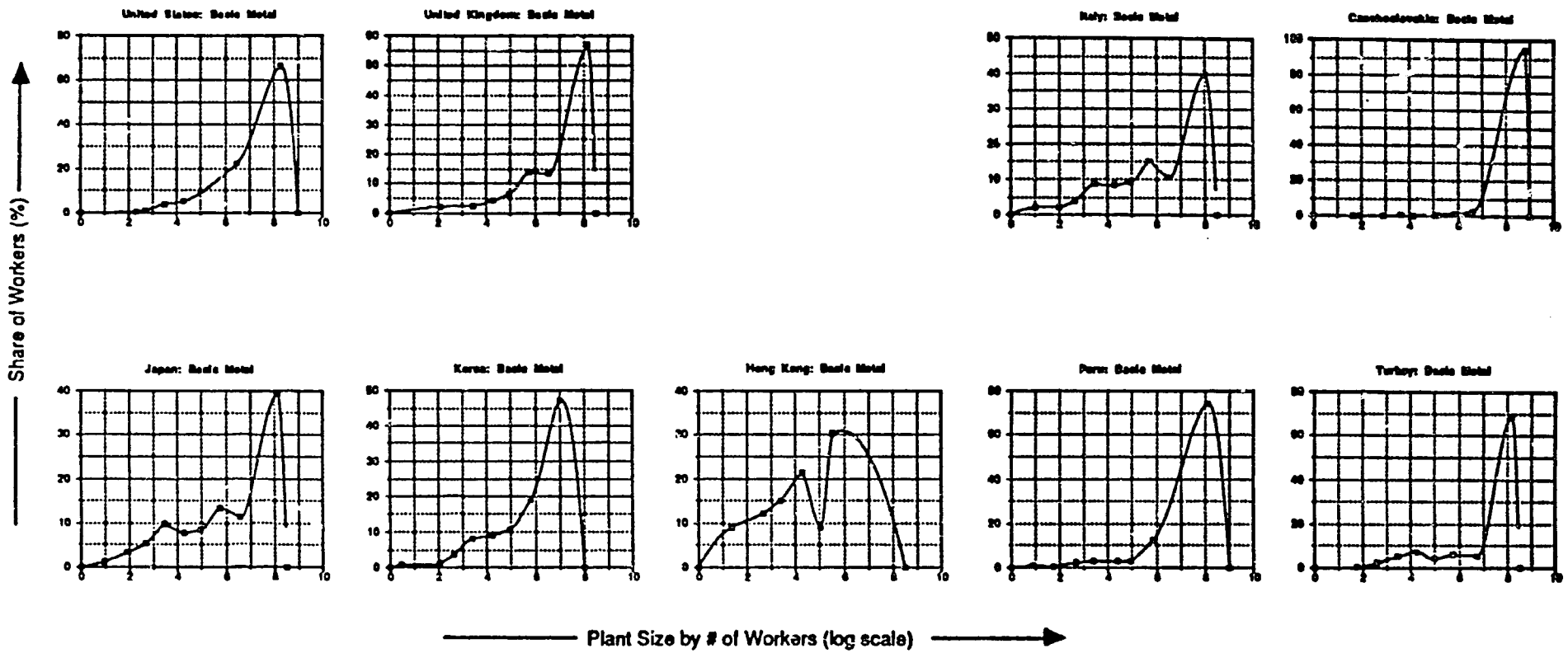


Figure 4.h

Distribution of Employment by Plant Size:

10 Countries, Basic Metal Industries

ISIC 710

between firms of different size in factor utilization.

One problem in explaining these differential firm growth rates is that neoclassical theory lacks a satisfactory theory either of optimal firm size or of the size distribution of firms. In a constant returns industry, firm size is indeterminate; while in an industry with U shaped cost functions (i.e. increasing returns to scale along part of the cost curve), there is only a single scale of production which can be efficient. In every country - both developed and developing - there is compelling evidence that firms of widely differing size compete in the same, or at least similar, product ranges.

Figures 4.a through 4.h make this point very clear, albeit at the 2 digit level. Only in the chemical and metal industries - the heavy industries - is the share of small scale production insignificant. In most industries, the size distribution of firms varies widely across countries in a way that appears to defy systematic "patterns - type" analysis.

An important body of literature exists, which seeks to remedy this deficiency in the basic neoclassical theory. It contains two main strands; the first analyzes the static productivity gap between different size classes of firm within an industry; the second examines dynamic changes in this productivity gap which influence the structural transformation of an industry over time. We begin by reviewing the first strand of the theory.

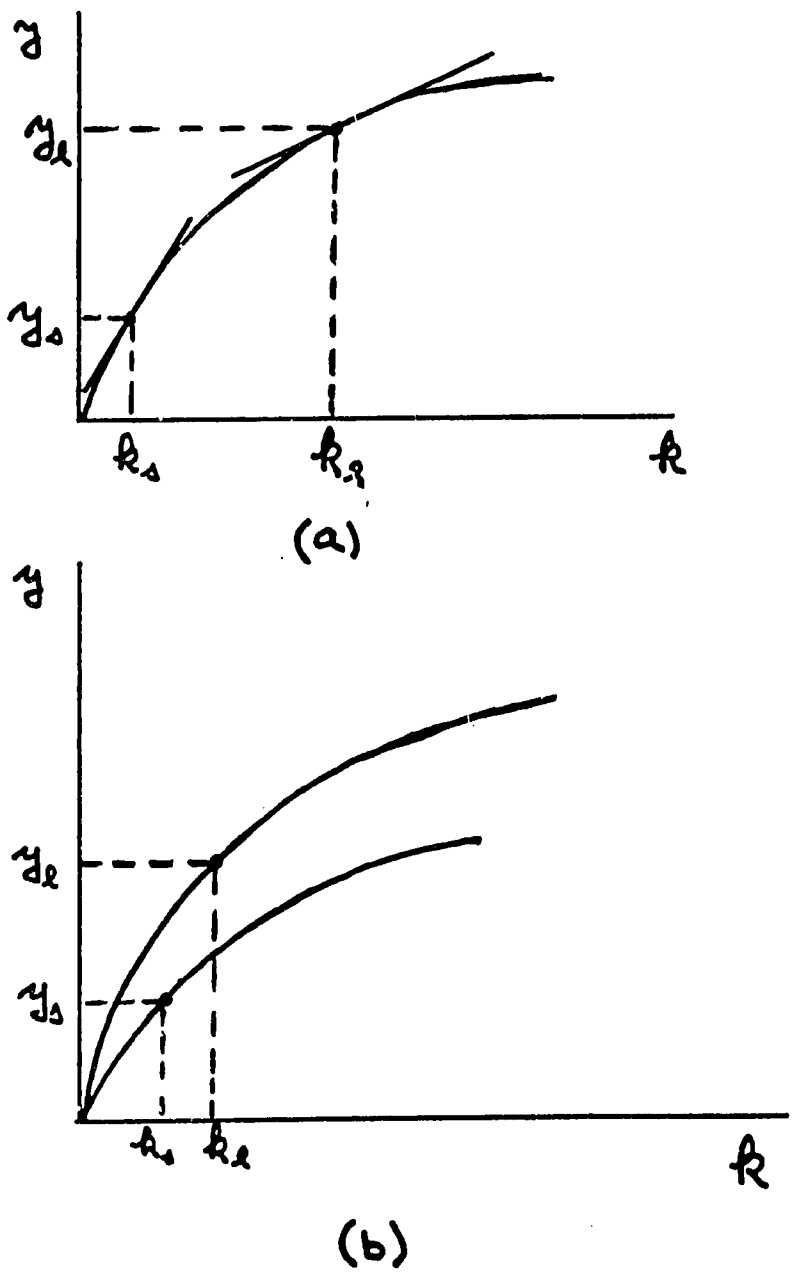
4.1 Reasons for Difference in Labor Productivity.

The static productivity gap between small and large firms may be due to differences in factor prices and/or in technology (see also Banerji's (1978) discussion). The various possibilities are described in Figures 4.1a and 4.1b where labor productivity (y) is plotted against the capital-labor ratio (k). The subscripts s and l refer to small and large firms respectively.

Figure 4.1a assumes the same constant returns to scale technology, and a higher wage-rental ratio for large firms. A large profit maximizing firm will have higher k and y than a small firm. The differences in factor prices may reflect differences in the quality of inputs or real differences in the cost of providing services (e.g. financial services) in which case there is no static misallocation of resources.

The differential may be due to market imperfections, but it may also be the outcome of past policies. The policy implication are of course different in these two cases. Finally, it has been suggested that higher wages in large firms are the means to higher productivity and not the other way around (Mazumdar xx.

Figure 4.1



Doc. 0008V (10/16/85)

see also Squire 1981).

Figure 4.1b assumes equal factor prices but differences in technology. The higher y in large firms could result from any of the following three factors, all of which fall under differences in technology. (Empirically it is very difficult, if not impossible to distinguish among them.)

a) Increasing returns to scale

b) Nonhomothetic production functions. Scale and k positively correlated along any expansion path.

c) Differences in efficiency (total factor productivity). The first two imply non constant returns to scale. One possible difference in their implications is that with an homothetic production function (a) ks = kl, and the capital output ratio is lower in the large firms. With non homotheticity (b), kl > ks but capital-output ratios could go either way.

Differences in efficiency (total factor productivity) cannot be distinguished from increasing returns if they are neutral, and cannot be distinguished from non-homotheticity when they are not.

Despite the productivity gap in many industries between large and small/medium firms (Banerji, 1978), firms of different size can often coexist for long periods of time. In part, this may be due to non-competitive behavior by the larger firms, which allows smaller enterprises to fill in the gaps. Especially in developing countries, this lengthy coexistence is made possible by natural barriers to entry in regional markets, consumer loyalty and all sorts of institutional impediments to full market integration. In the longer run, however, only those firms which can produce on or near the efficiency frontier are likely to survive.

To understand which firms will survive, we have to turn to the dynamic theories of structural transformation. These theories try to determine the existence of "natural laws" which relate the birth, growth and death of firms to an underlying size distribution of firms (Gibrat, 1931; Adelman, 1958; Hart & Prais, 1956; Simon & Ijiri, 1964; Marriss, 1979; Nelson & Winter, 1982).

Evidence that the lognormal distribution of firm sizes (based on modifications of Gibrat's law of proportionate growth) is particularly widespread has, according to Marriss (1979), spawned two main schools of thought; the "stochastic" and the "empiricist". The Empirical school tends to explain increases in average industrial concentration by particular historical chains of cause and effect within a given industry. By contrast, the "stochastic" school, while by no means necessarily implying that

the growth of a firm is a totally chance phenomenon, always includes some significant chance elements.

Until recently, however, there had been no attempts at a marriage between the two schools. With the publication of Nelson and Winter's, "An Evolutionary Theory of Economic Change" that lacuna has been partly filled. Nelson and Winter develop a model in which success in the R&D game is the principal determinant of firm size. A successful new product not only permits extra firm growth in the period of the discovery. By generating extra sources of internal finance, the new product permits greater R&D outlays in future periods, thereby increasing the probability of continuing firm growth through new product development.

Nelson and Winter tie this theory of firm growth into a model of industrial structure. First they distinguish between industries on the basis of R&D intensity. An R&D-intensive industry is one in which the returns to successful new product development are very high. It may also be an industry in which the ease of imitation for latecomers is extremely limited. Starting with different sets of initial conditions, they run simulations to show what happens to the size distribution of firms over time. Perhaps unsurprisingly, they show that as the pace of "latent productivity growth" increases and as imitation becomes more difficult, industries tend to become more concentrated more quickly. In other words, it is very hard for latecomers to catch up with firms which entered the industry at an earlier stage.

While this model seems to be more applicable to developed market economies, it contains a methodology which could be usefully applied to changes in industrial structure in developing economies. Suppose that the growth of a firm in a developing economy is determined by its access to imported technology. Because of learning costs associated with the incorporation of new technology into the production process, the early firms have a significant competitive advantage over latecomers to the field. The specification of different industries could allow;

(1) the productivity gap between imported and domestic technology (i.e. first and second best techniques) to vary and

(2) the steepness of the learning curve to vary.

In industries where there is a large productivity gap between the domestic and foreign technologies and where there is a steep learning curve, we would expect a simulation model to show an early tendency toward concentration. If, however, the learning associated with technology transfer is easy, then the barriers to entry for latecomers are much lower. The development of a simulation model which relates changes in structure to the defining technological characteristics of a set of "pseudo-

46

industries" could be a valuable future exercise in the EEPA research program.

Although we possess a number of clean theories which explain how the composition of output changes over time, the current models of structural transformation are much less convincing. The evidence presented in the next section shows that the composition of output is not the only determinant of the size distribution of firms. In most instances, structure is at least as important. To develop a reasonable model of intra-industry structural change, it will not be enough to generate some Nelsonian simulation results. Rather, much more field work is required to supplement the rather paltry data on intra-industry structural developments.

Section 5. The Relative Importance of Composition and Structure.

The main argument of this paper has been that "compositional" and "structural" forces interact to determine the aggregate size distribution of firms at any point in time. It would be extremely useful for policy makers to know which influence matters more.

Suppose that differences in structure across countries (at a similar stage of economic development) appear to be the principal determinant of variance in the aggregate size distribution of firms. In a country where small firms are under-represented, the implication of this finding would be that current policy discriminates against small firms in all or most industries. Policies which have a size effect indiscriminately across different industries are likely to be those that work through the factor markets for capital, labor and foreign exchange.

Conversely, suppose that differences in the composition of output drive the aggregate size distribution. In a country where small firms are under-represented, the problem is that policy has biased the mix of output toward those sectors where large firms predominate. Reform might begin with restrictive trade practices which encourage the premature development of "heavy" large scale industry.

However, to know that composition matters more than structure (or vice versa) is not enough for targeted policy making. What holds at the aggregate level may not be true in the context of a specific industry. If we consider the industry-specific size distribution of firms, then we will certainly find that the extent to which structure or composition matters varies substantially from industry to industry and, for that matter, between size class of firm.

If the size distribution of firms is regarded as a policy

objective per se, then the appropriate policy package is almost certain to be some combination of "compositional" and "structural" instruments, the content and weighting of which vary from industry to industry.

Consider a country in which small firms are under-represented, in comparison with other countries of a similar income level and resource base. This under-representation will be the product of two factors. Certain industries in which large firms predominate command "too" great a share of manufacturing GNP. And in other industries (whose weight in total output is "appropriate" at the stage of development), small firms have been driven out of the market place. What policy makers need is evidence, broken down by industry, of the relative importance of compositional and structural forces in determining the distribution of output across firms of different size.

This argument can be summarized using some very simple linear algebra. Let Sij be the proportion of output in industry i produced by size class of firm j, and Ci be the share of industry i in total manufacturing output. Then, total manufacturing output T equals

$$(1) \qquad T = \sum_{i=1}^{9} \sum_{j=1}^{3} S_{ij} * C_i$$

where we have assumed 3 different size classes (small, medium and large) and 9 two-digit industries. Accordingly the proportion of manufacturing output produced by firm of size j in industry i, Tij, is given by

$$(2) \qquad T_{ij} = S_{ij} * C_i$$

Taking logs of both sides, we get

$$(3) \qquad \ln T_{ij} = \ln S_{ij} + \ln C_i$$

We can then examine the importance of structure and composition by estimating

$$(4) \qquad \ln T_{ij} = \alpha_0 + \alpha_1 \ln S_{ij}$$

$$(5) \qquad \ln T_{ij} = \beta_0 = \beta_1 \ln C_i$$

where the observations for the estimation are drawn from a data set, containing industrial employment information for 85 countries (see appendix 1b). Provided that the covariance between Sij and Ci is second-order small, then the correlation coefficients for equations (4) and (5) will provide a good guide to the relative importance of structure and composition.

If, for example, the correlation between the variables in equation 4 is 75% and that in equation 5 is 25%, then we can safely conclude that for variations in structure are roughly three times as important as those in composition in explaining the estimated Tij. However, as the covariance between Sij and Ci increases, statistical inference of this kind becomes less compelling. To find out this covariance, we need to estimate

$$(6) \qquad \ln S_{ij} = d_0 + d_1 \ln C_i$$

If the correlation between the variables in equation 6 rises much above .1, then it becomes very hard to disentangle the separate effects of composition and structure on Tij.

To conduct this analysis, we used pooled data from a large sample of developing and developed economies. The shares of 3 size classes of firm (small < 20 employees; medium 20 - 100 employees; large > 100 employees) were calculated for each country at the two, or where possible, at the three digit level. While there are certain problems in using employment data - not least that they tend to under-represent large capital-intensive firms - the great advantage is that it permits a sufficiently large sample size for most industries.

The complete results of the data analysis are presented in appendix 2. Table 4.1 displays the results only for those industries where we could distinguish "clean" compositional from structural effects.

The main findings of the study are as follows. First, both structure and composition matter in almost every industry for every size class of firm. Only in very rare instances, are variations in (eg) the share of large firms in a given industry explained only by differences in that industry's importance across countries.

Second, it appears to be the case that in most industries, compositional effects are more important than structural influences in determining the Tij for large firms. Remember that the Tij is the product of the share of industry i in manufacturing output and the proportion of that industry's output produced by firms of size j. In other words, the contribution to manufacturing GNP of large firms in a given industry, say industrial chemicals, is on average determined more by the share of that industry in GNP than by differences in industry structure. One clear implication of this finding is that the easiest way to reduce the share of the large firm sector is to reform policies which discriminate in favor of those industries where large firms dominate the market.

Conversely, in most industries structural effects are a more important determinant than composition for the Tij of small

Table 5.1

A

Industries in which structure clearly more important than composition for small firms.

Definition	ISIC	R2: Equation 4	R2: Equation 5	R2: Equation 6
Food manufacturing	110	.77	.49	.074
Beverages	130	.75	.48	.056
Wearing apparel	220	.84	.36	.05
Chemical products	520	.956	.015	.008
Nonelectrical machinery	820	.87	.58	.037
Electrical machinery	830	.87	.58	.085
Transport equipment	840	.9	.64	.096
Scientific equipment	850	.96	.037	.012

B

Industries in which structure clearly more important than composition for medium firms.

Definition	ISIC	R2: Equation 4	R2: Equation 5	R2: Equation 6
Food manufacturing	110	.64	.56	.05
Wearing apparel	220	.66	.497	.026
Chemical products	520	.79	.336	.02
Nonelectrical machinery	820	.67	.58	.06
Electrical machinery	830	.77	.47	.062
Scientific equipment	850	.94	.037	.002

C

Industries in which structure clearly more important than composition for large firms.

Definition	ISIC	R2: Equation 4	R2: Equation 5	R2: Equation 6
Chemical products	520	.78	.1	.02
Nonelectrical machinery	820	.66	.54	.04
Scientific equipment	850	.82	.35	.036

D

Industries in which composition clearly more important than structure for large firms.

Definition	ISIC	R2: Equation 4	R2: Equation 5	R2: Equation 6
Food, beverages	100	.45	.77	.057
Food	110	.2	.746	.04
Beverages	130	.28	.86	.03
Wearing apparel	220	.48	.57	.004
Printing	420	.44	.76	.045
Chemicals	500	.32	.91	.093
Chemical products	510	.5	.79	.094
Nonmetallic minerals	610	.53	.77	.1
Cement	690	.44	.7	.02
Nonferrous basic metal	720	.39	.87	.09
Electrical machinery	830	.53	.69	.046
Transport equipment	840	.48	.726	.043

E

Overall fit all industries

Size`	Countries	R2: Equation 4	R2: Equation 5	R2: Equation 6
S	All	.767	.68	.2
M	All	.61	.8	.18
L	All	.4	.859	.087
S	Income<Mean	.77	.69	.213
M	Income<Mean	.626	.811	.2
L	Income<Mean	.41	.88	.117
S	Income>Mean	.76	.65	.173
M	Income>Mean	.575	.77	.127
L	Income>Mean	.39	.795	.041

Where mean = $3260 pc.

firms. That is not to say that the composition of output does not matter. If small firms are under-represented in a country, when compared to the average aggregate size distribution of other countries at the same stage of development, then part of the problem is that composition is biased toward those industries where large firms are dominant.

The story for medium size firms falls somewhere in between that for large and small enterprises. On average, however, it seems that variations in structure, rather than in composition, explain more of the product of the two forces (the Tij term) for the middle size of firms.

The overall picture can be clarified with a bit more terminology. Let Tis, Tim and Til be the product terms for small, medium and large firms respectively. The variations in each term, across countries, is the product of differences in the share of industry i (Ci) and differences in the proportion of output produced by each size class of firm (Sij). Our results seem to suggest that, in many industries, the share of output produced by large firms does not vary much across countries. More precisely, variations in the share of output produced by large firms (Sil) are less closely correlated than variations in the composition of output with movements in the product term (Til). The opposite result is true in particular for small but also for medium firms. This implies that, in any given industry, the share of output produced by large firms is less likely to vary across countries than the shares of small and medium firms. This in turn means that much of the variance in the shares of small and medium firms must be explained by an inverse relationship between their shares.

The same point can be made in less theoretical jargon. If, in say the Philippines, small firms appear to be doing surprisingly well in the food processing industry, then the reason is probably that medium size firms are doing surprisingly badly. Competition between small and medium firms for room in the market place has only a marginal impact on the proportion of output produced by large firms. The fight for shares takes place between small and medium firms, not between the three size classes. So policies which improve the competitive position of small firms are likely to do so at the expense of medium, rather than large, firms.

We stress again that this result holds <u>on average</u> and will not be true in every industry or in every country. However, the results in Table 5.1 do confirm the validity of the <u>average</u> result for a number of industries. In the food-processing (110), footwear (220) and the electrical machinery (830) industries, the share of large firms is <u>relatively</u> fixed, while that of small and medium firms varies more significantly. On the other hand, in the chemical products (520), non-electrical machinery (820), and

scientific equipment (850) industries, our results show that the share of all three size classes vary from country to country. These three industries might be particularly valuable ones to study in that the technological characteristics of the product do not appear to have as much influence on shares as elsewhere in industry. Policy, which is not size-neutral, is likely to have an especially important effect on shares in these industries.

What are the implications of these results for policy?

First, in that composition and structure matter for almost every industry across each of the three size classes of firm, the aggregate size distribution of firms will be influenced by a lack of even-handedness with respect both to size and to sector. Our results give little indication as to which non-neutrality might matter more.

Second, on average the first best way to reduce the share of large firms in total manufacturing output is likely to be the elimination of policy biases in favor of those industries where production is particularly concentrated. This will often have the beneficial side-effect of a rationalization in trade policy.

Third, it will often be counter-productive to implement policies which improve the competitive basis of small and medium firms. Such policies will only raise the stakes in a fight for market shares at the bottom end of the size distribution. Special assistance packages for small and medium enterprises are appropriate only in those industries where the share of large firms has been artificially increased by policy non-neutralities.

The correct formulation of policy requires extremely careful micro-analytic fieldwork. In each country where EEPA has a long term project, we will need to look carefully at the effects of policy on composition and structure. There are two priorities in policy analysis. First, we need to identify those policies which distort the composition of output in a way that increases the share of large firms. Second, we need to acquire information regarding the impact of size non-neutralities on the structure of particular industries. While the results of this statistical provide some guidance, they are at best a starting point for the analysis.

APPENDIX 1

Industrial Census Results Collected as of 6/30/86
I. Establishments 85 Countries

Country	Year	Lower Bound	Upper Bound	Number of groups	ISIC Digits	Source
Algeria						
Angola						
Argentina						
Australia	1963	<4	1000+	13	2	Manufacturing Industry
Australia	1964	<4	1000+	13	2	Manufacturing Industry
Australia	1965	<4	1000+	13	2	Manufacturing Industry
Australia	1966	<4	1000+	13	2	Manufacturing Industry
Australia	1967	<4	1000+	13	2	Manufacturing Industry
Australia	1968	<4	1000+	13	2	Manufacturing Industry
Australia	1969	<5	100+	6	5	Manufacturing Industry
Australia	1973	1	1000+	8	2	UN 1973
Austria	1954	1	1000+	10	2	Ehrlich
Austria	1960	6	501+	6	2	Ehrlich
Austria	1964	1	1000+	9	2	Ehrlich
Austria	1970	1	501+	6	2	Ehrlich
Austria	1973	1	1000+*	8*	2	Un 1973
Bangladesh						
Belgium	1961	1	1000+	9	4	Recensement de l'industrie
Belgium	1967	5	200+	6	Strange	Statistiques industrielles
Belgium	1970	1	1000+	9	2	UN 1970
Bolivia	1967	1	41+	11	3	Estatisticas industrias
Bolivia	1979	<5	1000+	14	4	Estatisticas industrias
Brazil	1960	1	1000+	9	3	Censo Industrial
Brazil	1970	1	10000+	16	3	Censo Industrial
Brazil	1973	1	1000+	9	2	U.N. 1973
Brazil	1975	1	500+	8	3	Censo Industrial
Brazil	1980	1	500+	8	3	Censo Industrial
Bulgaria	1970	11	2000+	8	2	Ehrlich
Burundi						
Cameroon	1974	<10	500+	7	3	Recensement industriel
Cameroon	1976	<20	501+	6	3	ditto
Canada	1929	<5	501+	7	3	Manuf Industries
Canada	1939	<5	501+	7	1	Manuf Industries
Canada	1944	<5	501+	7	1	Genl Manufacturing
Canada	1950	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1955	<4	1500	9	3	Manufacturing ind
Canada	1958	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1959	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1960	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1961	<5	1000+*	8*	1	Genl Review of Manufact

Canada	1968	<4	1000+	8	3	Manuf Ind: section B
Canada	1972	1	1000+	9	4	Manuf Industries
Canada	1973	1	1000+	9	4	Manuf Industries
Chile	1967	5	1000+	8	3	World Bank study
China						
Colombia	1964	5	200+	7	1	Berry Book
Colombia	1970	5	200+	4	3	Boletin Mensual
Colombia	1973	1	100+	6	2	Un 1973
Colombia	1974	<5	200+	10	3	Industria manufactura
Colombia	1981	<5	200+	10	3	Industria manufactura
Colombia	1982	<5	200+	10	3	Industria manufactura
Congo						
Costa Rica	1958	1	70+	9	3	Censo de industrias
Costa Rica	1964	1	70+	9	3	Censo de industrias
Costa Rica	1975	1	150+	9	3	Censo de manufacturas
Cyprus	1954	1	1000+	7	3	Census of industn prodn 1962
Cyprus	1962	1	1000+	7	3	Census of industn prodn 1962
Cyprus	1967	1	100-499	8	4	ditto
Cyprus	1972	1	100+	8	4	ditto
Cyprus	1976	<5	5+	2	3	Indust prodn survey, 1979
Cyprus	1979	<5	500+	8	2	Indust prodn survey
Cyprus	1980	<5	500+	8	2	
Cyprus	1981	<5	500+	8	2	
Cyprus	1982	1	500+	9	3	ditto
Cyprus	1983	1	500+	9	3	ditto
Czechoslovakia	1960	11	2500+	8	2	Ehrlich
Czechoslovakia	1970	11	2500+	8	2	Ehrlich
Czechoslovakia	1973	1	1000+	9	2	UN 1973
Dominican Republic	1963				1	Estadistica industrial
Ecuador	1975	<7	500+	9	2	Censo de industrias
Ecuador	1976	<7	500+	9	2	Censo de Industrias
Ecuador	1980	1	500+	9	2	Censo de manufactura
Egypt						
El Salvador	1951	6	501+	8	3	Censo industrial
El Salvador	1961	5	500+	8	3	Censo industrial
El Salvador	1971	1	100+	6	5	Censo industrial
Ethiopia						
FRG	1962	1	1000+	8	2	Ehrlich
FRG	1967	1	1000+	8	2	Ehrlich
FRG	1970	1	1000+	8	2	Ehrlich
Finland	1973	1	1000+	9	2	UN 1973
France	1954	1	5000+	20	5	Etablissement industriels
France	1962	1	5000+	16	5	Etablissement industriels
France	1968	1	5000+	13	5	Etablissement industriels*
France	1971	1	5000+	7	5	Etablissement industriels*
Gambia						
German Dem. Rep.	1956	11	2501+	8	2	Ehrlich
German Dem. Rep.	1960	11	2501+	8	2	Ehrlich
German Dem. Rep.	1965	11	2501+	8	2	Ehrlich
German Dem. Rep.	1970	11	2501+	8	2	Ehrlich

Ghana	1959	6	500+	5	1	Industrial statistics
Ghana	1962	1	500+	10	1	Ind census report
Ghana	1963	<99	100+	2	1	Industrial statistics
Ghana	1964	ditto				
Ghana	1966	ditto				
Ghana	1967	ditto				
Ghana	1968	ditto				
Ghana	1973	10	1000+	7	2	UN 1973
Greece	1963	<10	30+	4	2/3	Annual industrial survey
Greece	1964	ditto				
Greece	1965	ditto				
Greece	1966	ditto				
Greece	1967	ditto				
Greece	1969	ditto				
Greece	1970	*				
Greece	1973	1	100+	6	2	UN 1973
Guatemala	1965	1	500+	13	4	UN 1973
Guatemala	1974	5	51+	4	2	Encuesta Industrial
Guatemala	1975	5	50+	4	4	Encuesta Industrial
Hong Kong	1971	1	1000+	8	4	Census of manufact. estab
Hong Kong	1973	1	1000+*	7*	4	Survey of Ind. Prodn.
Hong Kong	1978 *	1	1000+*	7*	4	Survey of Ind Prodn.(rep)
Hong Kong	1978	1	100+	4	4	Survey of Ind Prod
Hungary	1955	11	2001+	8	2	Ehrlich
Hungary	1960	ditto				
Hungary	1965	ditto				
Hungary	1970	ditto				
India	1971	10	500+	6	3	Census Estab. Tables
India	1977	1	100+	4	5	Report on small scale estab.
Indonesia	1974	20	500+	4	5	Industrial Census
Iraq	*					
Ireland						
Israel	1964	1	300+	10	2	Industry and Crafts Survey
Israel	1965	1	100+	6	3	Census of Industry and Crafts
Israel	1967	5	300+	9	2	Industry and Crafts Survey
Israel	1968	5	300+	9	2	Industry and Crafts Survey
Israel	1969	ditto				
Israel	1970	ditto				
Israel	1971	ditto				
Israel	1972	ditto				
Israel	1973	5	300+	6	2	UN 1973
Israel	1975	5	300+	9	2	Industry and Crafts Survey
Israel	1976	ditto				
Israel	1977	ditto				
Israel	1979	ditto				
Israel	1981	ditto				
Italy	1951	1	1000+	6	2	Ehrlich
Italy	1961	1	2000+	12	2	Ehrlich
Italy	1971	1	1000+	9	2	UN 1973
Ivory Coast						

Jamaica	1960	<15	15+	2	3	Industrial activity
Japan	1951	1	500+	7	3	Establishment Census
Japan	1954	1	500+	7	3	Establishment Census
Japan	1957	1	500+	7	3	Establishment Census
Japan	1960 *	1	1000+	14	4	Establishment Census
Japan	1960	1	500+	7	3	Establishment Census
Japan	1973	1	1000+	9	2	UN 1973
Japan	1978	1	300+	9	3	Establishment Census
Jordan	1972	5	200+	6	1	Jordan statistical yearbook
Jordan	1973	ditto				
Jordan	1974	ditto				
Jordan	1975	ditto				
Jordan	1976	ditto				
Kenya	1961	5	50+	3	2/3	Census of ind prodn,1967\
Kenya	1963	ditto				
Kenya	1967	nothing				
Kenya	1972	1	100+	5	2/3	ditto,1972
Kenya	1973	1	50+	4	2/3	Report on surveys of ind pro
Kenya	1974	ditto				
Kenya	1975	ditto				
Kenya	1976	ditto				
Korea	1966	5	1000+	12	3	Report on Mining & Man
Korea	1973	1	500+	8	2	UN 1973
Korea	1976	5	500+*	8	5	Report on Mining & Manuf
Korea	1977	5	500+*	8	5	Report on Mining & Manuf
Korea	1978	5	500+*	8	5	Report on Mining & Manuf
Korea	1979	5	500+*	8	5	Report on Mining & Manuf
Korea	1980	5	500+*	8	5	Report on Mining & Manuf
Korea	1981	5	500+*	8	5	Report on Mining & Manuf
Korea	1982					
Kuwait	1970	1	500+	9	1	Statistical Abstract,1974
Kuwait	1973	ditto				Stat Abstract,1981
Kuwait	1974	1	10+	3	2	UN 1973
Kuwait	1975	ditto				Stat Abstract,1981
Lebanon						
Liberia						
Malawi						
Malaysia						
Mauritania						
Mauritius	1964	3	400+	10	2	Census of ind prodn
Mauritius	1968	1	400+	18	2	ditto
Mexico	1965	<5	501+*	9*	5	Censo industrial
Mexico	1971	<5	551+*	10*	5	Censo industrial
Mexico	1979	<5	751+*	10*	5	Censo industrial
Morocco						
Nigeria	1968	10	1000+	7	4	Industrial Survey
Nigeria	1969	ditto				
Nigeria	1970	ditto				
Norway	1973	1	200+	7	3	UN 1973
Pakistan	1955	<20	500+	6	3	Census of Manuf Industry

Pakistan	1957	<20	1000+	7	3	Census of Manuf Industry
Pakistan	1958	<20	1000+	7	3	Census of Manuf Industry
Pakistan	1960	<20	1000+	7	4	Census of Manuf Industry
Pakistan	1967	<20	1000+	7*	3	Census of Manuf Industry
Pakistan	1970	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1975	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1979	<10	5000+	10*	3	Annual Estab Enquiry
Panama	1973	1	200+	7	2	UN 1973
Paraguay	1963	1	100+	7	3	Censos economicos
Peru	1963	5	500+	8	3	Censo de manufacturas
Peru	1973	1	500+	8	2	UN 1973
Peru	1974	1	500+	9	3	Censo economicos
Philippines	1958	20	1000+	4	3	Annual survey of manufacturin
Philippines	1961	<5	1000+	9	5	Economic census
Philippines	1967	<10	500+	8	5	Economic census
Poland	1965	11	2000+	8	2	Ehrlich
Poland	1970	ditto				
Portugal	1964	21	1001+	6	3	Inquerito Industrial
Portugal	1971	1	1000+	9	4	Estatisticas industrias
Portugal	1972	1	1000+	9	4	Estatisticas industrias
Portugal	1973	1	1000+	9	4	Estatisticas industrias
Portugal	1974	1	1000+	9	4	Estatisticas industrias
Portugal	1975	1	1000+	9	4	Estatisticas industrias
Portugal	1976	1	1000+	9	4	Estatisticas industrias
Portugal	1977	1	1000+	9	4	Estatisticas industrias
Portugal	1978	1	1000+	9	4	Estatisticas industrias
Portugal	1979	1	1000+	9	4	Estatisticas industrias
Portugal	1980	1	1000+	9	4	Estatisticas industrias
Puerto Rico	1967	<5	500+	8	5	US Census of manufacturing
Puerto Rico	1972	1	500+	8	4	US Census of manufacturing
Puerto Rico	1977	1	500+	8	4	US Census of manufacturing
Romania	1959	<20	2001+	8	2	Ehrlich
Romania	1965	<20	2001+	8	2	Ehrlich
Rwanda						
Saudi Arabia	1968	1	200+	9	2	Statistical Yearbook
Saudi Arabia	1971	1	100+	7	1	Statistical Yearbook, 1972
Saudi Arabia	1976	1	100+	8	2	Statistical Yearbook, 1977
Saudi Arabia	1981	1	100+	7	2	Statistical Yearbook, 1982
Senegal						
Sierra Leone						
Singapore	1962	10	100+	3	3	Census of indust prodn
Singapore	1964	10	100+	3	3	Census of indust prodn
Singapore	1968	10	100+	3	3	Census of indust prodn
Singapore	1970	10	100+	3	3	Census of indust prodn
Singapore	1972	10	100+	3	3	Census of indust prodn
Singapore	1974	10	100+	3	3	Census of indust prodn
Singapore	1976	10	100+	3	3	Census of indust prodn
Singapore	1978	10	100+	3	3	Census of indust prodn
Singapore	1980	10	100+	3	3	Census of indust prodn
South Africa	1966	1	1000+*	11	2	Census of manufacturing

Sri Lanka						
Sudan						
Sweden	1960	<9	1000+	4	4	Statistical Yearbook
Sweden	1961	<9	1000+	4	4	Statistical Yearbook
Sweden	1962	<9	1000+	4	4	Statistical Yearbook
Sweden	1963	<9	1000+	4	4	Statistical Yearbook
Sweden	1964	<9	1000+	4	4	Statistical Yearbook
Sweden	1965	<9	1000+	4	4	Statistical Yearbook
Sweden	1966	<9	1000+	4	4	Statistical Yearbook
Sweden	1967	<9	1000+	4	4	Statistical Yearbook
Sweden	1968	<9	1000+	4	4	Statistical Yearbook
Sweden	1969	<9	1000+	4	4	Statistical Yearbook
Sweden	1970	<9	1000+	4	4	Statistical Yearbook
Sweden	1971	<9	1000+	4	4	Statistical Yearbook
Sweden	1972	<9	1000+	4	4	Statistical Yearbook
Sweden	1973	<9	1000+	4	4	Statistical Yearbook
Sweden	1974	<9	1000+	4	4	Statistical Yearbook
Sweden	1975	<9	1000+	4	4	Statistical Yearbook
Sweden	1976	<9	1000+	4	4	Statistical Yearbook
Sweden	1977	<9	1000+	4	4	Statistical Yearbook
Sweden	1978	<9	1000+	4	4	Statistical Yearbook
Sweden	1979	<9	1000+	4	4	Statistical Yearbook
Sweden	1980	<9	1000+	4	4	Statistical Yearbook
Sweden	1981	<9	1000+	4	4	Statistical Yearbook
Switzerland	1955	1	1000+	11	2	Ehrlich
Switzerland	1960	1	1000+	11	2	Ehrlich
Switzerland	1965	1	1000+	11	2	Ehrlich
Switzerland	1970	1	1000+	11	2	Ehrlich
Switzerland	1975	1	500+	6	2	UN 1973
Syria						
Taiwan						
Tanzania	1966	10	500+	5	2	Survey of Industrial Producti
Tanzania	1970	10	500+	5	3	Survey of Industrial Producti
Tanzania	1972	10	500+	5	3	Survey of Industrial Producti
Thailand	1964	<10	100+	5	3	Industrial Census
Tunisia	1969	1	100+	5	2	Recensement des Activites Ind
Tunisia	1970	ditto				
Tunisia	1975	ditto				
Tunisia	1976	ditto				
Tunisia	1977	ditto				
Tunisia	1978	ditto				
Tunisia	1979	ditto				
Turkey	1964	1	1000+	9	2	Census of Manufacturing
Turkey	1970	1	1000+	9	2	UN 1973
Uganda	1964	10	100+	4	2	Survey of Industrial Producti
Uganda	1965	5	1000+	8	3	ditto
Uganda	1966	10	1000+	8	3	ditto
Uganda	1967	10	1000+	7	3	ditto
Uganda	1968	10	1000+	7	3	ditto
Uganda	1969	10	1000+	7	4	ditto

Uganda	1971	5	1000+	8	2	UN 1973
United Kingdom						
United States						
Uruguay	1968	1	100+	5	3	Censo economico
Venezuela	1974	1	101+	5	2	UN 1973
Yugoslavia	1955	<30	2001+	8	2	Ehrlich
Yugoslavia	1962	<30	2001+	8	2	Ehrlich
Yugoslavia	1966	<30	2001+	8	2	Ehrlich
Yugoslavia	1973	<30	2001+	8	2	Ehrlich
Zambia						
Zimbabwe						

Industrial Census Results Collected as of 6/30/86
II. Employment 85 Countries

Country	Year	Lower Bound	Upper Bound	Number of groups	ISIC Digits	Source
Algeria						
Angola						
Argentina						
Australia	1963	<4	1000+	13	2	Manufacturing Industry
Australia	1964	<4	1000+	13	2	Manufacturing Industry
Australia	1965	<4	1000+	13	2	Manufacturing Industry
Australia	1966	<4	1000+	13	2	Manufacturing Industry
Australia	1967	<4	1000+	13	2	Manufacturing Industry
Australia	1968	<4	1000+	13	2	Manufacturing Industry
Australia	1969	<5	100+	6	5	Manufacturing Industry
Austria	1954	1	1000+	9	2	Ehrlich
Austria	1960	6	501+	6	2	Ehrlich
Austria	1964	1	1000+	8	2	Ehrlich
Austria	1970	1	501+	6	2	Ehrlich
Austria	1973	1	1000+*	8*	2	Un 1973
Bangladesh						
Belgium	1961	1	1000+	9	4	Recensement de l'industrie
Belgium	1970	1	1000+	9	2	UN 1970
Bolivia	1979	<5	1000+	14	4	Estatisticas industrias
Brazil	1960	1	1000+	9	3	Censo Industrial
Brazil	1970	1	10000+	16	3	Censo Industrial
Brazil	1973	1	1000+	9	2	U.N. 1973
Brazil	1975	1	500+	8	3	Censo Industrial
Brazil	1980	1	500+	8	3	Censo Industrial
Bulgaria	1970	11	2000+	8	1	Ehrlich
Burundi						
Cameroon	1974	nothing				Recensement industriel
Cameroon	1976	nothing				ditto
Canada	1929	<5	501+	7	3	Manuf Industries
Canada	1939	<5	501+	7	1	Manuf Industries
Canada	1944	<5	501+	7	1	Genl Manufacturing
Canada	1950	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1955	<4	1500	9	3	Manufacturing ind
Canada	1958	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1959	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1960	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1961	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1968	<4	1000+	8	3	Manuf Ind: section B
Chile	1967	5	1000+	8	3	World Bank study
China						

Colombia	1956	5	100+	3	3	Berry book
Colombia	1964	<5	100+	4	3	Berry Book
Colombia	1973	1	100+	6	2	Un 1973
Colombia	1974	<5	200+	10	3	Industria manufactura
Colombia	1981	<5	200+	10	3	Industria manufactura
Colombia	1982	<5	200+	10	3	Industria manufactura
Colombia	1975	5	100+	3	3	Berry book
Congo						
Costa Rica	1958	1	70+	9	3	Censo de industrias
Costa Rica	1964	1	70+	9	3	Censo de industrias
Costa Rica	1975	1	150+	9	1	Censo de manufacturas
Cyprus	1954	1	1000+	7	3	Census of industn prodn 1962
Cyprus	1962	1	1000+	7	2	Census of industn prodn 1962
Cyprus	1967	1	499	8	4	ditto
Cyprus	1972	1	100+	8	4	ditto
Cyprus	1976	<5	5+	2	2	Indust prodn survey, 1979
Cyprus	1979	<5	500+	8	2	Indust prodn survey
Cyprus	1980	ditto				
Cyprus	1981	ditto				
Cyprus	1982	1	500+	9	3	ditto
Cyprus	1983	1	500+	9	3	ditto
Czechoslovakia	1970	11	2500+	8	2	Ehrlich
Czechoslovakia	1973	1	1000+	9	2	UN 1973
Dominican Republic	1963				1	Estadistica industrial
Ecuador	1975	<7	500+	9	2	Censo de industrias
Ecuador	1976	<7	500+	9	2	Censo de Industrias
Ecuador	1980	1	500+	9	2	Censo de manufactura
Egypt						
El Salvador	1951	6	501+	8	3	Censo industrial
El Salvador	1961	5	500+	8	3	Censo Industrial
El Salvador	1971	1	100+	6	5	
Ethiopia						
FRG	1962	1	1000+	8	2	Ehrlich
FRG	1967	1	1000+	8	2	Ehrlich
FRG	1970	1	1000+	8	2	Ehrlich
Finland	1973	1	1000+	9	2	UN 1973
France	1954	1	5000+	20	5	Etablissement industriels
France	1962	1	5000+	16	5	Etablissement industriels
France	1968	1	5000+	13	5	Etablissement industriels
France	1971	1	5000+	7	5	Etablissement industriels
Gambia						
German Dem. Rep	1956	11	2501+	8	2*	Ehrlich
German Dem. Rep.	1960	11	2501+	8	2*	Ehrlich
German Dem. Rep.	1965	11	2501+	8	2*	Ehrlich
German Dem. Rep.	1970	11	2501+	8	2*	Ehrlich
Ghana	1959	6	500+	5	1	Industrial statistics
Ghana	1962	1	500+	10	1	Ind census report
Ghana	1963	<99	100+	2	1	Industrial statistics
Ghana	1964	ditto				
Ghana	1966	ditto				

Ghana	1967	ditto				
Ghana	1968	ditto				
Ghana	1973	10	1000+	7	2	UN 1973
Greece	1963	<10	30+	4	2/3	Annual industrial survey
Greece	1964	ditto				
Greece	1965	ditto				
Greece	1966	ditto				
Greece	1967	ditto				
Greece	1969	ditto				
Greece	1970	*				
Greece	1973	1	100+	6	2	UN 1973
Guatemala	1965	1	500+	13	3	Censo Industrial
Guatemala	1974	5	51+	4	2	U.N. 1973
Guatemala	1975	5	50+	4	4	Encuesta Industrial
Hong Kong	1971	1	1000+	8	4	Census of manufact. estab
Hong Kong	1973	1	1000+*	7*	4	Survey of Ind. Prodn.
Hong Kong	1978 *	1	1000+*	7*	4	Survey of Ind Prodn. (rep)
Hong Kong	1978	1	100+	4	4	Survey of Ind Prod
Hungary	1955	11	2001+	8	2	Ehrlich
Hungary	1955	11	2001+	8	2	Ehrlich
Hungary	1955	11	2001+	8	2	Ehrlich
Hungary	1955	11	2001+	8	2	Ehrlich
India	1971	10	500+	6	3	Census Estab. Tables
Indonesia						
Iraq	*					
Ireland						
Israel	1964	1	300+	10	2	Industry and Crafts Survey
Israel	1965	1	100+	6	3	Census of Industry and Crafts
Israel	1967	5	300+	9	2	Industry and Crafts Survey
Israel	1968	5	300+	9	2	Industry and Crafts Survey
Israel	1969	ditto				
Israel	1970	ditto				
Israel	1971	ditto				
Israel	1972	ditto				
Israel	1973	5	300+	6	2	UN 1973
Israel	1975	5	300+	9	2	Industry and Crafts Survey
Israel	1976	ditto				
Israel	1977	ditto				
Israel	1979	ditto				
Israel	1981	ditto				
Italy	1951	1	1000+	6	2	Ehrlich
Italy	1961	1	1000+	10	2	Ehrlich
Italy	1971	1	1000+	9	2	UN 1973
Ivory Coast						
Jamaica	1960	<15	15+	2	3	Industrial activity
Japan	1951	1	500+	7	3	Establishment Census
Japan	1954	1	500+	7	3	Establishment Census
Japan	1957	1	500+	7	3	Establishment Census
Japan	1960	1	500+	7	3	Establishment Census
Japan	1960 *	1	1000+	14	4	ditto

Japan	1973	1	1000+	9	2	UN 1973
Japan	1978	1	300+	9	3	Establishment Census
Jordan	1972	5	200+	6	1	Jordan statistical yearbook
Jordan	1973	ditto				
Jordan	1974	ditto				
Jordan	1975	ditto				
Jordan	1976	ditto				
Kenya	1961	5	50+	3	2/3	Census of ind prodn,1967\
Kenya	1963	ditto				
Kenya	1967	nothing				
Kenya	1972	1	100+	5	2/3	ditto,1972
Kenya	1973	1	50+	4	2/3	Report on surveys of ind prod
Kenya	1974	ditto				
Kenya	1975	ditto				
Kenya	1976	ditto				
Korea	1966	5	1000+	12	3	Report on Mining & Man
Korea	1973	1	500+	8	2	UN 1973
Korea	1976	5	500+*	8	5	Report on Mining & Manuf
Korea	1977	5	500+*	8	5	Report on Mining & Manuf
Korea	1978	5	500+*	8	5	Report on Mining & Manuf
Korea	1979	5	500+*	8	5	Report on Mining & Manuf
Korea	1980	5	500+*	8	5	Report on Mining & Manuf
Korea	1981	5	500+*	8	5	Report on Mining & Manuf
Korea	1982					
Kuwait	1970	1	500+	9	1	Statistical Abstract,1974
Kuwait	1973	1	500+	9	1	Stat Abstract,1981
Kuwait	1974	1	10+	3	2	UN 1973
Kuwait	1975	1	500+	9	1	Stat Abstract,1981
Lebanon						
Liberia						
Malawi						
Malaysia						
Mauritania						
Mauritius	1964	nothing				Census of ind prodn
Mauritius	1968	nothing				ditto
Mexico	1965	<5	501+*	9*	5	Censo industrial
Mexico	1971	<5	551+*	10*	5	Censo industrial
Mexico	1979	<5	751+*	10*	5	Censo industrial
Morocco						
Nigeria	1968	10	1000+	7	4	Industrial Survey
Nigeria	1969	ditto				
Nigeria	1970	ditto				
Norway	1973	1	200+	7	3	UN 1973
Pakistan	1957	<20	1000+	6	3	Census of Manuf Industry
Pakistan	1958	<20	1000+	7	3	Census of Manuf Industry
Pakistan	1960	<20	1000+	7	4	Census of Manuf Industry
Pakistan	1970	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1975	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1979	<10	5000+	10*	3	Annual Estab Enquiry
Panama	1973	1	200+	7	2	UN 1973

araguay	1963	1	100+	7	3	Censos economicos
eru	1963	5	500+	8	3	Censo de manufacturas
eru	1973	1	500+	8	2	UN 1973
eru	1974	1	500+	9	3	Censo economicos
hilippines	1958	20	500+	4	3	Annual survey of manufacturin
hilippines	1967	<10	10+	2	5	Economic census
oland	1965	11	2000+	8	2	Ehrlich
oland	1970	11	2000+	6	2	Ehrlich
ortugal	1964	21	1001+	6	3	Inquerito Industrial
ortugal	1972	<5	5+	2	3	Recenseamento Industrial
uerto Rico	1967	<5	500+	8	5	US Census of manufacturing
uerto Rico	1972	1	500+	8	4	US Census of manufacturing
uerto Rico	1977	1	500+	8	4	US Census of manufacturing
omania	1959	<20	2001+	8	2	Ehrlich
omania	1965	<20	2001+	8	2	Ehrlich
wanda						
audi Arabia	1968	nothing				Statistical Yearbook
audi Arabia	1971	nothing				Statistical Yearbook, 1972
audi Arabia	1976	1	100+	8	2	Statistical Yearbook, 1977
audi Arabia	1981	1	100+	7	2	Statistical Yearbook, 1982
enegal						
ierra Leone						
ingapore						
outh Africa	1966	1	1000+*	11	2	Census of manufacturing
ri Lanka						
udan						
weden	1960	<9	1000+	4	4	Statistical Yearbook
weden	1961	<9	1000+	4	4	Statistical Yearbook
weden	1962	<9	1000+	4	4	Statistical Yearbook
weden	1963	<9	1000+	4	4	Statistical Yearbook
weden	1964	<9	1000+	4	4	Statistical Yearbook
weden	1965	<9	1000+	4	4	Statistical Yearbook
weden	1966	<9	1000+	4	4	Statistical Yearbook
weden	1967	<9	1000+	4	4	Statistical Yearbook
weden	1968	<9	1000+	4	4	Statistical Yearbook
weden	1969	<9	1000+	4	4	Statistical Yearbook
weden	1970	<9	1000+	4	4	Statistical Yearbook
weden	1971	<9	1000+	4	4	Statistical Yearbook
weden	1972	<9	1000+	4	4	Statistical Yearbook
weden	1973	<9	1000+	4	4	Statistical Yearbook
weden	1974	<9	1000+	4	4	Statistical Yearbook
weden	1975	<9	1000+	4	4	Statistical Yearbook
weden	1976	<9	1000+	4	4	Statistical Yearbook
weden	1977	<9	1000+	4	4	Statistical Yearbook
weden	1978	<9	1000+	4	4	Statistical Yearbook
weden	1979	<9	1000+	4	4	Statistical Yearbook
weden	1980	<9	1000+	4	4	Statistical Yearbook
weden	1981	<9	1000+	4	4	Statistical Yearbook
witzerland	1955	1	1000+	11	2	Ehrlich
witzerland	1960	1	1000+	11	2	Ehrlich

Switzerland	1965	1	1000+	11	2	Ehrlich
Switzerland	1970	1	1000+	11	2	Ehrlich
Switzerland	1975	1	500+	6	2	UN 1973
Syria						
Taiwan	1971	1-3	500+	6	2	World Bank Staff Wkg Paper 38
Tanzania	1966	10	500+	5	2	Survey of Industrial Producti
Tanzania	1970	nothing				Survey of Industrial Producti
Tanzania	1972	nothing				Survey of Industrial Producti
Thailand	1964	<10	100+	5	3	Industrial Census
Tunisia	1969	1	100+	5	2	Recensement des Activites Ind
Tunisia	1970	ditto				
Tunisia	1975	ditto				
Tunisia	1976	ditto				
Tunisia	1977	ditto				
Tunisia	1978	ditto				
Tunisia	1979	ditto				
Turkey	1964	1	1000+	9	2	Census of Manufacturing
Turkey	1970	1	1000+	9	2	UN 1973
Uganda	1964	10	100+	4	2	Survey of Industrial Producti
Uganda	1965	5	1000+	8	3	ditto
Uganda	1966	10	1000+	8	3	ditto
Uganda	1967	10	1000+	7	3	ditto
Uganda	1968	10	1000+	7	3	ditto
Uganda	1969	10	1000+	7	4	ditto
Uganda	1971	5	1000+	8	2	UN 1973
United Kingdom						
United States						
Uruguay						
Venezuela	1974	1	101+	5	2	UN 1973
Yugoslavia	1955	<30	1001+	7	2	Ehrlich
Zambia						
Zimbabwe						

Industrial Census Results Collected as of 6/30/86
III. Gross Output 85 Countries

Country	Year	Lower Bound	Upper Bound	Number of groups	ISIC Digits	Source
Algeria						
Angola						
Argentina						
Australia	1969	<5	100+	6	5	Manufacturing Industry
Australia	1973	1	1000+	8	2	UN 1973
Austria	1973	1	1000+*	8*	2	Un 1973
Bangladesh						
Belgium						
Bolivia	1979	<5	1000+	14	4	Estatisticas industrias
Brazil	1960	1	1000+	9	3	Censo Industrial
Brazil	1970	1	10000+	16	3	Censo Industrial
Brazil	1973	1	1000+	9	2	U.N. 1973
Brazil	1975	1	500+	8	3	Censo Industrial
Brazil	1980	1	500+	8	3	Censo Industrial
Bulgaria						
Burundi						
Cameroon	1974	nothing				Recensement industriel
Cameroon	1976	nothing				ditto
Canada	1958	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1959	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1960	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1961	<5	1000+*	8*	1	Genl Review of Manufact
Canada	1968	<4	1000+	8	3	Manuf Ind: section H
Chile	1967	5	1000+	8	3	World Bank study
China						
Colombia	1973	1	100+	6	2	Un 1973
Colombia	1974	<5	200+	10	3	Industria manufactura
Colombia	1981	<5	200+	10	3	Industria manufactura
Colombia	1982	<5	200+	10	3	Industria manufactura
Congo						
Costa Rica	1964	1	70+	9	3	Censo de industrias
Costa Rica	1975	1	150+	9	1	Censo de manufacturas
Cyprus	1954	nothing				Census of industn prodn 1962
Cyprus	1962	<5	5+	2	2	Census of industn prodn 1962
Cyprus	1967	nothing				ditto
Cyprus	1972	nothing				ditto
Cyprus	1976	nothing				
Cyprus	1979	nothing				Indust prodn survey
Cyprus	1980	nothing				

Cyprus	1981	<5	500+	8	2	
Cyprus	1982	1	500+	9	3	ditto
Cyprus	1983	1	500+	9	3	ditto
Czechoslovakia						
Dominican Republic	1963				1	Estadistica industrial
Ecuador	1975	<7	500+	9	2	Censo de industrias
Ecuador	1976	<7	500+	9	2	Censo de industrias
Ecuador	1980	1	500+	9	2	Censo de manufactura
Egypt						
El Salvador	1951	6	501+	8	3	Censo industrial
El Salvador	1961	5	500+	8	3	Censo industrial
El Salvador	1971	1	100+	6	5	
Ethiopia						
FRG						
Finland	1973	1	1000+	9	2	UN 1973
France						
Gambia						
German Dem. Rep.						
Ghana	1959	6	500+	5	1	Industrial statistics
Ghana	1962	1	500+	10	1	Ind census report
Ghana	1963	<99	100+	2	1	Industrial statistics
Ghana	1964	ditto				
Ghana	1966	ditto				
Ghana	1967	ditto				
Ghana	1968	ditto				
Ghana	1973	10	1000+	7	2	UN 1973
Greece	1963	<10	30	4	2/3	Annual industrial survey
Greece	1964	ditto				
Greece	1965	ditto				
Greece	1966	ditto				
Greece	1967	ditto				
Greece	1969	ditto				
Greece	1970	*				
Greece	1973	nothing				UN 1973
Guatemala	1965	1	500+	13	3	Censo Industrial
Guatemala	1974	5	51+	4	2	Encuesta Industrial
Guatemala	1975	5	50+	4	4	Encuesta Industrial
Hong Kong	1971	1	1000+	8	4	Census of manufact. estab
Hong Kong	1978	1	100+	4	4	Survey of Ind Prod
Hong Kong	1978 *	1	1000+*	7*	4	Survey of Ind Prodn. (rep)
Hungary						
India						
Indonesia						
Iraq	*					
Ireland						
Israel	1964	1	300+	10	2	Industry and Crafts Survey
Israel	1965	1	100+	6	3	Census of Industry and Crafts
Israel	1967	5	300+	9	2	Industry and Crafts Survey
Israel	1968	5	300+	9	2	Industry and Crafts Survey
Israel	1969	ditto				

;rael	1970	ditto				
;rael	1971	ditto				
;rael	1972	ditto				
;rael	1973	5	300+	6	2	UN 1973
;rael	1975	5	300+	9	2	Industry and Crafts Survey
;rael	1976	ditto				
;rael	1977	ditto				
;rael	1979	ditto				
;rael	1981	ditto				
:aly						
/ory Coast						
mmaica	1960	<15	15+	2	3	Industrial activity
ıpan	1973	1	1000+	9	2	UN 1973
›rdan	1972	nothing				Jordan statistical yearbook
›rdan	1973	nothing				
›rdan	1974	nothing				
›rdan	1975	nothing				
›rdan	1976	nothing				
›nya	1961	5	50+	3	2/3	Census of ind prodn,1967\
›nya	1963	ditto				
›nya	1967	ditto				
›nya	1972	1	100+	5	2/3	ditto,1972
›nya	1973	1	50+	4	2/3	Report on surveys of ind prodn
›nya	1974	ditto				
›nya	1975	ditto				
›nya	1976	ditto				
›rea	1966	5	1000+	12	3	Report on Mining & Man
›rea	1973	1	500+	8	2	UN 1973
›rea	1976	5	500+*	8	5	Report on Mining & Manuf
›rea	1977	5	500+*	8	5	Report on Mining & Manuf
›rea	1978	5	500+*	8	5	Report on Mining & Manuf
›rea	1979	5	500+*	8	5	Report on Mining & Manuf
›rea	1980	5	500+*	8	5	Report on Mining & Manuf
›rea	1981	5	500+*	8	5	Report on Mining & Manuf
›rea	1982					
ɹwait	1970	nothing				Statistical Abstract,1974
ɹwait	1973	nothing				Stat Abstract,1981
uwait	1974	1	10+	3	2	UN 1973
uwait	1975	nothing				Stat Abstract,1981
ebanon						
iberia						
alawi						
alaysia						
auritania						
auritius	1964	nothing				Census of ind prodn
auritius	1968	nothing				ditto
exico	1965	<5	501+*	9*	5	Censo industrial
exico	1971	<5	551+*	10*	5	Censo industrial
exico	1979	<5	751+*	10*	5	Censo industrial
orocco						

Nigeria	1968	10	1000+	7	4	Industrial Survey
Nigeria	1969	ditto				
Nigeria	1970	ditto				
Norway	1973	1	200+	7	3	UN 1973
Pakistan	1957	<20	1000+	7*	3	Census of Manuf Industry
Pakistan	1958	<20	1000+	7	3	Census of Manuf Industry
Pakistan	1960	<20	1000+	7	4	Census of Manuf Industry
Pakistan	1970	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1975	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1979	<10	5000+	10*	3	Annual Estab Enquiry
Panama	1973	1	200+	7	2	UN 1973
Paraguay	1963	1	100+	7	3	Censos economicos
Peru	1963	5	500+	8	3	Censo de manufacturas
Peru	1973	1	500+	8	2	UN 1973
Peru	1974	1	500+	9	3	Censo economicos
Philippines	1958	20	500+	4	3	Annual survey of manufacturing
Philippines	1967	<10	10+	2	5	Economic census
Portugal	1972	<5	5+	2	3	Recenseamento Industrial
Puerto Rico						
Romania						
Rwanda						
Saudi Arabia	1968	nothing				Statistical Yearbook
Saudi Arabia	1971	nothing				Statistical Yearbook, 1972
Saudi Arabia	1976	nothing				Statistical Yearbook, 1977
Saudi Arabia	1981	nothing				Statistical Yearbook, 1982
Senegal						
Sierra Leone						
Singapore						
South Africa	1966	1	1000+*	11	2	Census of manufacturing
Sudan						
Sweden						
Switzerland						
Syria						
Taiwan						
Tanzania	1966	10	500+	5	2	Survey of Industrial Production
Tanzania	1970	10	500+	5	3	Survey of Industrial Production
Tanzania	1972	10	500+	5	3	Survey of Industrial Production
Thailand	1964	<10	100+	5	3	Industrial Census
Tunisia	1969	1	100+	5	2	Recensement des Activites Indus
Tunisia	1970	ditto				
Tunisia	1975	ditto				
Tunisia	1976	ditto				
Tunisia	1977	ditto				
Tunisia	1978	ditto				
Tunisia	1979	ditto				
Turkey	1964	1	1000+	9	2	Census of Manufacturing
Turkey	1970	1	1000+	9	2	UN 1973
Uganda	1964	10	100+	4	2	Survey of Industrial Production
Uganda	1965	5	1000+	8	3	ditto
Uganda	1966	10	1000+	8	3	ditto

Uganda	1967	10	1000+	7	3	ditto
Uganda	1968	10	1000+	7	3	ditto
Uganda	1969	10	1000+	7	4	ditto
Uganda	1971	5	1000+	8	2	UN 1973
United Kingdom						
United States						
Uruguay						
Venezuela	1974	1	101+	5	2	UN 1973
Yugoslavia						
Zambia						
Zimbabwe						

Industrial Census Results Collected as of 6/30/86
IV. Value Added 85 Countries

Country	Year	Lower Bound	Upper Bound	Number of groups	ISIC Digits	Source
Algeria						
Angola						
Argentina						
Australia	1969	<5	100+	6	5	Manufacturing Industry
Australia	1973	1	1000+	8	2	UN 1973
Austria	1973	1	1000+*	8*	2	Un 1973
Bangladesh						
Belgium						
Bolivia						
Brazil	1960	1	1000+	9	3	Censo Industrial
Brazil	1970	1	10000+	16	3	Censo Industrial
Brazil	1973	1	1000+	9	2	U.N. 1973
Brazil	1975	1	500+	8	3	Censo Industrial
Brazil	1980	1	500+	8	3	Censo Industrial
Bulgaria						
Burundi						
Cameroon	1974	nothing				Recensement industriel
Cameroon	1976	nothing				Recensement Industrial
Canada	1968	<4	1000+	8	3	Manuf Ind: section H
Chile	1967	5	1000+	8	3	World Bank study
China						
Colombia	1973	1	100+	6	2	UN 1973
Colombia	1974	<5	200+	10	3	Industria manufactura
Colombia	1976	<5	200+	10	1	Berry book
Colombia	1981	<5	200+	10	3	Industria manufactura
Colombia	1982	<5	200+	10	3	Industria manufactura
Congo						
Costa Rica	1964	1	70+	9	3	Censo de industrias
Costa Rica	1975	1	150+	9	1	Censo de manufacturas
Cyprus	1954	nothing				Census of industn prodn 1962
Cyprus	1962	<5	5+	2	3	Census of industn prodn 1962
Cyprus	1967	nothing				ditto
Cyprus	1972	nothing				ditto
Cyprus	1979	nothing				Indust prodn survey
Cyprus	1980	nothing				
Cyprus	1981	<5	500+	8	2	
Cyprus	1982	nothing				ditto
Cyprus	1983	1	500+	9	3	ditto
Czechoslovakia						
Dominican Republic					1	Estadistica industrial

Ecuador	1975	<7	500+	9	2	Censo de industrias
Ecuador	1976	<7	500+	9	2	Censo de Industrias
Ecuador	1980	1	500+	9	2	Censo de manufactura
Egypt						
El Salvador	1951	6	501+	8	3	Censo industrial
El Salvador	1961	5	500+	8	3	Censo Industrial
El Salvador	1971	1	100+	6	5	
Ethiopia						
FRG						
Finland	1973	1	1000+	9	2	UN 1973
France						
Gambia						
German Dem. Rep.						
Ghana	1959	6	500+	5	1	Industrial statistics
Ghana	1962	1	500+	10	1	Ind census report
Ghana	1963	<99	100+	2	1	Industrial statistics
Ghana	1964	ditto				
Ghana	1966	ditto				
Ghana	1967	ditto				
Ghana	1968	ditto				
Ghana	1973	10	1000+	7	2	UN 1973
Greece	1963	<10	30+	4	2/3	Annual industrial survey
Greece	1964	ditto				
Greece	1965	ditto				
Greece	1966	ditto				
Greece	1967	ditto				
Greece	1969	ditto				
Greece	1970	*				
Greece	1973	nothing				UN 1973
Guatemala	1965	1	500+	13	3	Censo Industrial
Guatemala	1974	5	51+	4	2	Encuesta Industrial
Guatemala	1975	5	50+	4	4	Encuesta Industrial
Hong Kong	1978 *	1	1000+*	7*	4	Survey of Ind Prodn. (rep)
Hong Kong	1978	1	100+	4	4	Survey of Ind Prod
Hungary						
India						
Indonesia						
Iraq	*					
Ireland						
Israel	1964	1	300+	10	2	Industry and Crafts Survey
Israel	1965	1	100+	6	3	Census of Industry and Crafts
Israel	1967	5	300+	9	2	Industry and Crafts Survey
Israel	1968	5	300+	9	2	Industry and Crafts Survey
Israel	1969	ditto				
Israel	1970	ditto				
Israel	1971	ditto				
Israel	1972	ditto				
Israel	1973	5	300+	6	2	UN 1973
Israel	1975	5	300+	9	2	Industry and Crafts Survey
Israel	1976	ditto				

;rael	1977	ditto				
;rael	1979	ditto				
;rael	1981	ditto				
:aly						
/ory Coast						
ɜmaica						
ɜpan	1973	1	1000+	9	2	UN 1973
ɔrdan	1972	nothing				Jordan statistical yearbook
ɔrdan	1973	nothing				
ɔrdan	1974	nothing				
ɔrdan	1975	nothing				
ɔrdan	1976	nothing				
ɜnya	1961	5	50+	3	2/3	Census of ind prodn,1967\
ɜnya	1963	ditto				
ɜnya	1967	ditto				
ɜnya	1972	1	100+	5	2/3	ditto,1972
ɜnya	1973	1	50+	4	2/3	Report on surveys of ind prodn
ɜnya	1974	ditto				
ɜnya	1975	ditto				
ɜnya	1976	ditto				
ɔrea	1966	5	1000+	12	3	Report on Mining & Man
ɔrea	1973	1	500+	8	2	UN 1973
ɔrea	1976	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1977	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1978	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1979	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1980	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1981	5	500+*	8	5	Report on Mining & Manuf
ɔrea	1982					
ɹwait	1970	nothing				Statistical Abstract,1974
ɹwait	1973	nothing				Stat Abstract,1981
ɹwait	1974	1	10+	3	2	UN 1973
ɹwait	1975	nothing				Stat Abstract,1981
ebanon						
iberia						
ɜlawi						
ɜlaysia						
ɜuritania						
ɜuritius	1964	nothing				Census of ind prodn
ɜuritius	1968	nothing				ditto
exico	1971	<5	551+*	10*	5	Censo industrial
exico	1979	<5	751+*	10*	5	Censo industrial
orocco						
igeria	1968	10	1000+	7	4	Industrial Survey
igeria	1969	ditto				
igeria	1970	ditto				
orway	1973	1	200+	7	3	UN 1973
akistan	1957	<20	1000+	7	3	Census of Manuf Industry
akistan	1958	<20	1000+	7	3	Census of Manuf Industry
akistan	1960	<20	1000+	7	4	Census of Manuf Industry

Pakistan	1970	<10	5000+	10*	3	Census of Manuf Industry
Pakistan	1975	<10	5000+	10*	3	Census of Manuf Industry
Panama	1973	1	200+	7	2	UN 1973
Paraguay	1963	1	100+	7	3	Censos economicos
Peru	1963	5	500+	8	3	Censo de manufacturas
Peru	1973	1	500+	8	2	UN 1973
Peru	1974	1	500+	9	3	Censo economicos
Philippines	1958	20	1000+	4	3	Annual survey of manufacturing
Philippines	1967	<10	500+	8	5	Economic census
Poland						
Portugal	1972	<5	5+	2	4	Recenseamento Industrial
Puerto Rico	1967	<5	500+	8	5	US Census of manufacturing
Puerto Rico	1972	1	500+	8	4	US Census of manufacturing
Puerto Rico	1977	1	500+	8	4	US Census of manufacturing
Romania						
Rwanda						
Saudi Arabia	1968					
Saudi Arabia	1971					
Saudi Arabia	1976					
Saudi Arabia	1981					
Senegal						
Sierra Leone						
Singapore						
South Africa	1966	1	1000+*	11	2	Census of manufacturing
Sri Lanka						
Sudan						
Sweden						
Switzerland						
Syria						
Taiwan	1971	1-3	500+	6	2	World Bank Staff Wkg Paper 384
Tanzania	1966	10	500+	5	2	Survey of Industrial Production
Tanzania	1970	10	500+	5	3	Survey of Industrial Production
Tanzania	1972	10	500+	5	3	Survey of Industrial Production
Thailand	1964	<10	100+	5	3	Industrial Census
Tunisia	1969	1	100+	5	2	Recensement des Activites Indus
Tunisia	1970	ditto				
Tunisia	1975	ditto				
Tunisia	1976	ditto				
Tunisia	1977	ditto				
Tunisia	1978	ditto				
Tunisia	1979	ditto				
Turkey	1964	1	1000+	9	2	Census of Manufacturing
Turkey	1970	1	1000+	9	2	UN 1973
Uganda	1964	10	100+	4	2	Survey of Industrial Production
Uganda	1965	5	1000+	8	3	ditto
Uganda	1966	10	1000+	8	3	ditto
Uganda	1967	10	1000+	7	3	ditto
Uganda	1968	10	1000+	7	3	ditto
Uganda	1969	10	1000+	7	4	ditto
Uganda	1971	5	1000+	8	2	UN 1973

nited Kingdom						
nited States						
ruguay						
enezuela	1974	1	101+	5	2	UN 1973
ugoslavia						
ambia						
imbabwe						

ndustrial Census Results Collected as of 6/30/86
. Wages and Salaries 85 Countries

Country	Year	Lower Bound	Upper Bound	Number of groups	ISIC Digits	Source
lgeria						
ngola						
rgentina						
ustralia	1969	<5	100+	6	5	Manufacturing Industry
ustria	1973	1	1000+*	8*	2	Un 1973
angladesh						
elgium						
olivia						
razil	1960	1	1000+	9	3	Censo Industrial
razil	1970	1	10000+	16	3	Censo Industrial
razil	1973	1	1000+	9	2	U.N. 1973
razil	1975	1	500+	8	3	Censo Industrial
razil	1980	1	500+	8	3	Censo Industrial
ulgaria						
urundi						
ameroon	1974	nothing				Recensement industriel
ameroon	1976	nothing				Recensement industrial
anada	1958	<5	1000+*	8*	1	Genl Review of Manufact
anada	1959	<5	1000+*	8*	1	Genl Review of Manufact
anada	1960	<5	1000+*	8*	1	Genl Review of Manufact
anada	1961	<5	1000+*	8*	1	Genl Review of Manufact
anada	1968	<4	1000+	8	3	Manuf Ind: section H
hile						
hina						
olombia	1964	5	200+	7	1	Berry Book
olombia	1973	1	100+	6	2	Un 1973
olombia	1974	<5	200+	10	3	Industria manufactura
olombia	1981	<5	200+	10	3	Industria manufactura
olombia	1982	<5	200+	10	3	Industria manufactura
ongo						
osta Rica	1958	1	70+	9	3	Censo de industrias
osta Rica	1964	1	70+	9	3	Censo de industrias
yprus	1954	nothing				Census of industn prodn 1962
yprus	1962	nothing				Census of industn prodn 1962
yprus	1967	nothing				ditto
yprus	1972	nothing				ditto
yprus	1979	nothing				Indust prodn survey
yprus	1980	nothing				
yprus	1981	nothing				

prus	1982	nothing				ditto
prus	1983	nothing				ditto
echoslovakia	1973	1	1000+	9	2	UN 1973
minican Republic	1963				1	Estadistica industrial
uador	1975	<7	500+	9	2	Censo de industrias
uador	1976	<7	500+	9	2	Censo de industrias
uador	1980	1	500+	9	2	Censo de manufactura
ypt						
Salvador	1951	6	501+	8	3	Censo industrial
Salvador	1961	5	500+	8	3	Censo industrial
Salvador	1971	1	100+	6	5	
hiopia						
nland						
ance	1962	<9	1000+	8	4*	Recensement de l'industrie
mbia						
rman Dem. Rep.						
ana	1959	6	500+	5	1	Industrial statistics
ana	1962	1	500+	10	1	Ind census report
ana	1963	<99	100+	2	1	Industrial statistics
ana	1964	ditto				
ana	1966	ditto				
ana	1967	ditto				
ana	1968	ditto				
ana	1973	10	1000+	7	2	UN 1973
eece	1963	<10	30+	4	2/3	Annual industrial survey
eece	1964	ditto				
eece	1965	ditto				
eece	1966	ditto				
eece	1967	ditto				
eece	1969	ditto				
eece	1970	*				
eece	1973	nothing				UN 1973
atemala	1965	1	500+	13	3	Censo Industrial
atemala	1974	5	51+	4	2	Encuesta Industrial
atemala	1975	5	50+	4	4	Encuesta Industrial
ng Kong	1978	1	100+	4	4	Survey of Ind Prod
ng Kong	1978 *	1	1000+*	7*	4	Survey of Ind Prodn.(rep)
ngary						
dia						
donesia						
aq	*					
eland						
rael	1964	1	300+	10	2	Industry and Crafts Survey
rael	1965	1	100+	6	3	Census of Industry and Crafts
rael	1967	5	300+	9	2	Industry and Crafts Survey
rael	1968	5	300+	9	2	Industry and Crafts Survey
rael	1969	ditto				
rael	1970	ditto				
rael	1971	ditto				

srael	1972	ditto				
srael	1973	5	300+	6	2	UN 1973
srael	1975	5	300+	9	2	Industry and Crafts Survey
srael	1976	ditto				
srael	1977	ditto				
srael	1979	ditto				
srael	1981	ditto				
taly						
vory Coast						
amaica						
apan	1973	1	1000+	9	2	UN 1973
ordan	1972	nothing				Jordan statistical yearbook
ordan	1973	nothing				
ordan	1974	nothing				
ordan	1975	nothing				
ordan	1976	nothing				
enya	1961	nothing				Census of ind prodn,1967\
enya	1963	nothing				
enya	1967	nothing				
enya	1972	1	100+	5	2/3	ditto,1972
enya	1973	1	50+	4	2/3	Report on surveys of ind prodr.
enya	1974	ditto				
enya	1975	ditto				
enya	1976	ditto				
orea	1966	5	1000+	12	3	Report on Mining & Man
orea	1973	1	500+	8	2	UN 1973
orea	1976	5	500+*	8	5	Report on Mining & Manuf
orea	1977	5	500+*	8	5	Report on Mining & Manuf
orea	1978	5	500+*	8	5	Report on Mining & Manuf
orea	1979	5	500+*	8	5	Report on Mining & Manuf
orea	1980	5	500+*	8	5	Report on Mining & Manuf
orea	1981	5	500+*	8	5	Report on Mining & Manuf
orea	1982					
uwait	1970	nothing				Statistical Abstract,1974
uwait	1973	nothing				Stat Abstract,1981
uwait	1974	1	10+	3	2	UN 1973
uwait	1975	nothing				Stat Abstract,1981
ebanon						
iberia						
alawi						
alaysia						
auritania						
auritius	1964	3	400+	10	2	Census of ind prodn
auritius	1968	1	400+	18	2	ditto
exico	1965	G	501+*	9*	5	Censo industrial
exico	1971	G	551+*	10*	5	Censo industrial
exico	1979	G	751+*	10*	5	Censo industrial
orocco						
Nigeria	1968	10	1000+	7	4	Industrial Survey
Nigeria	1969	ditto				

geria	1970	ditto				
rway	1973	1	200+	7	3	UN 1973
kistan	1957	<20	1000+	7	3	Census of manuf inds.
istan	1958	<20	1000+	7	3	Census of manuf inds.
kistan	1960	<20	1000+	7	4	Census of manuf inds.
kistan	1970	<10	5000+	10*	3	Census of manuf inds.
kistan	1975	<10	5000+	10*	3	Census of manuf inds.
nama	1973	1	200+	7	2	UN 1973
uraguay	1963	1	100+	7	3	Censos economicos
ru	1963	5	500+	8	3	Censo de manufacturas
ru	1973	1	500+	8	2	UN 1973
ru	1974	1	500+	9	3	Censo economicos
ilippines	1958	20	500+	4	3	Annual survey of manufacturing
ilippines	1967	<10	10+	2	5	Economic census
land						
rtugal	1972	1	1000+	9	4	Estatisticas industrias
erto Rico	1977	1	500+	8	4	US Census of manufacturing
mania						
anda						
udi Arabia	1968	nothing				Statistical Yearbook
udi Arabia	1971	nothing				Statistical Yearbook, 1972
udi Arabia	1976	nothing				Statistical Yearbook, 1977
udi Arabia	1981	nothing				Statistical Yearbook, 1982
enegal						
erra Leone						
ingapore						
uth Africa	1966	1	1000+*	11	2	Census of manufacturing
i Lanka						
dan						
veden						
itzerland						
ria						
iwan						
nzania	1966	nothing				Survey of Industrial Productio
nzania	1970	nothing				Survey of Industrial Productic
nzania	1972	nothing				Survey of Industrial Productio
nailand	1964	<10	100+	5	3	Industrial Census
nisia	1969	nothing				Recensement des Activites Indu
nisia	1970	nothing				
nisia	1975	nothing				
nisia	1976	nothing				
nisia	1977	nothing				
nisia	1978	nothing				
nisia	1979					
rkey	1964	1	1000+	9	2	Census of Manufacturing
rkey	1970	1	1000+	9	2	UN 1973
ganda	1964	nothing				Survey of Industrial Productio
ganda	1965	nothing				ditto
ganda	1966	nothing				ditto
ganda	1967	nothing				ditto

Uganda	1968	nothing				ditto
Uganda	1969	nothing				ditto
Uganda	1971	nothing				UN 1973
United Kingdom						
United States						
Uruguay						
Venezuela	1974	1	101+	5	2	UN 1973
Yugoslavia						
Zambia						
Zimbabwe						

APPENDIX 2

Classification Codes of Industry Groups/Sectors

I.S.I.C. Code No. (the first digit 3 omitted)	Industry Groups/Sectors
11 – 12	FOOD MANUFACTURING
111	Slaughtering, preparing and preserving meat
112	Manufacturing of dairy products
113	Canning and preserving of fruits and vegetables
114	Canning, preserving and processing of fish and crustacea
115	Manufacture of vegetable and animal oils and fats, except lard
116	Grain mill products
117	Manufacture of bakery products
118	Sugar factories and refineries
119	Manufacture of cocoa, chocolate and sugar confectionery
121	Manufacture of food products not elsewhere classified
13	BEVERAGE INDUSTRIES
131	Distilling, rectifying and blending spirits
133	Breweries and manufacture of malt (grouped under 134)
134	Soft drinks and carbonated waters industries (grouped with 133)
14	TOBACCO MANUFACTURES
140	Tobacco manufactures
21; 25–29	MANUFACTURE OF TEXTILES
250	Spinning – cotton
251	Spinning – wool
252	Spinning – others
260	Weaving – cotton
261	Weaving – wool
262	Weaving – silk
263	Weaving – others
270	Knitting – cotton
271	Knitting – wool
272	Knitting – others
273	Gas mantles
274	Hosiery
280	Bleaching and dyeing
290	Textile stencilling and printing
291	Textile finishing others
212	Manufacture of made-up textile goods except wearing apparel
214	Manufacutre of carpets and rugs
215	Cordage, rope and twine industries
216	Manufacture of threads – cotton and nylon
217	Manufacture of embroideries
219	Manufacture of textiles not elsewhere classified
22	MANUFACTURE OF WEARING APPAREL, EXCEPT FOOTWEAR
220	Tailoring
221	Manufacture of garments except knitwear from yarn
222	Manufacture of gloves
223	Manufacture of handbags
224	Manufacture of raincoats
225	Manufacture of knitwear from yarn
229	Manufacture of wearing apparel not elsewhere classified

87

I.S.I.C. Code No. (the first digit 3 omitted)	Industry Groups/Sectors
23	MANUFACTURE OF LEATHER AND LEATHER PRODUCTS, EXCEPT FOOTWEAR AND WEARING APPAREL
231	Tanneries and leather finishing
233	Manufacture of leather products, except footwear and wearing apparel
24	MANUFACTURE OF FOOTWEAR, EXCEPT RUBBER, PLASTIC AND WOODEN FOOTWEAR
240	Manufacture of footwear, except rubber, plastic and wooden footwear
31	MANUFACTURE OF WOOD AND CORK PRODUCTS, EXCEPT FURNITURE
311	Sawmills, planing and other wood mills
313	Manufacture of trunks and cases
314	Manufacture of wooden containers and barrels
315	Manufacture of wooden articles
316	Manufacture of wooden toys (grouped under 319)
317	Manufacture of cane containers and small cane ware
319	Manufacture of wood and cork products not elsewhere classified (grouped with 316)
32	MANUFACTURE OF FURNITURE AND FIXTURES, EXCEPT PRIMARILY OF METAL
321	Manufacture of wooden furniture
322	Manufacture of rattan
329	Manufacture of furniture and fixtures others
41	MANUFACTURE OF PAPER AND PAPER PRODUCTS
411	Manufacture of pulp, paper and paperboard
412	Manufacture of containers and boxes of paper and paperboard
419	Manufacture of articles of pulp, paper and paperboard not elsewhere classified
42	PRINTING, PUBLISHING AND ALLIED INDUSTRIES
421	Newspaper printing
422	Job printing
429	Other printing, publishing and allied industries
51 – 52	MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS
511	Manufacture of basic industrial chemicals except fertilizers (grouped with 512)
512	Manufacture of fertilizers and pesticides (grouped under 511)
521	Manufacture of paints, varnishes and lacquers
522	Manufacture of drugs and medicines
523	Manufacture of soap and cleaning preparations, perfumes, cosmetics and other toilet preparations
529	Manufacture of chemical products not elsewhere classified

I.S.I.C. Code No. (the first digit) 3 omitted)	Industry Groups/Sectors
53 – 54	MANUFACTURE OF PRODUCTS OF PETROLEUM AND COAL
530	Petroleum refineries
540	Manufacture of miscellaneous products of petroleum and coal
55	MANUFACTURE OF RUBBER PRODUCTS
551	Tyre retreading and manufacture of rubber tube
552	Manufacture of rubber footwear
559	Manufacture of rubber products not elsewhere classified
56	MANUFACTURE OF PLASTIC PRODUCTS
561	Manufacture of plastic flowers and foliage
562	Manufacture of plastic toys
569	Manufacture of plastic products not elsewhere classified
6	MANUFACTURE OF NON-METALLIC MINERAL PRODUCTS, EXCEPT PRODUCTS OF PETROLEUM AND COAL
610	Manufacture of pottery, china and earthenware
620	Manufacture of glass and glass products
691	Manufacture of structural clay products
692	Manufacture of cement, lime and plaster
699	Manufacture of non-metallic mineral products not elsewhere classified

I.S.I.C. Code No. (the first digit) 3 omitted)	Industry Groups/Sectors
7	BASIC METAL INDUSTRIES
710	Iron and steel basic industries (grouped with 846)
721	Non-ferrous metal basic industries – brass
722	Non-ferrous metal basic industries – aluminium
723	Non-ferrous metal basic industries – others
81	MANUFACTURE OF FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT
810	Manufacture of cutlery
811	Manufacture of hand tools and general hardware
812	Manufacture of furniture and fixtures primarily of metal
813	Manufacture of structural metal products
814	Manufacture of aluminium ware
815	Manufacture of pressure stoves and lanterns and accessories
816	Manufacture of torches, torch cases and parts (excluding torch bulbs)
817	Manufacture of metal wrist watch bands
818	Buffing and polishing and electro-plating
819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified
82	MANUFACTURE OF MACHINERY, EXCEPT ELECTRICAL
821	Manufacture of engines and turbines

94

I.S.I.C. Code No. (the first digit 3 omitted)	Industry Groups/Sectors
822	Manufacture of agricultural machinery and equipment
823	Manufacture of metal and wood working machinery
824	Manufacture of special industrial machinery and equipment except metal and wood working machinery
825	Manufacture of office, computing and accounting machinery (grouped under 829)
829	Manufacture of machinery and equipment except electrical not elsewhere classified (grouped with 825)
83	MANUFACTURE OF ELECTRICAL MACHINERY, APPARATUS, APPLIANCES AND SUPPLIES
831	Manufacture of electrical industrial machinery and apparatus
833	Manufacture of electrical appliances and housewares
834	Manufacture of electronic products
835	Manufacture of sound-reproducing and recording equipment and apparatus
836	Manufacture of dry batteries
837	Manufacture of torch bulbs
839	Manufacture of electrical apparatus and supplies not elsewhere classified
84	MANUFACTURE OF TRANSPORT EQUIPMENT
840	Ship building and repairing – boatyards
841	Ship building and repairing – shipyards
843	Manufacture of motor vehicles
844	Manufacture of motor-cycles and bicycles (grouped under 849)
845	Manufacture of aircraft (grouped under 849)
846	Ship-breaking (grouped under 710)
849	Manufacture of transport equipment not elsewhere classified (group with 844 and 845)
85	MANUFACTURE OF PROFESSIONAL AND SCIENTIFIC, MEASURING AND CONTROLLING EQUIPMENT NOT ELSEWHERE CLASSIFIED, AND OF PHOTOGRAPHIC AND OPTICAL GOODS
851	Manufacture of professional and scientific, and measuring and controlling equipment, not elsewhere classified
852	Manufacture of photographic and optical goods
853	Manufacture of watches and clocks
9	OTHER MANUFACTURE-ING INDUSTRIES
901	Manufacture of jewellery and related articles
902	Manufacture of musical instruments
903	Manufacture of sporting and athletic goods
904	Manufacture of wigs and hair products
905	Manufacture of bakelite ware
906	Manufacture of artificial pearls and imitation jewellery
907	Manufacture of buttons and button holes
908	Manufacture of umbrellas
909	Manufacture industries not elsewhere classified

Appendix 3

Table A: Results for Small Firms

ISIC	R2 for Product Term/Structure (Equation (4))	R2 for Product Term/Composition (Equation (5))	R2 for Composition/ Structure (Equation (6))
All industries	.767	.68	.2
PC Income>$3260	.76	.65	.173
PC Income<$3260	.77	.69	.213
100	.81	.61	.184
110	.77	.49	.074
130	.75	.48	.056
140	.97	.98	.91
200	.905	.925	.69
210	.85	.88	.54
220	.84	.36	.05
230	.786	.787	.33
240	.75	.81	.31
300	.73	.71	.196
310	.702	.738	.194
400	.796	.75	.3
410	.824	.787	.374
420	.827	.474	.105
500	.85	.72	.33
510	.83	.575	.175
520	.956	.015	.008
530	.936	.87	.664
540	.89	.89	.612
550	.89	.83	.52
560	.826	.76	.345
600	.79	.89	.265
610	.86	.86	.46
620	.946	.89	.776
690	.86	.78	.15
700	.88	.85	.46
710	.9	.65	.256
720	.88	.66	.23
800	.85	.86	.3
810	.867	.71	.115
820	.87	.58	.037
830	.87	.47	.085
840	.9	.64	.096
850	.96	.037	.012
900	.83	.799	.39

Table B: Results for Medium Firms

ISIC	R2 for Product Term/Structure (Equation (4))	R2 for Product Term/Composition (Equation (5))	R2 for Composition/ Structure (Equation (6))
All industries	.61	.8	.18
PC Income>$3260	.575	.77	.127
PC Income<$3260	.626	.811	.2
100	.63	.8	.195
110	.64	.56	.05
130	.31	.69	.0004
140	.86	.97	.78
200	.82	.96	.64
210	.75	.916	.47
220	.66	.497	.026
230	.656	.9	.34
240	.59	.84	.2
300	.616	.89	.28
310	.654	.905	.346
400	.74	.89	.42
410	.727	.91	.432
420	.66	.834	.254
500	.742	.824	.324
510	.625	.787	.175
520	.79	.336	.02
530	.782	.786	.322
540	.77	.86	.38
550	.77	.82	.357
560	.646	.76	.16
600	.78	.89	.46
610	.74	.86	.374
620	.8	.89	.5
690	.68	.78	.22
700	.81	.85	.44
710	.824	.65	.23
720	.826	.66	.24
800	.826	.86	.47
810	.739	.71	.198
820	.67	.58	.06
830	.77	.47	.062
840	.789	.64	.1889
850	.94	.037	.002
900	.75	.86	.38

Table C: Results for Large Firms

ISIC	R2 for Product Term/Structure (Equation (4))	R2 for Product Term/Composition (Equation (5))	R2 for Composition/ Structure (Equation (6))
All industries	.4	.859	.087
PC Income>$3260	.39	.795	.041
PC Income<$3260	.41	.88	.117
100	.45	.77	.057
110	.2	.746	.04
130	.28	.86	.03
140	.42	.99	.32
200	.34	.93	.12
210	.25	.98	.15
220	.48	.57	.004
230	.54	.91	.247
240	.49	.93	.245
300	.56	.82	.156
310	.59	.79	.157
400	.53	.87	.19
410	.49	.9	.19
420	.44	.76	.045
500	.32	.91	.093
510	.5	.79	.094
520	.78	.1	.02
530	.45	.88	.145
540	.56	.92	.28
550	.37	.91	.12
560	.43	.88	.13
600	.47	.84	.12
610	.53	.77	.1
620	.41	.95	.21
690	.44	.7	.02
700	.44	.94	.22
710	.33	.92	.11
720	.39	.87	.09
800	.62	.9	.32
810	.53	.79	.117
820	.66	.54	.04
830	.53	.69	.046
840	.48	.726	.043
850	.82	.35	.036
900	.6	.81	.178

BIBLIOGRAPHY

Adelman, I. "A Stochastic Analysis of Size Distribution of Firms," Journal of American Statistical Association, (Dec., 1958).

Anderson, Dennis. "Small Industry in Developing Countries: Some Issues," World Bank Staff Working Paper No. 518, (1982).

Balassa, B. (et. al.) The Structure of Protection in Developing Countries, Johns Hopkins University Press, (1971).

Banerji, R. "Small-Scale Production Units in Manufacturing: An International Cross-Section Overview," Weltureitschafiches Archiv, (1978).

Bimberg, T. and Resnick, S.A. Colonial Development: An Econometric Study, Yale University Press, (1975).

Chenery, H. B. and Syrquin, M. Patterns of Development, 1950-1970, Oxford University Press, London, (1975).

Chenery, H. B. and Syrquin, M. "Typical Patterns of Transformation in Chenery, H., Robinson, S. and Syrquin, M., Industrialization and Growth," New York, Oxford, (1986).

Chenery, H. B. and Taylor, L. J. "Development Patterns: Among Countries and Over Time," Review of Economics and Statistics, (Nov., 1968) pp. 391-416.

Cordon, W. M. The Theory of Protection, Clarendon Press, (1971).

Gibrat, R. "Les Inequalities Economiques," Paris, (1931).

Hart, P. E. and Prais, S. "The Analysis of Business Concentration: A Statistical Approach," Journal of the Royal Statistical Society, (1956).

Ho, S. "Small -Scale Enterprises in Korea and Taiwan," World Bank Staff Working Paper No. 384, (1979).

Hoselitz, B.F. "Small Industry in Under-Developed Countries," Journal of Economic History No. 19, (1959).

Krueger, A. O. Foreign Trade Regimes and Economic Development, Turkey, Columbia University Press, (1975).

Kuznets, S. Economic Growth and Structure, Norton, New York, (1965).

Mariss, R. The Theory and Future of the Corporate Economy and Society, North Holland, (1979).

Michaely, M. Foreign Trade Regimes and Economic Development, Columbia University Press, (1975).

Mills and Schumann "Industry Structure with Fluctuating Demand," American Economic Review, Vol. 75, 4, (Sept., 1985).

Nelson, R. and Winter, S. An Evolutionary Theory of Economic Change, Harvard University Press, (1982).

Simon, H. and Ijiri, Y. "Business Firm Growth and Size," American Economic Review, (March, 1964).

Staley, E. and Morse, R. Modern Small-Scale Industry for Developing Countries, McGraw-Hill, (1965).