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Small Manufacturing Establishments in Developing Countries: an empirical analysis

JOHN WEEKS

ABSTRACT *There is considerable literature on the promotion of small and medium establishments (SMEs) in developing countries. Rather little attention has been given to the long-term performance of these in the development process. This paper considers the small literature on the trends in the SMEs' contribution to manufacturing in the long run, and the more recent discussion of the effect of policy on these trends. Using considerably more data than previous studies, the paper concludes that (1) it appears that the importance of SMEs tends to decline in early stages of development (as others have suggested), but that this is reversed as countries reach middle-income status, and (2) several of the generalisations frequently made about the impact of policy variables on SMEs cannot be sustained at the country level.*

1. Introduction

There exists a wealth of literature on the process of industrialisation in developing countries and policies to foster industrialisation, including promotion of small and medium size establishments.[1] However, one finds relatively little analysis, theoretical or empirical, of the relationship of size of production unit to key variables such as wage behaviour and employment growth. This relative absence is in contrast to the voluminous number of articles and books on the size distribution of production units in agriculture.[2] This study investigates these issues, with specific attention to the long-run relationship between size of establishment and the level of development. The issue is of some policy importance, since a number of developing countries have programmes to foster small and medium establishments.[3]

After a review of the literature, we inspect aggregate data for manufacturing across 25 countries, and this prompts the conclusion that there appears to be a non-linear relationship between the share of employment in small manufacturing establishments and the level of development. In particular, the share of employment in small establishments seems to decline sharply as countries pass from the low-income to middle-income category, then, subsequently, it rises slowly. For a few countries, there is sufficient data to investigate the relationship in time-series. The time series data, for eight countries, seems to verify the 'U-shaped' cross-sectional

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relationship, but indicates that individual countries tend to have markedly different 'turning points' (i.e. the point at which decline is reversed). While further disaggregation would be necessary to draw policy conclusions, the empirical evidence presented suggests that programmes to foster small and medium establishments in low-income countries may be based on unverified hypotheses about relative efficiency over the size distribution of firms. After considering long-term trends, the paper inspects the behaviour of small establishment employment in the short run.

2. Size Distribution of Establishments in the Long Run: hypotheses

Since Alfred Marshall used the concept of the 'representative firm', neoclassical economics has developed its analytical generalisations on the presumption that the behaviour of an industry can be theoretically explained on the basis of all production units being assumed similar. It has been widely recognised that this theoretical approach is too static for the context of developing countries. In place of this static equilibrium approach, it is frequently argued, in general and specifically for manufacturing, that small establishments tend to decline as a country's level of development rises.

Typical of this view is Anderson's argument, that the evolution of the size distribution of establishments proceeds in phases: first, in the earliest phase of development, household and artisan production is replaced by small workshops with wage labour, then these decline in favour of medium-sized units, which, in turn are replaced by large-scale units (Anderson, 1982).

Though almost 15 years old, the most detailed statistical study of this issue to date was by Little, Mazumdar & Page, who ventured the following conclusions:

> Secure generalizations clearly cannot be made from the limited information presented, but some tentative suggestions are in order. Everywhere there is a relative fall in employment in household manufacturing . . . The same may well be true of minifactories or workshops with 1–3 workers. Likewise, where manufacturing employment has grown very fast (Korea, Singapore, and Taiwan), factories with 10–99 workers have increased employment more slowly than have larger ones. Where manufacturing has been more sluggish, firms of this size have probably held their own or been in the lead.
>
> . . .
>
> In manufacturing, the very small establishments (fewer than 10 workers) are destined to near extinction unless they become a protected species. In this respect [industrial policy in] India is trying to swim against the tide of history . . . Manufacturing establishments with 10–50 workers will decline relatively and probably also in absolute numbers; but the future of the middle ground in manufacturing, say 50–500 workers, is more obscure. (Little *et al.*, 1987, pp. 13, 17][4]

This scenario of an inevitable upward migration in establishment size in manufacturing (e.g. Mead 1994) is analytically based upon two hypothesized mechanisms, which can be called the output composition effect, and the social-relations-economies-of-scale (SRES) effect. The former maintains that there tend to

be relatively more small establishments in the production of consumer products, and as per capita incomes rise, the share of manufacturing output of these products falls, bringing about a decline in the relative contribution of small establishments to employment and output. This hypothesised effect is neutral with regard to judgements about the relative efficiency of small establishments. These establishments may be technically and economically efficient, but they decline due to secular changes in the composition of output. In contrast, the hypothesised SRES effect passes a negative judgement on the efficiency of small establishments, and is the principal basis for the conclusion of Little *et al.*, and the scenario described by Anderson. The development process involves the progressive emergence of capitalist methods of business management, which prove more responsive to market rationality than family establishments, which are based on kinship and patronage. Associated with this emerging form of management are economies of scale, perhaps conforming to the standard neoclassical presentation of long-run average cost curves. Since the internal markets of developing countries are initially small, the expansion of those markets from a low-income base would tend to induce firms down their long-run average cost curves to a larger scale of production.

More recent studies have considered which policies and institutional structures would be conducive or detrimental to the economic health of SMEs, with the implicit assumption of technical efficiency across the distribution of establishments by size. Various policy variables were tested by Mulhern (2002) for Venezuela, and across countries by Nugent & Nabli (1992). However, the modelling of the latter lacks a clear analytical foundation, which the statistical results below seek to rectify.[5]

Our statistical work excludes those establishments hiring less than ten, due to lack of data. Thus, while we cannot test for how these units behave during the process of development, some speculation is possible. To the extent that these micro establishments adapt to market discipline, one would expect them to respond similarly to our small establishment category (i.e. those hiring 10–49 employees). There is no obvious theoretical reason to assume that they would not adapt, so Anderson's conclusion that they disappear in the early stages of development may be too negative.

3. Size Distribution of Establishments in the Long Run: evidence

Prior to the statistical analysis, it is necessary to refer to the organisation of the data.[6] What published data exist on the size distribution of establishments typically come in ranges by numbers of workers engaged.[7] These ranges are not the same for each country, so it is necessary to reorganise the data for international cross-section comparisons. This study uses the standard definitions found in the literature: 'small establishments' are those hiring 10 to 49 workers, 'medium' 50 to 499, and 'large' 500 and more. Those with fewer employees, sometimes called 'micro-establishments', are excluded from the empirical analysis.[8] The most recent country data are from the mid–1990s.

Table 1(a) presents the distribution of employment for the three establishment categories, across 25 countries for various years.[9] For several of the countries, all available years are included, and these are marked with an asterisk. The statistics provide evidence of a tremendous variation in the contribution of small establishments to total manufacturing employment, from a low of around 10% for Bangladesh, Pakistan and South Africa, to over 50% for Guatemala. Table 1(b)

Table 1a. The Size Distribution of Employment in Manufacturing

Country	Year	Employment Shares			Relative wage (sm/agg)
		Est 10–49	Est 50–499	Est 500 +	
1. Bangladesh	1955	7.2	22.3	70.6	1.18
	1965	15.0	24.3	60.7	.77
	1976	10.1	30.1	59.7	na
	1984	10.5	21.8	67.7	.54
2. Bolivia	1979	28.6	52.2	19.2	na
3. Brazil	1960	20.6	47.7	31.7	.83
	1965	16.4	47.2	36.3	.74
	1970	24.9	52.3	22.8	.77
	1975	25.9	52.6	21.5	.82
	1980	24.1	54.9	21.1	.68
4. Colombia	1956	31.0	na	na	.73
	1960	28.3	na	na	.75
	1965	25.1	na	na	.70
	1970	19.6	na	na	.60
	1975	19.7	na	na	.63
	1980	19.5	51.8	28.7	.64
	1985	21.1	51.0	27.8	.63
	1990	20.5	na	na	.65
5. Costa Rica	1964	50.3	na	na	na
	1967	41.9	na	na	na
6. Cyprus	1972	53.8	46.2	0.0	na
	1976	47.2	48.7	4.1	.91
	1982	46.6	50.8	2.6	.91
	1985	47.1	47.7	5.2	.92
7. Ecuador	1974	23.1	62.6	14.3	.75
	1980	20.4	56.0	23.5	.80
	1985	20.9	57.7	21.5	.67
	1991	21.5	55.8	22.8	.61
8. El Salvador	1970	22.7	55.0	22.3	.71
	1975	16.2	66.0	17.7	.84
	1979	17.7	na	na	.76
9. Greece	1960	40.4	na	na	.74
	1965	39.1	43.4	17.5	.84
	1970	37.7	44.6	17.6	.82
	1980	31.9	na	na	.77
	1985	33.1	na	na	.77
	1990	39.5	na	na	.76
	1992	39.5	na	na	.79
10. Guatemala	1971	59.7	na	na	.84
	1975	50.9	na	na	.77
	1984	51.7	na	na	.87
11. Hong Kong	1951	22.8	49.4	27.9	na
	1955	24.2	48.1	27.6	na
	1961	25.1	50.5	24.4	na
	1965	20.3	52.7	27.0	na
	1971	24.8	48.2	27.0	na
	1975	27.5	48.8	24.0	.96
	1980	29.4	51.3	19.3	1.00
	1985	32.0	51.3	16.6	.94
	1990	35.4	48.9	15.7	.90
	1996	34.3	47.4	18.3	.84

Table 1a. (Continued)

Country	Year	Employment Shares			Relative wage (sm/agg)
		Est 10–49	Est 50–499	Est 500 +	
12. India	1974	13.6	na	na	na
	1980	13.8	na	na	na
	1985	17.5	na	na	na
13. Indonesia	1974	31.3	35.7	33.0	.56
	1985	33.0	na	na	na
	1990	37.0	na	na	na
14. Korea	1958	43.2	na	na	na
	1962	33.8	na	na	.61
	1966	29.9	40.1	30.0	.80
	1970	22.6	38.6	38.8	.68
	1975	13.6	40.8	45.6	.75
	1980	15.5	41.1	43.4	.83
	1985	20.3	41.9	37.8	.79
	1990	27.9	39.0	31.6	.76
	1992	30.9	39.2	29.9	.77
15. Malaysia	1957	36.1	na	na	na
	1967	28.5	57.3	14.2	.82
	1970	25.5	59.5	15.0	.81
	1974	19.3	53.6	27.0	.82
	1985	16.0	54.8	29.2	.85
	1991	9.1	55.4	35.5	.89
	1997	10.0	41.8	48.3	.87
16. Mexico	1970	19.4	50.8	29.8	.64
	1975	15.4	48.8	35.7	.62
	1988	15.0	45.3	39.7	.54
	1993	12.2	56.4	31.4	.60
17. Pakistan	1954	18.4	20.8	60.8	.99
	1960	17.1	28.9	54.1	.81
	1966	13.7	28.8	57.5	.88
	1970	12.3	27.2	60.5	.87
	1975	7.9	25.3	66.8	.94
	1980	10.3	28.5	61.2	.80
	1985	10.1	30.1	59.8	.76
	1988	10.6	32.9	56.5	.74
18. Peru	1963	25.7	52.9	21.4	.66
	1967	28.8	52.8	18.3	.77
	1970	33.8	53.2	13.0	.73
	1974	26.8	56.9	16.2	.68
	1980	28.4	na	na	na
	1985	29.9	na	na	na
	1990	31.4	na	na	na
	1992	32.1	na	na	na
19. Singapore	1959	37.8	na	na	na
	1962	37.3	na	na	.76
	1965	34.6	na	na	.78
	1970	20.3	42.8	37.0	.76
	1975	15.6	37.9	46.6	.80
	1980	17.3	40.1	42.6	.67
	1985	19.6	40.6	39.6	.83
	1990	14.6	40.5	44.9	.88

Table 1a. (Continued)

Country	Year	Employment Shares			Relative wage (sm/agg)
		Est 10–49	Est 50–499	Est 500 +	
20. South Africa	1950	18.2	52.4	29.4	na
	1960	15.2	52.3	32.5	1.13
	1970	11.0	47.5	41.5	1.02
	1979	11.1	47.1	41.8	.99
	1988	12.1	48.2	39.6	.88
21. Sri Lanka	1989	11.2	32.3	55.8	na
22. Taiwan*	1954	33.0	na	na	na
	1961	29.2	29.6	41.2	na
	1971	18.7	41.4	39.9	.79
23. Thailand	1975	36.0	na	na	na
	1984	31.2	na	na	na
24. Turkey	1981	17.1	34.6	48.3	.47
25. Venezuela	1976	29.7	na	na	.82
	1985	32.9	na	na	na
	1990	30.7	na	na	na
	1995	29.9	na	na	na
	1997	29.9	na	na	na

Note: For Venezuela the small category is 5–51 employed.

Table 1b. Distribution of Countries by Share of Employment In Small Enterprises (average over all observations)

Percentage Range	Countries	
	Number	List
zero to 9%	0	none
10 to 19	8	Bangladesh, El Salvador, India, Mexico, Pakistan South Africa, Sir Lanka*, Turkey*
20–29	6	Bolivia*, Brazil, Colombia, Ecuador, Hong Kong, Peru
30–39	4	Greece, Indonesia, Thailand, Venezuela
40–49	2	Costa Rica*, Cyprus
50 & higher	1	Guatemala
Others	4	Korea (U-shaped path), Malaysia, Singapore, Taiwan (all declining trend)
Total	25	

* Countries with only one observation, or observations over five years or less.

Table 1c. Distribution of Countries by Percentage of Small Enterprise Wages to the Manufacturing Average (countries with data)

	Countries	
Percentage Range	Number	List
less than 50%	1	Turkey*
50 to 59	1	Indonesia*
60 to 69	3	Colombia, Ecuador, Mexico
70 to 79	6	Brazil, El Salvador, Greece, Korea, Peru, Taiwan*
80 to 89	5	Guatemala, Malaysia, Pakistan, Singapore, Venezuela*
90 and higher	3	Cyprus, Hong Kong, South Africa
Other	1	Bangladesh (declining trend)
	20	

* Countries with only one observation.

summarises the distribution data, further indicating the great variation in the contribution of small establishments across countries. In this part of Table 1, the countries are listed by ranges for the contribution of small establishments to manufacturing employment, based on averaging across all years for which there are observations. For no country is this average below 10%, and the modal range is 10 to 19, with eight countries, followed by six countries for the next range upwards. If we list separately the countries for which there are substantial changes over time (making the average misleading), 18 of 21 counties fall into the 10 to 39 range.

For those countries with a time series, continuous or interrupted, no obvious pattern emerges. The conclusion by Little *et al.*, that small establishments seem everywhere to decline in importance, shows the perils of making judgements on the end-points of available statistics. They based their conclusion on data through the 1970s at the latest, for Colombia, Korea, Malaysia, Singapore and Taiwan. For the first two countries, one can observe a pronounced reversal of the decline in the 1980s, and the judgement for Taiwan must be viewed sceptically, for there is only evidence for two years. When one scans the table, only two countries with time series show continuous declines, Malaysia and Singapore. In the other cases, either the decline is reversed, or the share stabilises (e.g. Ecuador and South Africa).

The inevitable decline hypothesis should not be judged by such a crude comparison as shares over time. First, the hypothesised relationship is between small establishment shares and the level of development. As Mead (1994, p. 1883) suggested, the decline of shares may be postponed by stagnant or negative growth, as in the sub-Saharan region in the last two decades of the 20th century.[10] Second, one would not expect the employment share of small establishments to be determined by the level of development alone. This influence, measured by an appropriate proxy variable, may exert the hypothesised secular effect, but be reduced or enhanced in the medium term by changes in relative costs across establishments. The final column of Table 1(a) provides statistics on perhaps the most important short and medium term effect, the average wage in small establishments relative to the manufacturing average. This variable shows consider-

able variation across countries, from virtual parity in Hong Kong and South Africa, to a differential of 35 to 40% in Colombia in the 1970s and 1980s. There is also substantial variation over time within countries, especially for Bangladesh, Korea and Singapore. It cannot be ruled out that the intervention of relative wage costs obscures the hypothesised long-term trend.

Before testing for a long-term pattern, we consider Table 1(c), which tends to dispel one of the common generalisations about small establishments, that their wage levels are substantially lower than for larger establishments. Table 1(c) shows that for eight of the 20 countries, the differential is 20% or less, and for 70% of the countries (14) 30% or less. When one considers that the skill composition of manufacturing as a whole is likely to be higher than for small establishments, and wage-incorporated fringe benefits also higher, the differentials are relatively modest.

With these points noted, we inspect the hypothesis of a secular tendency. The possibility of a secular decline in the contribution of small establishments in the manufacturing sector cannot be evaluated by inspecting time-series and cross-country statistics; a formal model is required. We begin with a simple equilibrium model, in which the stable value of the employment share of small establishments in aggregate manufacturing employment is determined by short-term competitiveness (C), and secular (long-term) influences (D), and structural factors (E). We assume economies of scale give the secular influences a negative sign in the early stages of development of a country. In the absence of data on total factor productivity across establishment sizes for most countries and years, competitiveness is approximated by relative wages. If one makes the strong assumption that the skill composition of the labour force is the same for all establishment sizes, or is unchanged within each, then relative wage costs can be approximated by the ratio of the average wage in small establishments to the aggregate average for manufacturing (rw_{ij}, where i indicates country and j year).

Second, for long-term influences, the hypothesis is tested that the share of employment in small establishments is a function of the level of development, which is proxied by per capita income in constant prices, as is the common practice (Mead, 1994, p. 1183). This variable is measured by the 'Laspeyres Index of Real GDP per capita, international prices of 1985', from the Penn World Tables (y_{ij}). Third, we consider structural factors, whose impact may be cyclical or secular (E_{ij}). These include the export orientation of the economy, as measured by the share of exports in GDP (x_{ij}). The prediction is that this variable will have a negative effect on the share of small establishment employment, based on two important influences. First, success in export of manufactures tends to be associated with the production of standardised products that can be delivered at regular intervals. These requirements are more easily achieved at a medium or large scale of production. Second, we assume that the relevant cost curves for most industries are of the standard neoclassical 'U-shape', and small establishments are likely to be on the falling portion of the long run average cost curves. Finally, as a hypothesis test, we include the Nugent & Nabli credit variable (total bank credit to GDP, crd_{ij}). It might be argued that the two structural variables are not independent of the dependent variable; i.e. that the employment share of small enterprises is one of the variables that determines the export and credit shares. We argue that this is not the case for either. Our behavioural assumption is that, for exports, total value is determined by macro variables such as the exchange rate. These variables determine the broad distribution between domestic and external demand, and producers respond by

attempting to satisfy that demand. An analogous argument is made for the credit share: monetary policy sets the potential for credit expansion, to which enterprises respond.

On the basis of our behavioural assumptions, the equilibrium employment share for small establishments is specified as

$$\text{Empsh}(10\text{–}49)_{ij} = S_{ij} = \gamma C_{ij}\, \beta 1 D_{ij}\, \beta 2 E_{ij}\, \beta 3 \tag{1}$$

where γ is a shift parameter.

And,

$$C_{ij} = C_{ij}[rw_{ij}]^{\chi},\ D_{ij} = D_{ij}(y_{ij}),\ \text{and}\ E_{ij}(x_{ij},\ crd_{ij}). \tag{2}$$

To test for non-linearity (reversal of the long term trend), the relationship was estimated in the following form:

$$\begin{aligned} \text{In}\,[S_{ij}] = {} & \alpha_0 + \alpha_1 \ln [rw_{ij}] + \alpha_2 \ln [y_{ij}] + \alpha_3 \{\ln[y_{ij}]\}^2\, \alpha_1 \ln[x_{ij}] + \\ & \alpha_1 \ln[crd_{ij}] + \varepsilon \end{aligned} \tag{3}$$

This non-linearity hypothesis can be viewed as the establishment size distribution equivalent of the famous Kuznets Curve for income inequality; i.e. the hypothesis that income inequality first rises, then falls in the process of development (Kuznets 1955). The equation is estimated with data from eight countries, for a total of 192 observations. First, what might be called the simple U-shaped secular hypothesis is tested, with only the secular trend and the relative wage variable. The structural variables, the export share and the credit to GDP ratio, are omitted to test the hypothesis in its 'pure' form; that is, in the absence of any behavioural variables, is there *prima facie* evidence of a U-shape? The result is given in Table 2(a). The variables account for over 70% of the variation in employment shares, and the F-statistic is highly significant. The relative wage variable shows the predicted sign and is significant at below 1%. The coefficient indicates that a rise in the average wage in small establishments of 10%, relative to the manufacturing average, results in a 5% decline in the employment share in those establishments. The dummy variables indicate the difference in employment shares associated with the initial conditions and unspecified structural characteristics for each country in the sample. As hypothesised, per capita income, seeking to measure level of development, has a non-linear impact. At low levels of development, the employment share of small establishments tends to fall, then reaches a minimum value, after which it rises. If one takes the partial derivative of the employment share with respect to per capita income and sets this to zero, the per capita income associated with the minimum value can be calculated. The implied 'turning point' for the equation is slightly less than US$8000 at 1985 prices.

In Table 2(b), the relationship is estimated with the inclusion of two structural variables, the export share and the ratio of bank credit to GDP. In this form, the equation becomes a behavioural relationship. Hong Kong is excluded because of the non-availability of data for one of the variables. The export variable is of the predicted sign; that is, a rise in exports to GDP is associated with a fall in the employment share of small establishments.[11] Contrary to the hypothesis of Nugent

Table 2a. Test of the U-Shaped Hypothesis (eight countries) Dependent variable: Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	20.632	2.785	.000
PCYT	−4.039	.676	.000
PCYTSQD	.225	.041	.000
RELWAGT	−.494	.176	.005
C1 PAK	−1.103	.094	.000
C2 COL	.040	.059	.501
C3 SING	.342	.059	.000
C4 GREECE	.907	.068	.000
C5 ECU	.058	.078	.457
C6 MALAY	−.009	.063	.881
C7 HK	.883	.092	.000

R-square (adj) = .732
F-stat significant @ .000
Degrees of freedom = 192
The omitted country is South Korea.
Turning point per capita income
(Penn Tables) = US$ 7900

& Nabli, the credit variable shows a negative sign. However, the most notable result in the second equation is the substantial change in the coefficients for the two income variables. The omission of Hong Kong, and inclusion of the structural variables, results in a decline in the 'turning point' of over 45%, from US$7900 to US$4300. This large change demonstrates the importance of evaluating the U-shaped hypothesis with a behavioural model.

Table 2b. Test of the U-Shaped Hypothesis with Structural Variables (seven countries) Dependent variable: Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	14.183	3.967	.000
PCYT	−2.355	.986	.018
PCYTSQD	.140	.060	.020
EXPGDPT	−.155	.090	.086
CRDGDP	−.303	.061	.000
RELWAGT	−.541	.184	.004
C1 PAK	−1.001	.107	.000
C2 COL	−.169	.076	.026
C3 SING	.631	.153	.000
C4 GREECE	.458	.117	.000
C5 ECU	−.193	.092	.038
C6 MALAY	.106	.088	.232

R-square (adj) = .737
F-stat significant @ .000
Degrees of freedom = 168
The omitted country is South Korea.
Turning point per capita income
(Penn Tables) = US$ 4300

Table 2c. Test of the U-Shaped Hypothesis by Country

	PCY	PCY$\hat{2}$	Rel wage	R-square	F-stat	Turning point
1. Colombia DF =	**neg & sign**	pos & sign	neg & sign	.891	76.67 30	2600
2. Ecuador DF =	**neg & sign**	non-sign	non-sign	.362	4.26 15	not app
3. Greece DF =	**neg & sign**	pos & sign	neg & sign	.710	11.44 16	5100
4. Hong Kong DF =	**pos & sign**	non-sign	non-sign	.877	67.50 19	not app
5. Korea DF =	**neg & sign**	pos & sign	non-sign	.843	47.52 23	2700
6. Malaysia DF =	**neg & sign**	pos & sign	neg & sign	.869	82.95 24	900
7. Pakistan DF =	**neg & sign**	pos & sign	non-sign	.592	7.25 20	1100
8. Singapore DF =	**neg & sign**	pos & sign	neg & sign	.906	79.85 29	6700

* Rounded to nearest 100.

This decline suggests that, as for the Kuznets Curve, the 'turning point' generated by combined cross-section and time-series data cannot be regarded with great confidence. In this case, the positioning of the turning point is greatly influenced by the data from Hong Kong and Singapore, countries that provide the only observations for per capita incomes in excess of eight thousand US (1985) dollars. Thus, it would seem more interesting to test the hypothesis by country. For the eight countries there are sufficient observations for time-series estimation of the simpler equation, and the results are presented in Table 2(c). These results sustain the analytical appropriateness of the model. For six of the eight countries, Colombia, Greece, Korea, Malaysia, Pakistan, and Singapore, the share of small establishments first falls, then rises, though the turning points vary among countries, from a low of US$900 for Malaysia (with Pakistan close to this), to over US$5000 for Greece and Singapore. Colombia and Korea lie quite close together, at 2600 and 2700.

The two other cases, Ecuador and Hong Kong, *can be interpreted* as consistent with the U-shaped relationship for the other countries. Over the observed range, Ecuador has the lowest per capita incomes for any of the countries save Pakistan, and the results indicate continuous decline in the small establishment share. Hong Kong is the opposite case: its observations cover the highest per capita incomes, and the small establishment share is estimated to rise continuously. If we assume that the former country was observed in the falling phase, and the latter in the rising phase, all seven countries can be interpreted as following a common secular path. The U-shape is imposed on the eight countries in Fig. 1, in which the turning point share (minimum value for the share of employment in small establishments) is 'normalised' in each case to 20%. The final observation for Ecuador is assumed to

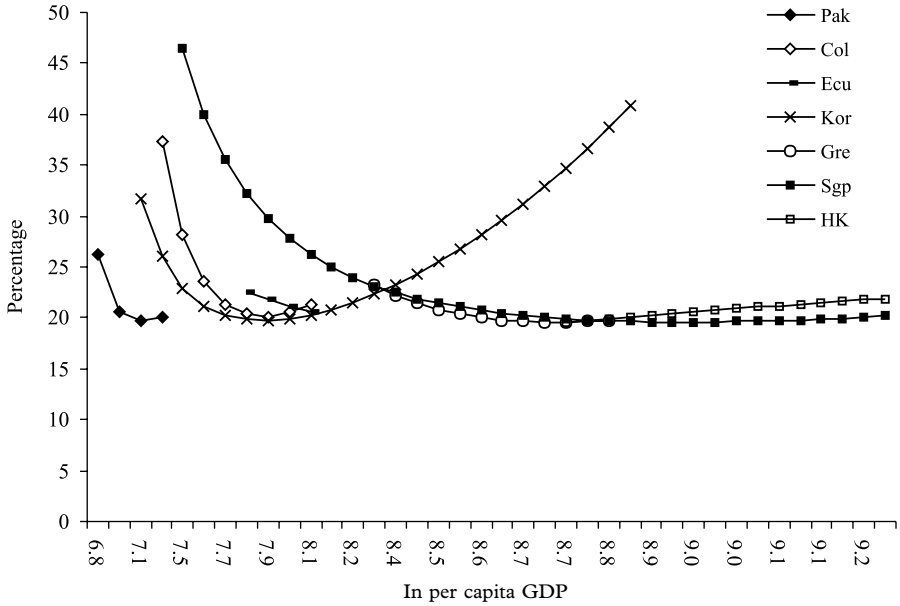

Fig. 1. Simulated Employment Shares for Seven Developing Countries, by levels of per capita GDP (normalised to minimum = 20%)
Note: Hong Kong assumed to be at its minimum point at first observation. Equador is assumed to be at its minimum value at the last observation.

be the secular minimum, and the same assumption is made for Hong Kong's initial value. The result is a series of staggered and overlapping curves taking a U-shape with respect to per capita income.

The empirical results suggest that previous authors were correct in identifying a tendency for small establishment employment to decline at low levels of per capita income (e.g. Little *et al.*, 1987). This is manifest in seven of the eight countries. However, in large part due to the limited data available to those authors, they did not note the possibility of a reversal of the decline as incomes per head rose. Not considering a reversal was made more likely by the relationship between the small establishment employment share and an alternative proxy for level of development, the share of manufacturing in GDP.[12] As is well recognised in the empirical literature, this percentage is not monotonic with per capita income. After rising over a long range, it levels off and even falls at high levels of income per head (Chenery, 1960; Chenery *et al.*, 1986).

The statistical results provide some support for the view that there are systematic economies of scale in manufacturing in the early stages of development. However, this is less of an explanation of the relative decline of small establishments than a restatement of ignorance in other words. The relevant policy and research issue is the causal mechanism: why are there apparently economies of scale at one stage of development and none, or less so, at later stages? One can venture several hypotheses for this, none of which necessarily imply public intervention to foster small establishments. First, as development proceeds, capital markets spread and deepen. Simultaneously, small establishments may transform themselves, with the rest of the economy, along more commercial lines. This transformation might involve adopting standard accounting practices, for example. The combination of

these tendencies would reduce the much-noted discrimination of banks against borrowers on the basis of establishment size. In the next section, we assume that this discrimination is a general characteristic across countries, so that the predicted sign of the credit variable is negative.

Second, development is associated with an increase in education and the supply of skilled labour. Were skilled labour scarce, it would receive a large premium over unskilled labour, which small establishments would be less able to pay. As the scarcity of skilled labour recedes, the premium received by this type of labour declines, making it more available to small establishments.[13]

Third, at low levels of development, foreign investment will tend to play a relatively larger role in the manufacturing sector's development than at later stages. In general, foreign investment tends to transfer a technique and type of product that implies a relatively large scale of operation. The more underdeveloped a country, and its manufacturing sector, the greater will tend to be the contrast between scales of production for domestic producers and foreign-owned entrants. Over time, as techniques spread among countries, the contrast will diminish, reducing the tendency for small establishments to decline in relative terms. It is possible that the foreign investment mechanism accounts in part for the variation in the per capita income at which the turning points occur by country. While foreign investment to the manufacturing sector tends to flow to middle income countries, this is not exclusively the case. In as far as foreign investment enters the manufacturing sectors of low-income countries, one would expect the turning point to occur at relatively low levels of per capita income. This might, for example, explain the low turning point for Pakistan, the country with the lowest per capita income, over the observed period for the eight countries in Table 2(c). Since there are no data on foreign investment inflows *to manufacturing* for the seven countries, the hypothesis cannot be tested directly.

One further mechanism that would foster the growth of small manufacturing enterprises is 'outsourcing', in which large enterprises systematically contract components of their products to smaller ones. In as far as this practice was common to all the time periods we cover, it provides an explanation for the rise of small enterprises. A detailed country study would be required to investigate its importance relatively to other factors. It may be the case that, with the expansion of international trade in the 1980s and 1990s, along with associated factors that fall under the broad term 'globalisation', this practice increased across countries. Given the availability of data, one can only speculate as to the long-term impact of 'outsourcing', and it provides a hypothesis to test as more recent statistics become available.

4. The Size Distribution in the Short and Medium Term

For policy purposes, identifying secular trends is less relevant that specifying short and medium term behavioural relationships. To model short and medium term behaviour, we use a partial adjustment to equilibrium model. By definition, the change in share of employment in small establishments in any period is (for a single country, so we use the time subscript t, rather than the previous ij):

$$\Delta[S_t] \;=\; S_t - S_{t-1} \tag{4}$$

Define S^*_t as the equilibrium value of S in period t. S_t, the actual value, is the value in the previous period plus an adjustment to the equilibrium value, with γ the

Table 3. A Behavioural Model for Changes in the Employment Share (seven countries)
Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	.280	.279	.316
EMPSHT1	–.166	.039	.000
PCYT	.067	.035	.056
RELWAGT	–.218	.092	.019
EXPGDPT	–.019	.046	.686
CRDGDP	–.091	.033	.006
C1 PAK	–.120	.056	.033
C2 COL	–.066	.040	.096
C3 SING	.061	.082	.461
C4 GREECE	.013	.060	.831
C5 ECU	–.094	.047	.047
C6 MALAY	–.023	.045	.608

R-square (adj) = .138
F-stat significant @ .000
Degrees of freedom = 160
The omitted country is South Korea.

adjustment coefficient. If full adjustment to equilibrium occurs in each period, then γ is unity.

$$\Delta[S_t] = \gamma[S^*_t - S_{t-1}] + S_{t-1} \tag{5}$$

Let the equilibrium value depend upon aggregate demand, the relative wage, and the export share, and the ratio of credit to GDP ratio in period *t*. Aggregate demand is approximated by per capita income and lagged one period, as is the relative wage. Because this is a short-run estimation, the squared value of GDP is omitted, since it is part of the test for a secular trend. Substituting in the variables for S^*_t, one obtains the following equation for estimation, in natural logarithms.

$$\Delta\ln[S_t] = \beta_0 + \beta_1\ln[S_{t-1}] + \beta_2\ln[rw_t] + \beta_3\ln[y_t] + \beta_4\ln[x_t] + \beta_5\ln[crd_t] + \varepsilon \tag{6}$$

Where β_1 is the adjustment coefficient (γ). The predicted values are:

$$0 > \beta_1 > -1;$$

with β_2 and β_4 negative, and β_3 positive, and β_5 not predicted.

As for the long run model, we first pool the data (so that the *t*s become *ij*s). The results for seven countries are shown in Table 3. Except for the export share, the variables are statistically significant. However, the overall explanatory power of the model is relatively small, suggesting that an investigation by country would be more informative. The model was estimated by country, and the results reported in Tables 4(a)–(g), then summarised in Table 5. The model would seem appropriate for six of the seven countries, with Greece the exception. For the latter, the central

Table 4a. A Behavioural Model for Changes in the Employment Share: South Korea Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	–.366	.232	.131
EMPSHT 1	–.211	.080	.016
PCYT 1	.229	.062	.001
RELWAGT 1	–.562	.249	.036
EXPGDPT	–.212	.084	.020
CRDGDP	.003	.097	.978

R-square (adj) = .596
F-stat significant @ .000
Degrees of freedom = 20

Table 4b. A Behavioural Model for Changes in the Employment Share: Pakistan Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	–2.679	1.598	.114
EMPSHT1	–.581	.083	.000
PCYT1	.895	.253	.003
RELWAGT1	.010	.188	.960
EXPGDPT	–.338	.138	.027
CRDGDP	–.438	.089	.000

R-square (adj) = .814
F-stat significant @ .000
Degrees of freedom = 17

Table 4c. A Behavioural Model for Changes in the Employment Share: Malaysia Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	3.299	1.197	.012
EMPSHT1	–.678	.135	.000
PCYT	–.054	.147	.719
RELWAGT	–2.618	.502	.000
EXPGDPT	–.330	.155	.046
CRDGDP	–.022	.089	.811

R-square (adj) = .531
F-stat significant @ .001
Degrees of freedom = 21

Table 4d. A Behavioural Model for Changes in the Employment Share: Singapore Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	.017	1.025	.987
EMPSHT1	–.211	.125	.098
PCYT	–.007	.206	.974
RELWAGT	–1.195	.208	.000
EXPGDPT	.187	.148	.218
CRDGDP	–.122	.271	.656

R-square (adj) = .596
F-stat significant @ .000
Degrees of freedom = 25

Table 4e. A Behavioural Model for Changes in the Employment Share: Greece Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	–2.557	2.192	.268
EMPSHT1	–.299	.293	.330
PCYT1	.523	.244	.055
RELWAGT1	.877	.882	.342
EXPGDPT	–.196	–.115	.117
CRDGDP	–.047	.098	.640

R-square (adj) = .338
F-stat significant @ .084
Degrees of freedom = 13

Table 4f. A Behavioural Model for Changes in the Employment Share: Ecuador Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	4.286	1.498	.016
EMPSHT1	–.613	.235	.001
PCYT1	–.236	.152	.102
RELWAGT1	–.070	.081	.408
EXPGDPT	.130	.072	.099
CRDGDP	.140	.087	.135

R-square (adj) = .555
F-stat significant @ .012
Degrees of freedom = 12

Table 4g. A Behavioural Model for Changes in the Employment Share: Colombia
Dependent variable: change in Employment share 10–49

Variable	Coefficient	Std. Error	Signif
(Constant)	1.447	.576	.018
EMPSHT	–.174	.079	.036
PCYT	.113	.060	.071
RELWAGT	–.193	.157	.230
EXPGDPT	–.101	.042	.023
CRDGDP	.065	.032	.056

R-square (adj) = .331
F-stat significant @ .006
Degrees of freedom = 27
Notes to Table 4:
All variables enter as natural logrithms except for country variables, which are binary. The change in the employment share is the first relative difference (difference in logs).

behavioural hypothesis, partial adjustment, must be rejected, and only one variable of the five is significant (per capita income, measuring aggregate demand). For the other countries, the partial adjustment model is not rejected: the adjustment coefficient is of the predicted sign and, as predicted, less than unity in absolute value. For three countries, South Korea, Singapore and Colombia, adjustment involves about a 20% closure of the gap between the previous year's value and the equilibrium value. For Ecuador, Malaysia and Pakistan, the adjustment is in the 60 to 70% range. The domestic demand variable, per capita income, is positive and significant for four countries, and only marginally above the critical 10% rule for Ecuador. Non-significance for Singapore and Malaysia might be explained by the combination of small internal markets and a high degree of export orientation (well above 50% of GDP for both countries).

Table 5. Summary of Significance of Variables Dependent variable: change in employment share 10–49

	EmpSh (t-1)	PCY (t-1)	Re/Wg (t-1)	Exp/GDP(t)	Credit/GDP(t)
Across countries	neg @ .00	pos @ .06	neg @ .02	non sign	pos @ .01
1. South Korea	neg @ .02	pos @ .00	neg @ .04	neg @ .02	non sign
2. Pakistan	neg @ .02	pos @ .00	non sign	neg @ .03	neg @ .00
3. Malaysia	neg @ .00	non sign	neg @ .00	neg @ .05	non sign
4. Singapore	neg @ .10	non sign	neg @ .00	non sign	non sign
5. Greece	non sign	pos @ .06	non sign	non sign	non sign
6. Ecuador	neg @ .00	non sign	non sign	pos @ .10	non sign
7. Colombia	*neg @ .04*	pos @ .07	non sign	neg @ .02	pos @ .06
Number of cases pos/neg/non-sign	0/6/1	4/0/3	0/3/4	1/4/2	1/1/5

Results for the relative wage variable suggest that, at the country level, this is an inadequate proxy for relative costs between small establishments and the rest of manufacturing, for it is significant for only three of the seven countries. The Nugent & Nabli hypothesis that the quantitative importance of bank credit in GDP is positively related to small establishment growth can be rejected, as can our prediction that it would be negative. The variable is non-significant for five countries, positive for one (Colombia), and negative for one (Pakistan). Either the variable is not the appropriate one to test the hypothesis, or there is no general relationship.

What is quite interesting is that the result for the export variable, which shows a significant, negative sign for four countries, is non-significant in two, and positive in only one, Ecuador, albeit marginally so. Authors frequently assert that small establishments, due to their alleged greater labour intensity, benefit from export growth more than large production units. The results suggest (a) that small establishments may not be more labour intensive, (b) they may be more labour intensive but manufactured exports are not, or (c) there are systematic internal economies of scale in the production of export lines (the theoretical explanation adopted here).

Overall, the results suggest that the variation in institutions, public sector regulations and aggregate skill endowments across countries is such that generalisations about the behaviour of small establishments in the short and medium term cannot be captured in cross-section time-series regressions for the short and medium run.

5. Conclusions

No social or economic process can be characterised as 'natural', for they are all affected by human agency. Thus, one must be cautious about identifying trends as 'inevitable', for history only superficially repeats itself. However, there is general agreement that countries exhibit certain common tendencies in the process of development, one of which is the relative rise of manufacturing and decline of agriculture. This paper suggests another possible common tendency. As earlier writers maintained, there is a tendency for the relative importance of small manufacturing establishments to decline as per capita income rises *from a low base*. This paper provides evidence that generally supports this hypothesis. The results provide *prima facie* support for the hypothesis that manufacturing production is associated with economies of scale for low-income countries. If this is the case, the conclusion over a decade ago of Little *et al.*, that public sector intervention in favour of small establishments is ill-advised, may have validity *for low income countries*.

While this paper lends support to that judgement, it also indicates that the process of development tends, after a point, to revive the role of small establishments; or, more modestly stated, that such an interpretation can reasonably be drawn from the cross-country data. Whether this revival is the result of public policy intervention, or can be influenced by public policy, raises complex questions that are difficult to model with existing data. Inferences from cross-country regressions, even with time series observations, in general were not sustained at the country level.

In the short run, the determinants of the small establishment employment share in manufacturing tend to vary across countries. The effect of domestic demand appears weak, suggesting that growth is not a strong stimulus, which is

consistent with a long-term U-shaped pattern. It would also appear that export orientation tends to have a negative impact more often than it is positive. These results indicate the need for further research, perhaps at a more disaggregated level, as is possible for several of the countries included in this study. As a final comment, it should be stressed that these results refer to manufacturing only, not to service establishments or the financial sector.

Notes

1. A glance at the list of references to this paper shows there to be a tendency in the literature to use the word 'enterprise' when the reference is to establishments. At the risk of overuse of the word, 'establishment' is always employed here. That is, the reference is to the production unit, not to the administrative unit, since the latter may oversee several of the former.
2. It is frequently argued that in agriculture in developing countries land productivity is inversely correlated with size of holding (the so-called inverse size rule). A concise and balanced review can be found in Platteau (1992). Also, see Dyer (1997, Chapters 1, 2, 3), who gives an incisive treatment of the issue.
3. The most notable example is India (Little *et al.*, 1987). For a presentation of the arguments for public policy intervention in favour of small establishments, see Liedholm (1992) and Levy (1993).
4. See also Little (1987), where the main findings of the book are summarised. For earlier work along the same analytical line (albeit with less empirical evidence), see Hoselitz (1959) and Banerji (1978).
5. The Nugent & Nabli study is to be recommended, as it represents almost the only attempt to relate size of enterprise to structural economic variables. The limitations of the study are discussed in an earlier version of this paper, available from the author.
6. See the Appendix for a discussion of the data.
7. Some country publications provide data by output and/or capital value ranges. These are rarely used in empirical work, since the ranges are not comparable over time due to inflation, and are equivalent across countries only by coincidence.
8. Almost no reliable data are available to measure the aggregate contribution of establishments hiring from one to ten workers. See Daniels (1998) for an estimate of the contribution of these establishments to employment in Kenya.
9. Kaplinsky & Manning (1998) give data on the share of small establishment employment for seven developing countries, including India, although we do not use their statistics. It is not clear in their article whether the statistics refer to manufacturing alone, and the precise dates are not given (in the text, they report '*circa* 1990').
10. The only data for a sub-Saharan country in the necessary ranges are from Nigeria, and, as with much data from that country, the results do not seem reliable.
11. This does not necessarily imply a fall in employment for a given level of manufacturing output, which depends on whether small establishments are more labour using. Despite the presumption in the literature that such is the case, empirical evidence is mixed (see Weeks, 2001).
12. If the manufacturing share is used in the tests in Table 2 instead of per capita income, the result is a monotonic decline in the employment share for small establishments with respect to that variable.
13. The author wishes to thank Homi Katrak for pointing out this and its implication for small establishments. See Katrak (1994) for a discussion of innovation and establishment size. The hypothesis, that large establishments can more readily pay a premium for skilled labour, is consistent with research by Velenchik (1997) on Zimbabwe.

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Appendix: Data Definitions and Sources

The Data

The data used in this paper were collected as part of a project funded by the Economic and Social Research Council of the United Kingdom. This database is available from the author. The sources are, in almost all cases, country documents, usually industrial or manufacturing surveys. Table 1(a) is derived from approximately 90 publications or unpublished data files of the relevant countries. The sources are listed, by country, in Weeks & Letteri (1994), also available from the author.

All countries listed in Table 1(a) report size distribution data by numbers employed. The ranges vary, and were combined to the standard categories 10–49, 50–499, and 500 and more employed. No attempt was made to generate the standard categories if they could not be directly created from the raw data. In all countries, data are reported by production unit ('establishment'), rather than by ownership unit ('firm'). For all countries, 'employment' refers to all paid workers; i.e. there is no disaggregation by skill level.

A few comments can be made about the reliability of the data. In Table 1(a) there was an attempt to minimise problems of comparability, arising from possible changes in definitions and coverage over

Table A1. Data availability for eight countries

Country	Years	Comments
Colombia	1958–1990 (with years missing)	Size categories consistent across all years for 10–49 range only (series terminated)
Ecuador	1965–1991	Size categories consistent across all years
Greece	1963–1992	Size categories consistent across all years
Hong Kong	1950–1970 (occasional data), 1976–1996	Size categories consistent across all years
Korea	1962, 1966–1992, complete	Size categories consistent across all years
Malaysia	1957, 1967–1996 (with years missing)	Size categories consistent across all years
Pakistan	1954–1959, 1965–1988 (with years missing)	Size categories consistent across all years for 10–49 range only
Singapore	1959–1990	Size categories consistent across all years

time, by omitting years when the original source indicated such inconsistencies. For the eight countries listed in Table A1 in this appendix, the sources indicate definitional consistency, although consistency in coverage from year to year cannot be assured. The most reliable statistics are those from Hong Kong and South Korea.

For some countries, data on establishments hiring less than ten are reported. However, for most of these countries the reported number of establishments is so small as to suggest incomplete coverage (Hong Kong and South Korea are the exceptions). The per capita income statistics are from the *Penn World Tables*, and we used the Laspeyres Index of Real GDP per capita, international prices of 1985. The export share and the ratio of credit to GDP are the World Bank's *World Development Indicators 1999* (CD-ROM) (World Bank, 1999). Table A1 gives details of the data for the seven countries with time series. It is unfortunately the case that some of these time series were discontinued or replaced by surveys or censuses not consistent with earlier years.

Stationarity and Cointegration

Because the regression analysis uses time series statistics, questions of stationarity and cointegration arise. The appropriate econometric tests indicate difficulties for the estimation in Table 2, which is the basis for Fig. 1. No attempt was made to reformulate the model, because its purpose was to test for a U-shaped pattern across and within countries. That is, the non-stationarity of the time series represented the theoretically predicted outcome. Further, the results of this estimation are not used beyond the testing of this hypothesis. The subsequent estimations (Table 4) resolve the non-stationarity and cointegration problems by specifying the dependent variable in terms of the first relative difference. The author thanks Satoshi Miyamura for his aid in carrying out the econometric tests. The full statistical results are available on request in an electronic file.