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Growth Patterns of Small Scale Plants in Manufacturing Industries. A cross-country analysis

by

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I. Introduction

An important issue that confronts small sector development policy in manufacturing is the question of whether small-scale plants are in the long-run viable or must they disappear in the development process. This question is important because answers to it may indicate whether small-scale plants are worthwhile developing in the first place and, if they are, which specific industries appear most appropriate for the purpose. Clearly, central to the issues raised are questions of economies of scale and production function in manufacturing. In planning investments the method of mathematical programming has proved to be quite useful in coping with them.[1]

In this paper an attempt is made to apply the patterns approach to development as a method of dealing with the question raised in a

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[1] See, for example, H.B. Chenery and L. Westphal, "Economies of Scale and Investment over Time", in Public Economics: An Analysis of Public Production and Consumption and their Relations to the Private Sectors, Proceedings of a Conference held by the International Economic Association, eds. J. Margolis and H. Guitton (London, Melbourne, Toronto, Macmillan and Co., 1969) 359-387; A.S. Manne, ed., Investments for Capacity Expansion: Size, Location and Time Phasing (London, George Allen and Unwin, 1967); L.E. Westphal, Planning Investments with Economies of Scale (Amsterdam, London, North Holland Publishing Co., 1971).

general way.[2] Briefly, this approach involves estimating by means of econometric methods the observed long-term quantitative relationship between a sector's relative importance in the economy and a set of variables systematically affecting the sector, in order to be able to indicate its possible development path over time. While the major concern of the patterns approach to development to date has been with structural composition of industries, this paper looks at intercountry differences in the size structure of plants within individual industries.

The principal concern of this paper is with the scale effects of economic development and market size on small-scale plants. Assume that at any point of time the same choices of techniques are open to all producers in a given industry in all countries and that these choices are mapped by a production function which is linearly homogeneous. Furthermore assume, to begin with, that the relative factor prices between labour and capital (the two primary factors of production) are the same for all producers in all countries. Under these simplifying assumptions, one sense in which the size of plant in a given industry can vary from country to country is when the size of market is different from one country to another. All other things being equal, the size of plant and that of the market will be positively associated with one another.

Assume now that not only the size of market but also relative factor prices are different across countries and that the envisaged

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[2] Pioneering studies in this field are, among others, S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations, II: Industrial Distribution of National Products and Labour Force", Economic Development and Cultural Change, 5 (July 1957, Suppl.); H.B. Chenery, "Patterns of Industrial Growth", The American Economic Review, 50 (September 1960) 625-645; H.B. Chenery and L. Taylor, "Development Patterns: Among Countries and Over Time", The Review of Economics and Statistics, 50 (November 1968) 391-416.

production function, instead of being characterised by constant returns to scale throughout, is non-homothetic.[3] These, more realistic, assumptions imply that the scale curve in a given industry may not be the same in all countries; rather, it is likely to differ from one country to another. This is because for non-homothetic production function the optimal size of plants associated with two expansion paths may vary from one another. Suppose, as some authors appear to find,[4] that returns to scale are higher along a capital-intensive expansion path on the production function than along a labour-intensive path. Then, other things being equal, the optimal plant size will be higher for the capital-intensive path when compared to the labour-intensive one.

In general, in all countries plants of different sizes will be found to be in operation in a given industry at a point of time. However, for countries at lower levels of development the cluster of plants is likely to be around an optimal size that is much smaller than the corresponding optimal size for countries at higher levels of development. This is to be expected because the relative prices between labour and capital are higher in developed than in developing countries and the effective market size is also larger in the former

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[3] A non-homothetic production function implies that the ratio between the marginal productivities of factors depends not only on the input proportions but also on the scale of production. Non-homotheticity has rarely been tested in empirical estimates of production function, an important exception in the literature being Z. Grilliches and V. Ringstad, Economies of Scale and the Form of Production Function: An Econometric Study of Norwegian Manufacturing Establishment Data (Amsterdam, London, North-Holland Publishing Company, 1971). See also, J. Todd, "Efficiency and Plant Size in Colombian Manufacturing" (Ph.D. dissertation, Yale University, 1972).

[4] H.B. Chenery, Capital-Labor Substitution in Metalworking Processes, Stanford Project for Quantitative Research in Economic Development, Memorandum C-3 (Stanford University, 1957); C.F. Pratten, Economies of Scale in Manufacturing Industries, Department of Applied Economics, Occasional Paper No. 3 (Cambridge, England, Cambridge University, 1965).

when compared to the latter.[5] In the light of the preceding paragraph, the countries at lower levels of development are operating along a labour-intensive path whereas those at higher levels are operating on a capital-intensive path. The upshot is that because of factor price relations, market size and the nature of production functions - it can be expected that smaller plants predominate in the manufacturing sector of countries at lower levels of development, as do comparatively larger plants in countries at higher levels.[6]

The presumption outlined above provides a basis for raising two questions which are central to this paper. The first one is whether there is a pattern of systematic and long-term relationships between the quantitative importance of small manufacturing plants on the one hand and the level of development and market size on the other. The answer to this question may throw some light on the issue of whether small plants are economically viable in the long run or must they die in the development process. The second question is the same as the first but addressed to specific industries. If the postulated relationship in the long run is found to be fairly stable for some industries as compared to others, our analysis may then throw some light on the question of which industries to develop in the small-scale sector. A tentative hypothesis in this regard might be that

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[5] An additional factor to be considered in this context is the capital expenditure associated with setting up a plant of optimal size. When this expenditure is high, it is to be expected that developed (or rich) rather than developing (or poor) countries are better placed to set up optimal sized plants and plants in countries belonging to the latter group will tend to be relatively smaller. See, for example, A. Silberston, "Economies of Scale in Theory and Practice", The Economic Journal, 28 (March 1972, Supplement) 369-391.

[6] This is not to say that the existence of large scale plants in developing countries is thereby precluded. The prevalence of large-scale plants alongside smaller plants in these countries is due to, inter alia, the heavy geographic concentration of economic and social infrastructure, import substituting industrial policies which are biased towards large-scale industries, artificial distortion of factor prices and foreign capital participation.

resources should be directed to industries in which the scale effects of development and market size are not significantly important.

For the purpose of this paper a small-scale plant is defined by the size of employment.[7] Three alternative definitions are used, namely, plants in the employment size classes 1-4, 1-9 and 1-49. In terms of these definitions, importance of small plants in manufacturing is measured in three dimensions: in terms of their shares in total number of plants, in total value added and total employment, both in aggregate and at broadly defined industry levels.[8]

A Chenery-type[9] regression model is posited in which the importance of small scale plants is postulated to be jointly determined by the level of per capita income, the degree of industrialization, the size of population and the density of population.[10] This regression model is applied to a sample of observations in which developed and developing countries are both represented.[11]

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[7] Despite its well-known shortcomings the employment measure of size is used here because it facilitates international comparisons, and classifications by employment may be very useful for policy-makers and planners.

[8] For a comparative overview of the small-scale sector importance in different countries by these criteria see: R. Banerji, "Small Scale Production Units in Manufacturing: An International Cross-Section Overview" (Kiel 1977) forthcoming.

[9] H.B. Chenery, "Patterns of Industrial Growth".

[10] Per capita income is expressed in constant US dollars; population is in millions; population density is the number of persons per square kilometer. The degree of industrialization is measured alternatively as the share of manufacturing value added in GDP and that of manufacturing employment in total employment.

[11] Among high-income countries: Austria, Australia, Canada, Germany F.R., Japan, Norway, United Kingdom and USA; among middle and low-income countries: Algeria, Brazil, Colombia, Cyprus, Israel, Korea (South), Malaysia (West), Mauritius, Mexico, Peru, Puerto Rico, Spain, Taiwan, Thailand and Turkey. It must be pointed out that because of the availability of industrial censuses the observations in our sample do not refer to the same point of time. For data sources see Appendix II.

II. The Hypotheses

The hypotheses to be tested can be formulated as follows:

(1) Other things being equal, the income effect of development is to reduce the small-scale sector in relative importance in the economy. To put it in terms of our model, the small sector's importance declines as we move across countries at lower levels of per capita income to those at higher levels, other things being the same. This would follow if we assumed that production function is internationally non-homothetic, the ratio between prices of labour and capital is higher for developed than developing countries, and developed (rich) countries are better placed with regard to capital required to build up plants of optimal scale than developing (poor) countries. These three assumptions tend to imply that, other things being equal, whether economies of scale in a given industry are important or not is a function of the level of development, when measured by per capita income.

(2) It is a well-known postulate that the size of plant is a positive function of the size of market, when market is defined to include home plus export markets.[12] Assume that population is allowed to reflect the size of the home market. Then, other things being equal, the importance of small-scale plants will be a decreasing function of the size of population; we should expect the small-scale sector to diminish in importance as we move from countries with small population to those with large. An important caveat in connection with this is that the hypothesised relationship may not hold up for small countries for which the export market is

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[12] See, for example, C.F. Pratten; F.L. Pryor, "The Size of Production Establishments in Manufacturing", The Economic Journal, 28 (June 1972) 547-66; F.M. Scherer, "The Determinants of Industrial Plant Sizes in the Six Nations", The Review of Economics and Statistics, 55 (May 1973) 135-45.

more important than the home market. In general terms, because of the various trade, institutional and policy barriers the size of the export market is not in all cases easy to measure. Hence, in our case a negative effect of the population size on the small sector will be assumed to reflect the scale effect of the size of the home market.

(3) The density effect is posited to reveal the importance of scale economies in relation to location of industries. If sources of supply and markets are concentrated (the density of population serving as an indicator of the concentration), the majority of plants within the industry will perhaps be larger in size than if supply and markets are dispersed.[13] If this relationship holds, other things being equal, we would expect higher density to be associated with diminishing importance of small-scale plants. It is important to note, however, that the population density is unlikely to be uniform within a country. The geographical dispersal of population is affected by social, historical and economic forces. The development process itself affects the distribution of density within a country by integrating self-contained and isolated sub-economies into the mainstream of economic activities. What the overall density figures fail to reveal is the presence of separate markets within the national economy, especially when transportation costs are high and infrastructure facilities are not fully developed. The point is that if the dispersal of population density within the national economy is high in relation to the average, the density effect as posited in this paper may not show the expected sign nor will its impact be significant.

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[13] See, for instance, P.S. Florence, Investment, Location and Size of Plant: A Realistic Enquiry into the Structure of British and American Industries (Cambridge, England, Cambridge University Press, 1948).

(4) The industrialization variable is introduced to capture the dynamic influences of growth on smaller plants. One set of dynamic effects will have implications for economies of scale which will probably cause the small sector to decline in importance in relation to the medium and large sector as the level of industrialization rises. The other set of major external influences generated by industrial development will include those affecting factor productivity, factor quality as well as the state of knowledge about technology. If these effects are predominant, we will expect the level of industrialization to be positively associated with the relative importance of the small sector in terms of value added and employment.

III. The Regression Results

Regression equations employed to test the various hypotheses outlined are linear in logarithms; the estimated coefficients are thus measures of elasticities with respect to the relevant variables which we have named as income effect, population effect, density effect and the industrialization effect. The dependent variables in the regression equations are the small sector's shares in total number of plants (i.e. relative frequency), total (sectoral) value added and total (sectoral) employment in manufacturing industries.

a) Results at overall industry level

These results, by three definitions of small-scale plants, are presented in Table 1.

The variables display the predicted sign in most cases but the various effects are not always significant and they also vary a great deal by the three size classes of small-scale plants. In general terms, the following relationships are established:

(i) Regardless of how the relative importance of small-scale activity is measured, the negative impact of per capita income is not significant for small-scale plants above the size group 1-9 (above 1-4 for relative employment share). The income-elasticity coefficient also considerably declines in magnitude across the three definitions of small-scale plants. The scale effects of development would thus seem to be particularly strong in impact for the class of plants in the 1-9 size range.

(ii) The industrialization variable is generally not significant, probably reflecting multicollinearity with per capita income. At the same time, the positive sign of the industrialization coefficient in explaining intercountry variations of relative value added share of the 1-9 size group seems to indicate that plants in that range benefit from external economies generated by industrialization. On the other hand, a significantly negative impact of industrialization on the employment share of small-scale plants in the 1-49 range may reflect capital deepening in the manufacturing sector at rising levels of industrialization, quite apart from any changes due purely to decline in the number of small establishments in the development process.

(iii) The size of the domestic market appears to be a significant factor in explaining the decline of the small-scale sector in terms of value added and employment, as the negative population effects suggest. For plants in the 1-4 size range, however, the size of the market does not seem to be a significant element.[14]

(iv) The density variable explains in a significant manner the decline of value added share of small-scale plants in the 1-9 range. In all other cases it fails to be significant.

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[14] To be noted is also that the population variable is not significant in explaining across country variations in the relative number of plants on any definitions and in one case its sign is even contrary to what was posited as a hypothesis.

Table 1 - Results of Cross-Country Multiple Regressions between Relative Importance of Small Scale Plants in Manufacturing and Selected Explanatory Variables[1]

Dependent Variable	Explanatory Variables						
	Constant term	Income effect	Population effect	Density effect	Industrialization effect	R^2	F-ratio
Relative Frequency							
A	6.27 (8.01)	-0.20 (-1.59)	-0.04 (-0.57)	-0.02 (-0.30)	-0.26 (-0.66)	0.44	2.71
B	5.47 (12.00)	-0.17 (-2.60)	-0.06 (-1.43)	-0.05 (-1.34)	0.07 (0.33)	0.45	3.95
C	5.06 (4.67)	-0.04 (-0.22)	0.15 (1.52)	-0.07 (0.82)	-0.38 (-0.63)	0.22	1.04
Relative Value Added Share							
A	5.62 (3.29)	-0.60 (-2.18)	-0.18 (-1.09)	-0.02 (-0.15)	0.02 (0.02)	0.54	3.48
B	2.66 (1.82)	-0.64 (-2.81)	-0.30 (-2.24)	-0.24 (-2.34)	1.69 (2.42)	0.40	3.16
C	5.09 (7.05)	-0.15 (-1.33)	-0.15 (-2.20)	-0.03 (-0.62)	-0.14 (-0.38)	0.52	3.26
Relative Employment Share							
A	12.84 (3.79)	-1.60 (-2.42)	-0.27 (-0.92)	-0.10 (-0.46)	2.49 (1.52)	0.54	3.32
B	7.58 (5.41)	-0.33 (-0.92)	-0.37 (-2.71)	-0.18 (-1.30)	-0.38 (-0.50)	0.42	3.97
C	5.21 (6.19)	-0.07 (-0.35)	-0.23 (-3.10)	-0.03 (-0.40)	-0.78 (-1.88)	0.57	4.26

[1] Explanatory variables are per capita income, population, density of population and the level of industrialization.

A = plants engaging up to 4 persons
B = plants engaging up to 9 persons
C = plants engaging up to 49 persons
t-values are in parentheses; the critical values at which 't' is significant are 2.06 at 5 % level and 1.71 at 10 % level.

Source: Based on national industrial censuses.

(b) Results at specific industry levels

Results in this case are shown only in summary form by three broad groups of industries in terms of the range of the elasticity coefficients for industries for which statistically significant results were obtained (Table 2).[15] No strict criterion was applied in classifying industries into the three groups except that Group I and II industries tend to be primary resource based and have in general a smaller income elasticity of demand than Group III industries comprising of engineering, chemicals and related products.

The results obtained are rather diffused, in many cases even with conflicting implications with regard to value added and employment shares of small-scale plants. The income effect is significantly negative in terms of the employment share in a large number of industries in the size group 1-4. On the other hand, in this size group in terms of value added share the income effect is statistically significant only in two industries. In addition, the magnitude of income elasticity is generally higher for employment than for value added share, meaning that, other things being equal, a given percentage increase of per capita income leads to faster decline of the small sector in terms of employment than in terms of value added, particularly in the 1-4 size group.

On the other hand, in the 1-9 size group the income effect is significantly negative in terms of value added for the majority of industries, whereas in terms of employment it is significant for only one industry. At the broadest definition of small scale (1-49),

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[15] Detailed results of multiple regressions are shown in the Appendix I. Industry specific results for the relative number of small-scale plants are not shown in the text because they did not seem to contribute much to the understanding of inter-industry differences in the small sector significance and partly because the relative number of plants per se is not an interesting variable from the point of view of policy implications.

Table 2 : Industries for which the Elasticity Coefficients are Significant in the Cross-Country Multiple Regressions between Small Sector Value Added Share and Selected Explanatory Variables and the Estimated Coefficients Expressed in Terms of Range

	Income Effect	Population Effect	Density Effect	Industrialization Effect
Group I (No. of industries = 6)				
A	Food, furniture (-0.49 - -1.02)	None (-)	Furniture (-0.27)	Furniture (-1.95)
B	All (-0.35 - -0.53)	Wood, furniture, printing, non-metallic mineral manufactures (-0.18 - -0.30)	All (-0.16 - -0.28)	All except furniture (+1.36 - +2.55)
C	Furniture (-0.23)	Wood, furniture, printing, diverse (-0.10 - -0.21)	None (-)	None (-)
Group II (No. of industries = 3)				
A	None (-)	None (-)	None (-)	None (-)
B	Apparel (-0.64)	None (-)	None (-)	Textiles (+2.34)
C	None (-)	Textiles (-0.17)	None (-)	None (-)
Group III (No. of industries = 7)				
A	None (-)	Rubber, fabricated metals, non-electrical machinery, transport equipment (-0.39 - -0.76)	Paper (+0.45)	Paper, fabricated metals (-2.07 - -2.45)
B	Rubber, fabricated metals, non-electrical machinery, transport equipment (-0.34 - -1.33)	All except chemicals and paper (-0.27 - -0.73)	Rubber, chemicals, electrical machinery, transport equipment (-0.17 - -0.35)	Transport equipment (+2.21)
C	Electrical machinery, non-electrical machinery, transport equipment (-0.32 - -0.64)	All except chemicals and paper (-0.16 - -0.52)	None (-)	Fabricated metals (-0.76)

Group I industries: Food, wood, furniture, printing & publishing, non-metallic mineral manufactures and diverse.
Group II industries: Textiles, apparel and leather products.
Group III industries: Rubber, paper, chemicals, fabricated metals, electrical machinery, non-electrical machinery and transport equipment.
A, B and C are the three alternative definitions of small scale, namely plants in the employment scale range 1-4, 1-9 and 1-49, respectively. The range of coefficients are in parentheses.

Source: Own estimates based on national census data.

Table 3 : Industries for which the Elasticity Coefficients are Significant in the Cross-Country Multiple Regressions between Small Sector Employment Share and Selected Explanatory Variables and the Estimated Coefficients Expressed in Terms of Range

	Income Effect	Population Effect	Density Effect	Industrialization Effect
Group I (No. of industries = 6)				
A	Food, furniture, non-metallic mineral manufactures (-1.15 - -1.22)	Food (-0.33)	Furniture (-0.26)	Furniture, non-metallic mineral manufactures (-1.53 - +2.54)
B	None (-)	Food, furniture diverse (-0.30 - -0.36)	Diverse (-0.26)	None (-)
C	None (-)	All except wood (-0.12 - -0.26)	None (-)	Food, printing non-metallic mineral manufactures (-0.45 - -1.12)
Group II (No. of industries = 3)				
A	Apparel, leather (-1.83 - -2.07)	None (-)	None (-)	Leather (+3.38)
B	Leather (-0.73)	Apparel (-0.35)	None (-)	None (-)
C	Textiles (+0.55)	None (-)	Textiles (+0.21)	Textiles (-1.30)
Group III (No. of industries = 8)				
A	All except paper (-0.65 - -2.23)	None (-)	Paper (-0.36)	None (-)
B	None (-)	All except basic metals (-0.28 - -0.63)	Rubber (-0.25)	None (-)
C	Transport equipment (-0.55)	All except basic metals (-0.21 - -0.53)	Basic metals (+0.43)	Paper, rubber, chemicals, fabricated metals (-0.57 - -1.68)

Group I industries: Food, wood, furniture, printing & publishing, non-metallic mineral manufactures and diverse.
Group II industries: Textiles, apparel and leather products.
Group III industries: Rubber, paper, chemicals, basic metals, fabricated metals, electrical machinery, non-electrical machinery and transport equipment.
A, B and C are the three alternative definitions of small scale, namely plants in the employment scale range 1-4, 1-9 and 1-49, respectively. The range of coefficients are in parentheses.

Source: Own estimates based on national census data.

particularly affected by rising income level are some industries in Group III in terms of value added; except textiles (in terms of employment) and furniture (in terms of value added), in neither Group I nor Group II industries is the income effect significant for small-scale plants.

The scale effect of market size on small-scale plants, as proxied by population, is seen to be particularly strong for industries in Group III and also in Group I except in the size range 1-4. The size of market per se does not seem to be a significant factor for the survival of small plants in terms of either value added or employment in leather, textiles (1-9 range) and apparel (except in the middle range).

Small plants in the 1-9 size range are the ones which are seen to be significantly affected by the density variable in terms of value added share in Group I and Group III industries. Other things being equal, the decline of the small sector in terms of employment share due to population density would not seem to be significant for most industries.

The industrialization effect is mixed, often pulling in the opposite direction. The positive coefficient for a large number of industries probably reflects the productivity effect of industrialization particularly as affecting plants in the 1-9 size range. On the other hand, the observed negative impact of industrialization on small-scale plants in the 1-49 range in terms of employment share is perhaps due to the process of capital deepening in the economy as industrialization progresses.

IV. Synthesis and Conclusions

Numerous factors must evidently contribute to explaining the importance of the small-scale sector as it varies across countries.

The relevant explanatory factors are moreover likely to differ from one country to another. Yet, a pattern of systematic relationship is observed between small-scale activity in various countries and a set of factors common to all of them. These common factors - per capita income, industrialization level, population and density of population - are posited to reflect the scale economy effects of economic development and market size.

Although the various scale effects pull in the opposite direction in some cases, the long-run average net impact of economic development and market size is to reduce smaller plants in relative importance in terms of number, value added and employment. Small-scale plants appear to be particularly vulnerable in the employment size range of 1-9. Although this relationship tends to hold overall, the various scale effects differ in their impact from industry to industry.

What can be said about the policy implications of the results, particularly from the viewpoint of industry composition, a question raised at the beginning? Apparently not much, when seen in the light of the following considerations, quite apart from the serious question with regard to the quality of the underlying data. First, the four common factors are unlikely to be within the control of the policy-makers in charge of small-sector development. Secondly, no explicit allowance was made in the regression analysis to reflect the policy differences among countries which might have affected the estimated parameters. Third, the important question of whether or not small-scale plants are economically efficient was not taken up in the analysis. Fourth, it is not at all clear from the results the extent to which the decline of the small sector in importance reflects a normal shift from one size range to another, higher, range and the extent to which it reflects a process of natural elimination as economies grow. Fifth, the aggregative analysis pursued at the industry level did not throw any light on the question of the viability of smaller plants at the product level. Sixth, the demand factor was not explicitly considered

in the regression model. And finally, in order to derive meaningful policy conclusions one must consider the unique features characterizing the country one wishes to study, in addition to the common factors which were central to our analysis.

These various shortcomings notwithstanding, which admittedly limit its significance from the policy point of view, our analysis is not without merit in at least pointing out some general conclusions bearing on policy matters.

1. One major conclusion of the regression analysis is that development process itself has a bearing on industrial plant structure in affecting and in being affected by economies of scale, an aspect no industrial strategy can possibly ignore. In particular, what appears important is that policies should be able to differentiate between different size range of small plants as well as between industries, as the scale effects appear to differ by broad classes of plants and industries.

2. Obtaining significant employment and value added impact from small-sector development will require policies which enable viable small-scale plants to grow, rather than promoting them in an indiscriminate manner. This is because unless due to demand conditions, technological change and policy impact the optimal scale of plant is significantly reduced, the average effect of increases in per capita income level and industrialization will be to significantly reduce the importance of small-scale plants.

3. In general terms, it is tempting to suggest that industries in which no significant decline of small-scale plants is observed are the ones requiring careful consideration in deciding which industries to develop. In practice, however, the decision with regard to which industries to develop may prove to be a much more complex matter. Apart from conditions of demand, much will depend on

whether it is their contribution in terms of value added or employment one has in mind and on the relative weights attached to the importance of plant level scale economies versus scale economies due to market size and market dispersion.

4. In general terms, it appears in the majority of industries the size of market per se is not an important factor for small-scale plants in the size range 1-4. Above this and up to 49 it seems that small-scale plants are associated with small markets in particular in Group I and III industries. A cautious conclusion would be that when the market is small, other things being equal, it should be possible to set up viable small plants in the 1-49 employment size range in all industries.

5. In all three industry groups a significant decline in the employment share of small plants in the 1-4 range is associated with increases in per capita income; no significant decline is revealed for the majority of industries for plants above the quoted range. This seems to imply that, from an employment point of view, it may make sense in a developing economy to set up small plants above the 1-4 size range in the manufacturing sector. On the other hand, in terms of value added, the small-scale sector may not contribute much in the long-run in many industries, especially in the engineering group (Group III). It would appear, nevertheless, that in the long run the potentially viable small-scale plants in terms of both value added and employment are in industries in Group I and II, in particular when their size in terms of employment is above the 1-9 range.

In concluding, the obvious point must be emphasised that none of the broad policy conclusions drawn above can be anything more than tentative and in no case are they definitive in character. This is due to, apart from the various reasons already outlined, the fact that the findings of this paper are based on intercountry comparisons,

which cannot readily be applied to draw specific policy conclusions with regard to small-scale sector development for a specific country. In particular, what appears important in this context is that the theoretical premises which formed the basis for the regression model must be modified to take account of the unique features characterizing the country one wishes to study. In this light, the major contribution of this paper lies in providing some concrete empirical evidence suggesting that in the long-run the small-scale sector tends to diminish in relative importance in a growing economic system.

Appendix I

Table A1 - Intercountry Variations of Sectoral Shares of Value Added by Small-Scale Units: Results of Regressions[1]

		Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
All industries								
	A	5.62 (3.29)	-0.60 (-2.18)	-0.18 (-1.09)	-0.02 (-0.15)	0.02 (0.02)	0.54	3.48
	B	2.66 (1.82)	-0.64 (-2.81)	-0.30 (-2.24)	-0.24 (-2.34)	1.69 (2.42)	0.40	3.16
	C	5.09 (7.05)	-0.15 (-1.33)	-0.15 (-2.20)	-0.03 (-0.62)	-0.14 (-0.38)	0.52	3.26
Food products								
	A	7.28 (2.51)	-1.02 (-2.19)	-0.29 (-1.07)	-0.24 (-1.05)	0.78 (0.51)	0.46	2.51
	B	1.10 (0.59)	-0.78 (-2.71)	-0.26 (-1.57)	-0.27 (-2.10)	2.55 (2.86)	0.36	2.78
	C	3.69 (2.76)	-0.34 (-1.57)	-0.07 (-0.53)	-0.04 (-0.38)	0.70 (0.98)	0.71	0.60
Textiles								
	A	1.95 (0.65)	-0.52 (-1.08)	-0.29 (-1.01)	-0.11 (-0.47)	0.81 (0.51)	0.17	0.59
	B	-1.51 (-0.61)	-0.51 (-1.20)	-0.02 (-0.08)	-0.28 (-1.42)	2.34 (1.99)	0.28	1.49
	C	3.36 (4.10)	-0.19 (-1.41)	-0.17 (-2.14)	-0.08 (-1.29)	0.43 (0.99)	0.35	1.63
Apparel								
	A	13.27 (4.31)	-0.57 (-1.16)	-0.12 (-0.42)	-0.14 (-0.57)	-2.25 (-1.38)	0.58	4.09
	B	5.67 (2.53)	-0.64 (-1.86)	-0.34 (-1.70)	-0.17 (-1.06)	0.88 (0.82)	0.25	1.63
	C	6.81 (6.01)	-0.12 (-0.66)	0.02 (0.19)	-0.07 (-0.73)	-0.71 (-1.18)	0.43	2.28
Wood products								
	A	5.52 (2.15)	-0.06 (-0.15)	-0.32 (-1.32)	0.20 (0.10)	-0.82 (-0.61)	0.24	0.92
	B	1.76 (1.27)	-0.49 (-2.26)	-0.29 (-2.38)	-0.20 (-2.05)	1.88 (2.84)	0.37	2.97
	C	4.59 (5.03)	-0.14 (-0.98)	-0.21 (-2.38)	-0.07 (-0.91)	0.34 (0.70)	0.35	1.61
Furniture								
	A	12.90 (8.02)	-0.49 (-1.81)	-0.27 (-1.67)	-0.27 (-2.11)	-1.95 (-2.09)	0.85	14.65
	B	5.65 (3.96)	-0.63 (-2.46)	-0.41 (-3.21)	-0.20 (-1.99)	1.07 (1.28)	0.51	4.45
	C	6.29 (8.19)	-0.23 (-1.75)	-0.20 (-2.57)	-0.08 (-1.37)	-0.03 (-0.06)	0.68	5.21

Continued ...

Table A1 - continued

	Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Paper products							
A	6.81 (2.42)	-0.10 (-0.25)	-0.21 (-0.88)	0.45 (2.30)	-2.45 (-1.86)	0.48	0.62
B	4.79 (2.10)	-0.47 (-1.58)	-0.22 (-1.13)	0.15 (1.04)	-0.21 (-0.20)	0.38	2.72
C	6.21 (3.45)	-0.18 (-0.73)	-0.18 (-1.19)	0.11 (0.91)	-0.77 (-0.91)	0.45	2.21
Printing & publishing							
A	4.73 (2.27)	-0.15 (-0.44)	-0.15 (-0.77)	-0.02 (-0.09)	-0.63 (-0.57)	0.22	0.83
B	1.53 (1.29)	-0.35 (-1.91)	-0.18 (-1.74)	-0.16 (-1.95)	1.36 (2.40)	0.30	2.11
C	4.56 (8.40)	0.14 (-1.63)	-0.10 (-2.02)	0.01 (0.15)	0.07 (0.25)	0.47	2.63
Leather products							
A	9.34 (2.49)	-0.44 (-0.72)	-0.17 (-0.47)	-0.07 (-0.25)	-1.43 (-0.72)	0.31	1.36
B	5.05 (2.37)	-0.54 (-1.63)	-0.22 (-1.18)	-0.16 (-1.06)	0.63 (0.62)	0.19	1.20
C	7.04 (5.10)	-0.28 (-1.25)	-0.14 (-1.06)	-0.02 (-0.22)	-0.36 (-0.49)	0.42	2.21
Rubber products							
A	5.67 (2.79)	-0.10 (-0.30)	-0.44 (-2.38)	-0.05 (-0.33)	-1.09 (-1.01)	0.47	2.86
B	2.42 (2.27)	-0.34 (-2.01)	-0.28 (-2.92)	-0.17 (-2.27)	0.86 (1.68)	0.39	3.08
C	4.03 (4.21)	0.13 (0.89)	-0.16 (-1.82)	0.06 (0.85)	-0.63 (-1.26)	0.35	1.73
Chemicals							
A	1.44 (0.54)	0.09 (0.24)	-0.57 (-0.27)	0.09 (0.51)	-0.75 (-0.61)	0.07	0.21
B	2.70 (1.66)	-0.36 (-1.52)	-0.25 (-1.68)	-0.26 (-2.37)	0.78 (1.06)	0.29	1.95
C	4.51 (4.49)	-0.17 (-1.27)	-0.07 (-0.81)	-0.03 (-0.47)	-0.10 (-0.22)	0.29	1.25
Non-metallic mineral products							
A	4.49 (2.48)	-0.27 (-0.93)	-0.11 (-0.62)	-0.18 (-1.29)	-0.27 (-0.28)	0.32	1.43
B	-0.95 (-0.63)	-0.41 (-1.78)	-0.30 (-2.21)	-0.27 (-2.62)	2.41 (3.36)	0.46	4.30
C	0.97 (1.17)	0.09 (0.68)	-0.06 (-0.77)	-0.04 (-0.56)	0.59 (1.33)	0.45	2.44

Continued ...

Table A1 - continued

	Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Fabricated metal products							
A	9.31	-0.09	-0.54	0.11	-2.07	0.60	4.86
	(4.09)	(-0.26)	(-2.59)	(0.61)	(-1.72)		
B	4.08	-0.48	-0.40	-0.11	0.96	0.40	3.29
	(2.86)	(-2.19)	(-3.16)	(-1.08)	(1.41)		
C	5.71	0.08	-0.26	0.07	-0.76	0.77	10.81
	(9.80)	(0.84)	(-4.80)	(1.63)	(-2.48)		
Non-electrical machinery							
A	6.94	-0.39	-0.39	0.10	-0.87	0.52	3.52
	(3.22)	(-1.13)	(-1.99)	(0.59)	(-0.76)		
B	3.43	-0.55	-0.27	-0.12	1.06	0.23	1.43
	(1.86)	(-1.93)	(-1.69)	(-0.91)	(1.22)		
C	6.80	-0.32	-0.27	0.0004	-0.21	0.65	5.97
	(6.78)	(-2.03)	(-2.89)	(0.005)	(-0.39)		
Electrical machinery							
A	9.38	-0.72	-0.24	-0.15	-1.04	0.46	2.33
	(2.62)	(-1.48)	(-0.80)	(-0.60)	(-0.62)		
B	6.80	-0.42	-0.65	-0.25	-0.03	0.57	6.03
	(3.85)	(-1.38)	(-4.01)	(-1.95)	(-0.03)		
C	8.35	-0.35	-0.34	-0.14	-0.65	0.71	6.82
	(6.36)	(-1.97)	(-3.13)	(-1.59)	(-1.05)		
Transport equipment							
A	6.93	-0.68	-0.76	0.11	-0.03	0.54	3.19
	(2.03)	(-1.49)	(-2.58)	(0.45)	(-0.02)		
B	5.36	-1.13	-0.73	-0.35	2.21	0.55	5.60
	(2.44)	(-3.34)	(-3.54)	(-2.28)	(2.11)		
C	5.51	-0.64	-0.52	0.003	0.91	0.73	7.40
	(3.73)	(-3.24)	(-4.11)	(0.02)	(1.33)		
Diverse industries							
A	7.35	-0.46	-0.25	-0.25	-0.34	0.34	1.69
	(2.75)	(-1.10)	(-1.03)	(-1.20)	(-0.24)		
B	2.36	-0.53	-0.21	-0.28	1.69	0.34	2.59
	(1.54)	(-2.22)	(-1.50)	(-2.61)	(2.32)		
C	4.98	-0.19	-0.14	-0.04	0.17	0.33	1.57
	(5.77)	(-1.39)	(-1.79)	(-0.62)	(0.37)		

[1] A = plants engaging upto 4 persons; B = plants engaging upto 9 persons; C = plants engaging upto 49 persons. t-values are in parenthesis; the critical values at which 't' is significant are 2.06 at 5 % level and 1.71 at 10 % level.

Source: Based on national censuses.

Table A2 - Intercountry Variations of Sectoral Shares of Employment of Small-Scale Units: Results of Regressions[1]

		Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
All industries								
	A	9.13 (4.54)	-1.31 (-2.19)	-0.46 (-2.10)		0.93 (0.83)	0.49	5.04
		12.84 (3.79)	-1.60 (-2.42)	-0.27 (-0.92)	-0.10 (-0.46)	2.49 (1.52)	0.54	3.32
	B	6.55 (5.79)		-0.34 (-2.60)		-1.06 (-2.89)	0.37	7.08
		7.58 (5.41)	-0.33 (-0.92)	-0.37 (-2.71)	-0.18 (-1.30)	-0.38 (-0.50)	0.42	3.97
	C	5.68 (11.12)		-0.19 (-2.96)		-0.60 (-3.63)	0.53	10.66
		5.21 (6.19)	-0.07 (-0.35)	-0.23 (-3.10)	-0.03 (-0.40)	-0.78 (-1.88)	0.57	4.26
Food products								
	A	10.54 (7.62)	-1.06 (-5.94)	-0.29 (-2.05)	-0.19 (-1.47)		0.73	13.67
		10.18 (4.46)	-1.16 (-2.67)	-0.33 (-1.72)	-0.21 (-1.43)	0.03 (0.03)	0.74	7.26
	B	6.81 (5.26)		-0.30 (-2.02)	-0.14 (-1.03)	-0.97 (-2.35)	0.32	3.59
		7.11 (4.57)	-0.14 (-0.36)	-0.30 (-1.97)	-0.16 (-1.06)	-0.71 (-0.84)	0.32	2.62
	C	4.29 (4.33)	-0.04 (-0.16)	-0.26 (-2.95)	-0.05 (-0.56)	-1.06 (-2.19)	0.50	3.20
Textiles								
	A	6.77 (4.15)	-0.93 (-3.82)				0.46	14.57
		7.47 (3.53)	-0.78 (-1.34)	-0.16 (-0.79)	-0.09 (-0.46)	-0.31 (-0.28)	0.50	3.44
	B	5.01 (2.59)		-0.10 (-0.49)	-0.18 (-0.90)	-0.90 (-1.53)	0.14	1.11
		5.06 (2.23)	-0.02 (-0.04)	-0.10 (-0.47)	-0.19 (-0.82)	-0.86 (-0.74)	0.14	0.80
	C	2.22 (1.81)	0.55 (1.74)	-0.08 (-0.68)	0.21 (1.71)	-1.30 (-2.03)	0.25	1.39
Apparel								
	A	16.46 (4.53)	-1.83 (-2.46)	0.09 (0.03)	-0.21 (-0.99)	2.75 (1.59)	0.61	3.77
	B	8.53 (5.09)	-0.61 (-2.80)	-0.35 (-2.15)	-0.20 (-1.38)		0.36	4.31
		8.56 (4.96)	-0.65 (-1.44)	-0.35 (-2.09)	-0.21 (-1.21)	-0.08 (0.09)	0.36	3.10

Continued ...

Table A2- continued

		Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Apparel								
	C	5.28 (8.29)		-0.11 (-1.38)		-0.44 (-2.13)	0.25	3.12
		5.28 (4.90)	-0.10 (-0.42)	-0.14 (-1.43)	-0.07 (-0.72)	-0.41 (-0.78)	0.28	1.24
Wood products								
	A	5.75 (4.40)	-0.47 (-2.40)				0.25	5.76
		5.45 (2.09)	-0.67 (-1.35)	-0.14 (-0.65)	-0.01 (-0.04)	0.22 (0.18)	0.30	1.11
	B	5.25 (4.42)	-0.16 (-1.02)	-0.15 (-1.24)	-0.17 (-1.63)		0.16	1.42
		5.26 (4.30)	-0.16 (-0.52)	-0.15 (-1.21)	-0.17 (-1.39)	-0.01 (-0.02)	0.16	1.02
	C	4.88 (10.14)	-0.08 (-1.24)	-0.08 (-1.54)			0.16	1.86
		4.80 (6.62)	-0.08 (-0.50)	-0.09 (-1.44)	-0.02 (-0.25)	-0.10 (-0.28)	0.18	0.69
Furniture								
	A	13.21 (8.81)	-1.15 (-4.12)	-0.16 (-1.24)	-0.26 (-2.74)	-1.53 (-1.84)	0.89	17.58
	B	7.21 (7.78)		-0.37 (-3.34)	-0.08 (-0.80)	-0.96 (-3.20)	0.52	7.60
		7.77 (6.98)	-0.23 (-0.79)	-0.36 (-3.26)	-0.12 (-1.07)	-0.55 (-0.92)	0.54	5.76
	C	6.16 (15.79)	-0.13 (-1.23)	-0.15 (3.14)		-0.31 (-1.38)	0.62	11.54
		6.06 (10.79)	-0.21 (-1.60)	-0.17 (-3.17)	-0.04 (-0.88)	-0.32 (-1.15)	0.71	6.94
Paper products								
	A	5.85 (3.71)			0.36 (1.95)	-2.30 (-4.65)	0.63	12.57
		9.12 (3.11)	-0.23 (-0.41)	-0.17 (-0.68)	0.36 (1.82)	-0.88 (-0.61)	0.72	6.11
	B	7.19 (5.58)	-0.71 (-3.65)	-0.30 (-2.12)			0.46	9.92
		6.44 (4.41)	-0.39 (-0.99)	-0.28 (-1.86)	0.17 (1.19)	-0.73 (-0.92)	0.50	5.26
	C	5.03 (6.01)		-0.28 (-2.79)	0.15 (1.67)	-0.64 (-2.51)	0.47	5.30
		4.08 (3.19)	0.07 (0.24)	-0.32 (-2.83)	0.16 (1.47)	-1.12 (-1.79)	0.50	3.25
Printing & publishing								
	A	7.15 (2.85)	-0.77 (-1.62)	-0.12 (-0.59)	0.02 (0.13)	1.51 (1.27)	0.37	1.61

Continued ...

Table A2 - continued

		Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Printing & publishing								
	B	5.18 (7.17)	-0.33 (-3.23)		-0.07 (-1.08)		0.33	5.62
		5.33 (6.72)	-0.33 (-1.56)	-0.50 (-0.58)	-0.08 (-1.06)	0.03 (0.06)	0.34	2.70
	C	4.95 (18.42)		-0.10 (-2.97)		-0.31 (-3.62)	0.53	10.66
		4.58 (10.39)	0.002 (0.02)	-0.12 (-2.96)	0.03 (0.71)	-0.45 (-2.09)	0.58	4.34
Leather products								
	A	15.18 (4.32)	-2.07 (-3.09)	0.10 (0.34)	-0.19 (-0.83)	3.38 (1.98)	0.60	3.83
	B	6.99 (5.02)	-0.56 (-2.71)	-0.22 (-1.48)			0.29	4.88
		7.63 (4.66)	-0.73 (-1.71)	-0.25 (-1.55)	-0.13 (-0.83)	0.38 (0.43)	0.31	2.48
	C	6.11 (7.20)	-0.31 (-2.58)	-0.13 (-1.38)			0.30	2.63
		6.02 (4.67)	-0.30 (-1.03)	-0.14 (-1.18)	0.01 (0.10)	-0.03 (-0.05)	0.30	1.40
Rubber products								
	A	10.75 (3.24)	-1.32 (-2.09)	-0.30 (-0.90)	-0.08 (-0.37)	2.37 (1.51)	0.49	2.71
	B	6.07 (5.06)		-0.32 (-2.31)	-0.19 (-1.50)	-0.86 (-2.26)	0.35	4.20
		6.83 (4.84)	-0.37 (-1.02)	-0.32 (-2.28)	-0.25 (-1.80)	-0.19 (-0.25)	0.38	3.42
	C	3.21 (2.62)	0.39 (1.43)	-0.28 (-2.55)	0.01 (0.11)	-1.68 (-2.80)	0.47	2.83
Chemicals								
	A	6.03 (5.67)	-0.67 (-4.39)	-0.24 (-1.99)			0.60	12.16
		7.76 (4.02)	-0.65 (-1.76)	-0.13 (-0.83)	-0.01 (-0.04)	0.51 (0.54)	0.65	4.77
	B	5.69 (5.99)		-0.41 (-3.47)		-0.96 (-3.18)	0.47	10.29
		6.27 (5.19)	-0.16 (-0.53)	-0.43 (-3.52)	-0.12 (-1.01)	-0.60 (-0.95)	0.50	5.19
	C	5.71 (16.41)		-0.29 (-6.53)		-0.64 (-5.72)	0.77	36.58
		5.56 (9.35)	-0.04 (-0.29)	-0.30 (-5.66)	0.01 (0.02)	-0.67 (-2.30)	0.80	12.71

Continued ....

Table A2 - continued

	Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Non-metallic mineral products							
A	8.53 (3.27)	-1.22 (-2.51)	-0.02 (-0.09)	-0.25 (-1.53)	2.54 (2.05)	0.42	1.90
B	5.85 (5.08)		-0.22 (-1.64)	-0.15 (-1.24)	-0.74 (-2.03)	0.27	2.85
	6.08 (4.39)	-0.11 (-0.31)	-0.22 (-1.60)	-0.17 (-1.22)	-0.54 (-0.72)	0.27	2.08
C	3.01 (4.31)	0.05 (0.34)	-0.20 (-3.26)	0.01 (0.10)	-1.06 (-3.09)	0.56	4.04
Basic metals							
A	7.99 (2.65)	-1.17 (-2.78)				0.41	7.73
	13.30 (2.54)	-1.70 (-1.75)	0.04 (0.11)	-0.16 (-0.51)	3.00 (1.07)	0.54	1.62
B	3.63 (1.42)	-0.43 (-0.64)	-0.18 (-0.64)	-0.03 (-0.11)	0.20 (0.12)	0.10	0.44
C	1.72 (1.03)	0.45 (1.22)	-0.14 (-0.93)	0.43 (2.93)	-0.26 (-0.28)	0.44	1.87
Fabricated metals							
A	11.14 (4.26)	-1.00 (-2.08)	-0.38 (-1.73)		1.38 (1.10)	0.62	6.07
	10.93 (3.95)	-0.94 (-1.79)	-0.36 (-1.56)	0.06 (0.34)	1.30 (1.00)	0.62	4.59
B	6.43 (6.88)		-0.40 (-3.65)		-0.90 (-2.96)	0.46	10.36
	6.85 (5.73)	-0.15 (-0.47)	-0.41 (-3.49)	-0.06 (-0.56)	-0.61 (-0.95)	0.47	4.92
C	5.24 (11.92)		-0.21 (-3.99)	0.08 (1.63)	-0.45 (-3.33)	0.61	9.41
	5.07 (8.88)	0.07 (0.48)	-0.21 (-3.85)	0.09 (1.62)	-0.57 (-1.92)	0.62	6.81
Non-electrical machinery							
A	12.43 (3.92)	-1.12 (-1.86)	-0.27 (-1.04)	-0.14 (-0.67)	2.11 (1.41)	0.56	3.54
B	5.86 (4.72)		-0.31 (-2.21)		-0.94 (-2.32)	0.28	4.64
	6.62 (4.20)	-0.27 (-0.66)	-0.32 (-2.10)	-0.11 (-0.76)	-0.40 (-0.47)	0.30	2.37
C	6.67 (11.80)	-0.39 (-4.89)	-0.21 (-3.43)			0.64	16.97
	6.56 (9.44)	-0.26 (-1.43)	-0.21 (-3.26)	0.02 (0.30)	-0.29 (-0.81)	0.65	8.05

Continued ...

Table A2 - continued

		Constant term	Income effect	Population effect	Density effect	Industrial-ization effect	R^2	F-ratio
Electrical machinery								
	A	16.95 (4.96)	-1.53 (-2.28)			-4.38 (-2.75)	0.65	8.32
		16.87 (4.18)	-1.65 (-2.19)	-0.18 (-0.51)	-0.17 (-0.67)	-3.60 (-1.62)	0.66	4.61
	B	7.60 (5.50)		-0.61 (-3.78)		-1.45 (-3.23)	0.49	11.58
		8.99 (5.26)	-0.55 (-1.24)	-0.63 (-3.76)	-0.19 (-1.12)	-0.39 (-0.43)	0.53	6.25
	C	6.56 (8.78)		-0.35 (-3.68)		-0.97 (-4.05)	0.60	14.54
		6.54 (5.12)	-0.14 (-0.49)	-0.37 (-3.27)	-0.03 (-0.29)	-0.87 (-1.42)	0.61	5.08
Transport equipment								
	A	11.72 (4.84)	-1.87 (-2.59)	-0.72 (-2.66)		1.46 (1.11)	0.61	7.21
		15.25 (3.19)	-2.23 (-2.60)	-0.50 (-1.16)	-0.14 (-0.42)	3.06 (1.34)	0.63	4.12
	B	7.38 (4.41)		-0.62 (-3.07)		-1.26 (-2.32)	0.38	6.98
		8.88 (4.27)	-0.60 (-1.07)	-0.62 (-2.99)	-0.23 (-1.07)	-0.09 (-0.08)	0.42	3.81
	C	7.53 (7.97)	-0.50 (-3.80)	-0.41 (-3.69)			0.60	13.55
		5.93 (4.52)	-0.55 (-1.89)	-0.53 (-4.26)	0.03 (0.23)	-0.65 (-0.98)	0.68	6.47
Diverse industries								
	A	7.74 (4.44)	-0.61 (-2.68)	-0.34 (-1.84)	-0.11 (-0.62)		0.45	3.79
		7.54 (2.35)	-0.75 (-1.27)	-0.37 (-1.33)	-0.13 (-0.67)	0.16 (0.10)	0.45	2.00
	B	6.67 (4.63)	-0.29 (-1.53)	-0.32 (-2.29)	-0.26 (-2.07)		0.39	4.66
		6.68 (4.50)	-0.31 (-0.79)	-0.32 (-2.23)	-0.26 (-1.78)	-0.04 (0.06)	0.30	2.32
	C	4.76 (5.73)	0.03 (0.16)	-0.18 (-2.39)	-0.05 (-0.73)	-0.53 (-1.30)	0.38	1.95

[1] A = plants engaging upto 4 persons; B = plants engaging upto 9 persons; C = plants engaging upto 49 persons. t-values are in parenthesis; the critical values at which 't' is significant are 2.06 at 5 % and 1.71 at 10 % level.

Source: Based on national censuses.

Appendix II: List of Data Sources

Country-specific source:

Austria: Ergebnisse der nichtlandwirtschaftlichen Betriebszählung 1964. Österreichisches Statistisches Zentralamt, Vienna 1968.

Australia: Economic Censuses: 1968-69: Manufacturing Establishment: Selected Items of Data Classified by Industry and Employment Size. Commonwealth Bureau of Census and Statistics, Canberra.

Canada: Manufacturing Industries of Canada: Type of Organization and Size of Establishments, 1970, Statistics Canada, Manufacturing and Primary Industries Division, Ottawa.

France: Les Etablissements Industriels et Commerciaux en France en 1966, Institut National de la Statistique et des Etudes Economiques, Paris 1968.

Federal Republic of Germany: Industrie und Handwerk, Fachserie D, Sonderbeiträge zur Industriestatistik: Betriebe, Beschäftigte und Umsatz nach Beschäftigtengrößenklassen, 1970. Statistisches Bundesamt, Wiesbaden 1971.

Japan: Establishment Census of Japan 1969, Vol. 1, Bureau of Statistics, Office of the Prime Minister, Tokyo 1970.

Census of Manufactures, 1971: Report by Industries. Research and Statistics Department, Ministry of International Trade and Industry, Tokyo 1974.

Norway: Bedriftstelling (Census of Establishments) 1963, Vol. 1, Statistisk Sentral Byra (Central Bureau of Statistics of Norway) Oslo 1966.

United Kingdom: Census of Production, 1968. Department of Trade and Industry, Business Statistics Office, London 1973.

U.S.A.: Census of Manufactures, 1967. Summary Series: General Summary MC67 (I)-1, U.S. Bureau of Census, Washington 1970.

Algeria: Industrie 1968, Sous-Direcion des Statistiques, Direcion General du Plan et des Etudes Economiques, Alger 1970.

Brazil: Censo Industrial de 1960, VII Recenseamento Geral do Brasil, Vol. III, IBGE-Servico Nacional de Recenseamento. The 1970 Census data are also available but because of incomplete coverage of the size group 1-4 it has not been possible to make use of them in this paper.

Colombia: Boletin Mensual de Estadistica 1970, Departmento Administrativo, Nacional de Estadistica, Bogotá. R. Albert Barry, "The Relevance and Prospects of Small-scale Industry in Colombia", Yale University, Economic Growth Centre Discussion Paper No. 142. United Nations Industrial Development Organisation, Small-scale Industry in Latin America. United Nations, New York 1969.

Cyprus: Census of Industrial Production 1967. Statistics and Research Department, Ministry of Finance, Nicosia, 1970.

Ghana: Industrial Census Report 1962, Vol. I: Industry. Central Bureau of Statistics, Accra 1965.

Iraq: United Nations Industrial Development Organisation, (UNIDO), Small-scale Industries in Arab Countries of the Middle East. United Nations, New York 1970.

Israel: Census of Industry and Crafts 1965. Central Bureau of Statistics, Jerusalem 1970.

Jordan: UNIDO, Small-scale Industries in the Arab Countries of the Middle East, op.cit.

Korea, South: Report on Mining and Manufacturing Survey, 1967. The Korean Reconstruction Bank 1968.

Kuwait: UNIDO, Small-scale Industries in the Arab Countries of the Middle East, op.cit.

Lebanon: ibid.

Malaysia, West: Census of Manufacturing Industries: West Malaysia 1968. Department of Statistics, Kuala Lumpur.

Mauritius: The Census of Industrial Production 1967-68. Central Statistical Office, Ministry of Economic Planning and Development, Port Louis, 1970.

Mexico: Censo Industrial 1966: Resumen General. Secretaria de Industria Y Commercio, Dirección General de Estadistica, Mexico D.F. 1967.

Peru: Primer Censo Nacional Economico: Industria Manufactura 1963. Dirección Nacional de Estadistica Y Censon, Lima.

Puerto Rico: Census of Manufactures 1963. U.S. Department of Commerce. Bureau of the Census, Washington, D.C. 1965.

Singapore: Report on the Census of Industrial Production 1968. Department of Statistics, Singapore 1970.

Spain: Estadistica de Producción Industrial 1972. Servicio Sindical de Estadistica, Madrid 1973.

Taiwan: General Report on the Third Industrial and Commercial Census of Taiwan: Vol. III: Manufacturing, 1965. Published by the Commission of I.C.C.T. 1968.

Thailand: Report of the 1964 Industrial Census. National Statistical Office, Office of the Prime Minister, Bangkok 1968.

Turkey: Census of Manufacturing Industries and Business Establishments: Manufacturing, 1964. Devlet Istatistik Enstitiisii, Ankara 1968.

General Source:

World Tables. International Bank for Reconstruction and Development, Washington, D.C.

Yearbook of National Accounts Statistics, United Nations, New York.

International Financial Statistics, International Monetary Fund, Washington, D.C.