NBER WORKING PAPER SERIES

GROWTH IN A DUAL ECONOMY

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Working Paper No. 4433

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 1993

This paper is part of NBER's research programs in Growth and International Trade and Investment. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

Growth and structural transformation of the manufacturing sector in developing countries are generally considered to be the result of the expansion of the "modern" (large-scale) sector relative to the "traditional" (small-scale) sector. Examining the sources of labor productivity growth in Mexican manufacturing, however, does not provide support for such a conclusion. Although we find that labor productivity levels vary almost in direct relation to establishment size, labor productivity growth shows no systematic variation by size class. In fact, small establishments have had the same rate of labor productivity growth as larger ones, partly because of the "excise-effect" (i.e. the exiting of low-productivity, small plants). Moreover, most of the variation in labor productivity across plant class sizes is found to be due to differences in capital intensity. The variation in TFP levels across size classes tends to be small. Thus, our results remove some justification of the policy measures that favor large firms in developing countries.

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GROWTH IN A DUAL ECONOMY*

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1. Introduction

The new literature on economic growth, which to a large extent has been stimulated by endogenous growth models following Romer (1986) and new data provided by Summers and Heston, searches for factors, or combinations of factors, that can explain the variations in the levels and rates of growth of output across countries. Many explanatory variables have been the focus of attention in the empirical literature so far[1]. Nevertheless, one of the most important elements of the growth process in developing countries - the structural transformation and the technology diffusion within countries and industries - has been largely ignored in the discussion.

Development economists tend to think of developing countries as dual economies that can be analyzed by models in the Lewis-Fei-Ranis tradition (see e.g. Ranis, 1988). Such dualism models assume no internal economic integration and no technological diffusion between the modern ("dynamic") and the traditional ("stagnant") sectors. Thus, economic growth in such models implies that the modern (often capital intensive and large scale) sector expands relative to the traditional (labor intensive and small scale) sector and, finally, drives

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*The research reported here is part of the NBER program in International Studies. Financial support from the C.V. Starr Center for Applied Economics, New York University and the Swedish Council of Research in the Humanities and Social Science is gratefully acknowledged. Excellent research assistance was provided by Maury Gittleman.

it out of business.

A good representative of this dualism tradition is Nelson (1968), who analyzes intra-country diffusion of technology (together with inter-country transfers) in Colombian manufacturing industries. He shows that (i) larger firms have higher levels of productivity; (ii) productivity growth in Colombian manufacturing between 1958 and 1964 was positive for large firms and zero and/or negative for small firms; and (iii) growth in overall manufacturing productivity over the same period was due 80 per cent to growth in industry productivity and 20 per cent to shifts in industry employment toward larger firms. Thus, Nelson suggests that dualism in the Colombian economy becomes more exaggerated over time and that the modern sector will outstrip the traditional sector.

Among the implications for policy of this diffusion model is import-substitution, which aims at making available scarce inputs, such as capital, on favorable terms to (the larger units in) the modern sector. Such a policy is supposed to facilitate structural transformations in developing economies and eliminate dualism. Some recent proponents of "strategic" trade and industrial policies for developing countries, building their arguments on economies of scale and positive externalities, also take for granted the economic superiority of large-scale modern manufacturing industry (see e.g. Smith, 1991 and the contributions in Helleiner, 1992).

In this paper we examine productivity growth and intra-national diffusion of technology in industries that are characterized by a dual production structure. By dual production structure we mean that firms are operating on different production functions, one of which is "modern", the other "traditional". This is a common feature in developing countries, and in this study we use data from Mexican manufacturing industry to test the generality of the dual model. As Nelson (1968) did, we examine dualism only in the manufacturing sector, and we define the modern sector as consisting of large-scale economic units, employing capital intensive methods of production, and the traditional sector as consisting of small scale economic units, employing labor intensive methods of production. However, we extend Nelson's analysis in several ways. We use 12 size classes instead of six and a ten-year time interval instead of a five-year interval. Our data are also more comprehensive and allow us to do regression analysis of labor productivity growth by industry.

The paper is organized as follows. Section 2 presents the basic statistics on Mexican labor productivity levels and growth rates by size class of establishments in 1970 and 1975. In Section 3, we analyze the sources of productivity growth in Mexican manufacturing over the same period. Section 4 repeats the productivity analysis for individual manufacturing industries. Section 5 investigates labor productivity movements for a longer period (1965-1975), but is confined to only two size classes, and Section 6 presents the regression analysis examining the factors determining industry productivity growth. The concluding section considers some implications of our findings for development policy.

2. Basic Statistics on Productivity by Size Class of Establishments, 1970 and 1975[2].

We begin with some basic statistics on labor productivity levels and growth rates by size class of establishments for 1970 and 1975 (Table 1). Establishments are classified according to the number of employees. It is first apparent that productivity levels vary in almost direct relation to plant size. However, what is striking and unexpected from the literature on dualism, is that labor productivity growth shows very little systematic variation by size class. Indeed, it is highest for the smallest two size classes, a medium size class (51 to 75), and a large size class (351 to 500). Moreover, the coefficient of variation, defined as the ratio of the standard deviation in labor productivity levels to the unweighted average labor productivity level, is almost identical in 1970 and 1975. This suggests that dualism, at least as indicated by productivity differences, was not increasing in Mexican manufacturing, at least not over this time period. Also, we can see that productivity growth in all size classes, except one, is below the overall average for the economy, so that there must be a strong employment shift effect among size classes.

This last implication is verified in Table 2. A substantial shift in employment occurred away from the smallest size classes to the larger ones, both in absolute and relative terms. In fact, employment in the largest size class increased from 19 per cent to 24 per cent of total employment. Likewise, the output shares of all size classes except 351-500 and 750+ (the largest) declined. The largest size class increased form 26 per cent to 32 per cent of total GDP.

The number of establishments fell over the 1970-75 period, with almost all the decline occurring in the 1-5 size class (the 6-15 and 26-50 size classes also experienced some decline). All size classes above 100 employees showed an increase in the number of establishments, with the largest size class increasing by 53 establishments. The average establishment size also increased, from 23.9 to 28.4 employees.

3. <u>Sources of Labor Productivity Growth, 1970-75</u>.

In our analysis, we focus on three sources of labor productivity growth in Mexican manufacturing: (i) changes in the distribution of employment among different size classes; (ii) changes in technology, measured as total factor productivity (TFP); and (iii) changes in the capital-labor ratio.

We begin with the analysis of <u>the employment shift effect</u>. Let:

Y^t_{ik} = GDP, 1975 US$, in industry i, size class k, year t.

L^t_{ik} = Employment in industry i, size class k, year t.

$\pi^t_{ik} = Y^t_{ik}/L^t_{ik}$, labor productivity level in industry i, size class k, year t.

$\phi^t_i = Y^t_i/L^t_i$, labor productivity level in industry i, year t.

Then,

$$(1) \qquad \phi^t_i = Y^t_i/L^t_i = \Sigma_k\, \beta^t_{ik}\pi^t_{ik}$$

where

β^t_{ik} = Employment in industry i, size class k, as a share of total employment of industry i in year t.

In vector notation, we can re-write (1) as

$$(1') \qquad \phi^t_i = \beta^t_i \cdot \pi^t_i$$

where a dot $(\cdot)$ indicates the inner product. Then, the change in industry i's productivity is given by

$$(2) \qquad d\text{♪}_i = \beta^1_i \cdot d\pi_i + (d\beta_i) \cdot \pi^1_i.$$

Thus, the change in the industry's labor productivity levels is due to two effects. The first, which we call the "productivity effect", is from the change in the labor productivity level of each size class, while holding constant the inter-size class distribution of employment. This is largely a result of technical change and capital accumulation by firms of different size classes within the industry. The second, which we call the "employment shift effect", is from the change in the distribution of employment among firms of different size classes within the industry, while holding constant the labor productivity level of each size class within the industry.

Equation (2) refers to instantaneous changes. Since our data are for discrete time periods, we use the discrete form of (2):

$$(2') \qquad \Delta\text{♪}_i \doteq \beta^1_i \cdot \Delta\pi_i + (\Delta\beta_i) \cdot \pi^1_i.$$

where $\Delta\pi_i = \pi^2_i - \pi^1_i$, $\Delta\beta_i = \beta^2_i - \beta^1_i$, and where we ignore second-order terms. There are alternative choices of weights that are available for the decomposition. We used beginning period, end period, and average period weights. The last set has the advantage of allowing an exact decomposition. To see this, let $\bar{\pi}_i = (\pi^1_i + \pi^2_i)/2$ and $\bar{\beta}_i = (\beta^1_i + \beta^2_i)/2$. Then,

$$\Delta\text{♪}_i = \bar{\beta}_i \Delta\pi_i + (\Delta\beta_i)\bar{\pi}_i .$$

Our results are shown only for average period weights.[3]

We also employed a second decomposition, because we are interested in separating out the effect of changes in the number of establishments by size class from the number of employees by establishment. How do we compare the size distribution of firms within industry over time? Within size class, firms can be different over time for three reasons: (i) firms may go bankrupt (or merge with other firms); (ii) small firms may grow larger over time (maybe because they have high productivity); and (iii) larger firms may grow smaller (low productivity growth ones, perhaps).

There are, of course, problems with this type of decomposition, since establishments are classified into size classes on the basis of the number of employees. However, size classes are fairly broad in terms of the number of employees, so that for moderate employment change, establishments will remain in the same size class. The results will then generally reflect new entrants and exits.

Define:

N^t_{ik} = number of establishments in industry i, size class k, year t.

E^t_{ik} = average number of employees per establishment in industry i, size class k, year t, so that $L^t_{ik} = N^t_{ik}E^t_{ik}$

Then,

$$(3) \qquad d\,\text{♪}_i = \beta^t_i \cdot d\pi_i + (\eta^t_i \cdot d\epsilon_i) \cdot \boldsymbol{\pi}^t_i + (d\eta_i \cdot \epsilon^t_i) \cdot \boldsymbol{\pi}^t_i.$$

where

$\eta^t_{ik} = N^t_{ik}/N^t_i$, the number of establishments in size class k of industry i as a proportion of the total number of establishments in industry i in year t.

$\epsilon^t_{ik} = E^t_{ik}/E^t_i$, the average number of employees per establishment in size class k of industry i as ratio to the average number of employees per establishment in industry i, year t.

or, in discrete form,

$$(3) \qquad \Delta \text{♫}_i \doteq \beta^t_i \cdot \Delta\pi_i + (\eta^t_i \cdot \Delta\epsilon_i) \cdot \pi^t_i + (\Delta\eta_i \cdot \epsilon^t_i) \cdot \pi^t_i.$$

We have, thus, separated the employment shift effect into two subfactors: the change in the number of establishments within each size class, and the change in average employment by size class. More simply, the change in employment in each size class, can be decomposed into two effects: the change in the number of establishments within each size, class and the change in average employment by size class.

$$(4) \qquad dL_{ik} = N^t_{ik} dE^t_{ik} + dN_{ik} dE^t_{ik}.$$

The most important finding is that about 70 per cent of the growth in overall labor productivity in total manufacturing was due to growth in labor productivity by size class and the remaining 30 per cent to shifts in the industry composition of employment (see Table 3). In particular, the relative growth in the largest size class, which also has the highest labor productivity level, accounted for almost all the employment shift effect. It is also interesting that almost all the employment growth was due to an increase in the number of establishments in the larger size classes. In fact, except for the largest size class, the average number of employees per plant fell. As noted above, most of the employment growth occurred in the largest plants, for whom 71 per cent of the employment growth was due to an increase in the number of establishments and 29 per cent to the growth in employees per establishment.

When the establishments are divided into only two size classes, the employment effect is much smaller. Indeed, the smaller the number of size classes, the smaller the employment effect. Nelson (1968) had fewer size classes than we did (six). As a result, his finding of a smaller employment effect for Colombia, 20 per cent, may be a result of the smaller number of size classes.

We now turn to TFP and capital intensity. The TFP level of industry i, τ_i, is measured by:

$$(5) \qquad \tau_i = \text{Ln } Y_i - \bar{\alpha}_i \text{Ln } L_i - (1 - \bar{\alpha}_i)\text{Ln } K_i,$$

where Y_i is output (measured here by value added only), L_i is the labor input, K_i is the capital input, and $\bar{\alpha}_i$ is the wage share in industry i averaged over the two years. The measure is standardized so that TFP for the total industry is set to unity in each year.[4]

The results, shown in Table 4, show a very strong correlation between plant size class and capital-labor ratios in both 1970 and 1975. However, capital-labor ratios have grown relatively more in smaller size classes over the 1970-75 period, so that the differentials in capital-labor ratios have narrowed somewhat, with the coefficient of variation falling from 0.48 to 0.46.

There is not a clear pattern of TFP levels by size class of establishments, except that the smallest size class has the lowest TFP and mid-size plants have the highest TFP levels. There is also no clear pattern in the growth in relative TFP between 1970 and 1975, except that, here again, the mid-size plants appear to have made the largest gains. As a result, there was a slight increase in dispersion in TFP levels over the period. However, what is striking is that the variation in TFP levels across size classes is very small. Indeed, there is much less variation in TFP levels, with coefficients of variation of 0.05 and 0.06 in 1970 and 1975, respectively, than in labor productivity levels, with a coefficient of variation of 0.32 in both years. Thus, it appears clear that most of the variation in labor productivity levels across plant size classes is due to differences in capital intensity.

We can also decompose the change in labor productivity by size class into a technology effect and a capital deepening effect, as follows. Let:

σ_{ik}: ratio of size class k's labor productivity (π_{ik}) to the industry's overall labor productivity (π_i);

τ_{ik}: ratio of size class k's TFP level (τ_{ik}) to the industry's overall TFP (τ_i) ; and

κ_{ik}: ratio of size class k's capital-labor ratio (K_{ik}/L_{ik}) to the industry's overall capital-labor ratio (K_i/L_i).

Equation (5) imply directly that

$$(6) \qquad \text{Ln}\ \sigma_{ik} = \tau_{ik} + (1 - \bar{\alpha}_i)\text{Ln}\ \kappa_{ik}$$

Differentiating this with respect to time yields

$$(7) \qquad \hat{\sigma}_{ik} = \hat{\tau}_{ik} + (1 - \bar{\alpha}_i)\hat{\kappa}_{ik}.$$

As before, we use the discrete approximation to equation (7) to estimate the decompositions.

The results, presented in Table 5, show no clear pattern by size class of establishment. Labor productivity by size class, relative to the overall level, declined in all size classes, except one, between 1970 and 1975 (this is due to the fact that employment shifts among industries also contributed to overall productivity growth). The technology effect was negative in seven of the 12 size classes and positive in the other five, but its sign and magnitude are not correlated with plant size. Likewise, the capital intensity effect was negative in 8 size classes and positive in 4, but its sign and magnitude show no direct correspondence with plant size. Thus, there is no evidence of a dualistic structure between small and large plants, in terms of the role of technology advance and capital intensity increase, on labor productivity growth.

4. Productivity on the Manufacturing Industry Level, 1970 and 1975

Labor productivity statistics for eight manufacturing industries are shown in Table 6. As before, industries are divided into size classes on the basis of the number of employees. Because of differences in size class data by individual four-digit industry, results are computed for only five size classes.

What is perhaps most notable is the difference in results across manufacturing industries. As with the data for total manufacturing, there is generally a close correlation between productivity levels and plant size, but there are exceptions -- as in chemicals, electrical machinery, and transport equipment. There is no clear relation between productivity growth and plant size. In food and food products, the highest labor productivity growth was recorded by the smallest and largest establishments. In textiles and apparel, productivity growth rates were inversely related to plant size. In chemicals, non-electrical machinery, electrical machinery, transport equipment, and other manufacturing, the medium-size establishments experienced the highest growth in productivity. In metals and metal products, productivity growth was positively related to plant size.

In terms of the variation in productivity levels across plant sizes, there is, again, no uniform pattern among industries. It is noteworthy that there are considerable differences in the coefficient of variation in productivity levels (in 1970, from a low of 0.16 in textiles and apparel to a high of 0.48 in metals and metal products). In total manufacturing (including only the four-digit industries represented in Table 6), the coefficient of variation in 1970 was 0.35. Moreover, in four of the eight manufacturing sectors, the coefficient of variation declined between 1970 and 1975, while in the other four, it increased.

For total manufacturing, we found that all the growth in percentage shares of GDP and employment between 1970 and 1975 occurred in the largest size classes. In fact, the number of establishments in the smaller size classes declined in absolute number, while those in the largest size classes increased in number. Table 7 shows the same set of statistics by manufacturing industry. Again, we see that results vary across industry. By and large, all the relative growth in GDP and employment occurred in the largest size class, but there are exceptions, as in textiles and apparel, metals and metal products (for GDP), electrical machinery (in which all the relative GDP growth occurred in the three smallest size classes), transport equipment (in which all the relative employment and GDP growth occurred in the four smallest size classes), and other manufacturing.

With regard to the number of establishments, the pattern for total manufacturing was replicated only in food and food products, where all the increase was concentrated in the largest size class. In textiles and apparel, the number of establishments declined in all size classes. In metal and metal products, all the gain occurred in the three smallest size classes. In electrical machinery, all size classes showed a gain in absolute terms (though in relative terms all the gain occurred in the smallest size class). In other manufacturing, the two smallest size classes showed a loss, while the three largest showed an absolute increase. In the other sectors, the patterns were quite mixed.

In Table 9, we replicate the decomposition of the change in overall productivity growth into a productivity and employment shift effect (see equation 2) on the industry level. The difference in results is again striking. On the basis of five size classes (and the inclusion of only selected 4-digit industries), 87 per cent of the change in productivity for total manufacturing is found to be due to productivity growth by size class and 13 per cent to shifts in employment shares among size classes. We find stronger employment shift effects in food and food products (36 per cent) and non-electrical machinery (24 per cent). In chemicals and chemical products and in other manufacturing, the employment shift effect is of the order of 10 per cent. However, in metals and metal products and electrical machinery, the employment shift effects are close to zero, and in textiles and apparel and in transport equipment, the employment shift effects are actually negative (that is, in the direction of reducing industry-level productivity).

5. Productivity Changes, 1965-1975

We next investigate productivity movements by size class between 1965 and 1975. We have data on the two-digit SIC level. Unfortunately, the data for 1965 are disaggregated into only two size classes.

Results on labor productivity levels are shown in Table 9. Over the 1965-75 period, productivity in total manufacturing grew by 26 per cent among establishments with five or fewer employees and 32 per cent in those with six or more -- a rather small difference. In fact, between 1970 and 1975, productivity growth was slightly greater in the small establishments.

Here too, there is considerable variability across industries in the relative productivity growth of small and large establishments. Of the 20 two-digit industries, productivity growth over 1965-75 was greater in small plants than large plants in 8 industries and smaller in 12. Over the 1965-70 period, the respective figures were 9 and 11, and over the 1970-75 period, 6 and 14.

Variability across industries is also evident in changes in the relative share of establishments, employment, and GDP between small and large establishments (Table 10). For total manufacturing, the number of establishments declined by almost 25,000 between 1965 and 1975. Of this, all the decline (101 per cent) was accounted for by plants with five or fewer employees, and establishments with six or more employees increased in number by 190. However, in percentage terms, the change does not appear that dramatic. The share of establishments with five or fewer employees declined from 85 per cent in 1965 to 81 per cent in 1975, or by 4 percentage points.

The share of establishments with five or fewer workers declined in 14 out of the 20 two-digit SIC industries between 1965 and 1975. However, in only a few cases were the declines particularly steep -- SIC 21 (23 per cent), SIC 30 (44 per cent), SIC 36 (53 per cent), and SIC 37 (53 per cent). In absolute terms, the number of plants with five or less employees showed sharp declines in only 5 industries -- SIC 24 (3,511), SIC 31 (5,369), SIC 36 (5,847), SIC 37 (12,135), and SIC 39 (2,991), while in 6 industries the number actually increased. The number of establishments with six or more employees showed increases in 14 industries and declines in the other 6.

In total manufacturing, the share of employment in establishments with five or fewer employees declined by 6 per cent between 1965 and 1975 and the share of GDP declined by 2 per cent. Again, we see a rather mixed pattern across two-digit industries. The share of employment in the small establishments fell in 16 industries, with SIC 24, SIC 31, SIC 36, SIC 37, SIC 38, and SIC 39 showing declines of 10 per cent or more, and rose in 4. The share of GDP originating from plants with five or less workers went down in 16 industries, particularly SIC 23, SIC 31, SIC 37, SIC 38, and SIC 39, and rose in 4.

In Table 11, we again decompose the change in overall labor productivity growth by industry into a productivity and employment shift effect (see equation 2). On the basis of two size classes, 18 per cent of the change in labor productivity for total manufacturing between 1965 and 1970 is attributable to the employment shift effect and 82 per cent to productivity growth within size class. Of the 20 two-digit industries, we find a substantial employment shift effect, of 20 per cent or more, in only 5 -- SIC 23, SIC 24, SIC 31, SIC 36, and SIC 37 -- while in 4 industries, the employment shift effect is actually negative. Between 1970 and 1975, the employment shift effect accounted for 11 per cent of the change in labor productivity for total manufacturing. It was substantial (over 20 per cent) in only 5 industries and actually negative in 6.

6. Regression Analysis.

These results lead quite naturally to questions about the relation between productivity growth on the industry level and shifts in the composition of industries by size class. Do industries with higher rates of productivity growth also experience more radical transformations in their industrial structure? Of particular interest is the drop-out or "excise" effect -- namely, whether the exiting of low productivity, small establishments is related to industry productivity growth. However, it should be emphasized at the outset that it is not possible to infer causation from such an analysis. For example, the introduction of new technology might cause high productivity gains by large plants and render small plants technologically obsolescent. On the other hand, the rapid departure of small establishments from an industry will, in general, because of their lower than average productivity, be associated with a gain in average industry productivity.

We test this by using three independent variables: (i) change in the per cent of establishments in the industry with five or fewer employees; (ii) the absolute change in the number of establishments in the industry; and (iii) the percentage change in the number of establishments in the industry.

Other factors that might be associated with industry productivity growth are as follows:

(1) the rate of output growth of an industry. As we argued in Blomström and Wolff (forthcoming), high output growth may allow small, inefficient firms to survive, while the contraction of industry output may cause low productivity establishments to exit. This would suggest a negative relation between industry productivity growth and output growth. On the

other hand, high output growth might stimulate new investment in an industry, the adoption of new technology, and the entry of new, presumably high efficiency establishments into an industry (the so-called Verdoorn effect). Such an effect would suggest a positive relation between productivity and output growth.

(2) capital intensity of an industry, as measured by the capital-labor ratio. More capital-intensive industries may experience more rapid rates of technological growth, through the embodiment (or vintage effect). Unfortunately, with the data at hand, it is not possible to measure the rate of growth of the capital stock (or capital intensity), only the capital intensity level in a given year (we use 1970).

(3) the degree of industry concentration (as measured by a Herfindahl or a CR4 index). Here, too, there are likely to be offsetting influences. On the one hand, there is likely to be more competition in less concentrated industries, suggesting greater productivity growth. On the other hand, more concentrated industries are likely to have, on average, greater economies of scale and, hence, more rapid labor productivity growth.

(4) the proportion of industry output produced by multinational corporations (MNCs). In Blomström and Wolff (forthcoming), we showed that there was a statistically significant relation between the degree of penetration of an industry by MNCs and its rate of labor productivity growth. Also, since we are studying an import-substituting country, it is typically the case that large firms get cheaper capital than small firms, and that MNCs get cheaper capital than locals (see Blomström, 1989). This would suggest that, ceteris paribus, MNCs may have higher investment rates than local firms and may, thus, have greater access to new technology embodied in new capital goods (through the embodiment or vintage

effect).

(5) the ratio of Mexican to U.S. industry productivity. The so-called catch-up effect states that countries further behind the leader in terms of initial productivity should experience, ceteris paribus, higher rates of productivity growth than countries further ahead. This effect has been extensively document on the aggregate level (see, for example, Baumol, Blackman, and Wolff, 1989, Chapter 5 for a discussion). Dollar and Wolff (1988 and 1993) found evidence of the catch-up effect on the industry level among OECD countries, while Blomström and Wolff, forthcoming, found it to be a significant determinant of productivity growth among Mexican industries between 1965 and 1975.[5]

6.1 Descriptive Statistics

We begin with descriptive statistics for each of the variables by two-digit SIC codes (Table 12). Labor productivity growth for total manufacturing averaged 3.3 per cent per year between 1965 and 1975. However, there was considerable variation across industries, ranging from a low of 0.6 per cent per year for SIC 25 (furniture and fixtures) to a high of 4.9 per cent for SIC 38 (instruments and related products). The coefficient of variation (the ratio of the standard deviation to the unweighted average) is 0.5.

There is also considerable cross-industry variation in the three variables which measure the change in the number of establishments in the industry. The percentage change in the number of establishments in an industry ranges from -94 in SIC 37 (transportation equipment) to +117 in SIC 25. The change in the percentage of establishments with five or fewer employees ranges from -53 in SIC 37 to +7 in SIC 33 (primary metal products). All three variables have a negative correlation with industry labor productivity growth, but the strongest correlation of the three is the change in the percentage of establishments with five or fewer employees.

Output growth also varies considerably among industries, but it has a strong positive correlation with industry labor productivity growth (0.61). Capital intensity (in 1970) has a positive, but weak correlation with labor productivity growth, whereas the per cent of industry output produced by multinationals has a 0.53 correlation with industry productivity growth. More concentrated industries, as measured by the Herfindahl index, also experienced higher labor productivity growth, with a correlation coefficient of 0.59.[6]

6.2 Regression Results

Our dependent variable is the average annual rate of labor productivity growth (LPGR) by industry and period. We use two periods, 1965-70 and 1970-75, and 20 2-digit SIC industries, for a sample size of 40. In some specifications, we also use the annual rate of labor productivity growth of establishments with five or fewer employees only by industry and period (LPGRSM).[7] Results are shown in Table 13.

The change in the number of establishments in an industry has a negative effect on industry labor productivity growth, and is significant at the one per cent level in two cases and at the five per cent level in the other. Of the three variables, the absolute change in the number of establishments has the highest t-ratio. The percentage change in the number of establishments is slightly less significant, while the change in the per cent with five or fewer employees is, also surprisingly, the least significant of the three.

The coefficient for output growth is positive and significant at the five per cent level in all the regressions. This suggests that the positive effect of output growth, through stimulating investment and the introduction of new technology, as well as through attracting new entrants, outweighs the negative effect of allowing inefficient firms to survive.

The catch-up effect, as we showed in Blomström and Wolff (forthcoming), remains negative and (extremely) significant (with t-ratios of 6.0 or more). Thus, the results seem to suggest significant cross-border spillovers of technology between the United States and Mexico. However, the other variables were all statistically insignificant. These include the percentage of industry output produced by MNCs, the capital intensity of the industry, and the industry concentration ratio (as well as a period dummy variable).[8]

In the last set of regressions, we used the rate of labor productivity growth of establishments with five or fewer employees in the industry as the dependent variable. The only two significant variables were the change in the number of establishments and the industry output growth. For the former, the percentage change in the number of establishments, was the most significant of the three variables reflecting changing industrial composition. Interestingly, it was considerably more significant than the change in the per cent of establishments with five or fewer employees. Rapid industry output growth also appears to increase efficiency in the smallest establishments. However, we found no catch-up effect in these regressions. The reason for this may be that small Mexican firms have little to learn from the United States, because they are too far behind in their technological levels to be imitators (see Kokko, 1993 for such an argument).

7. Concluding Remarks.

Growth and structural transformation of the manufacturing sector in developing countries are generally considered to be the result of the expansion of the "modern" (large-scale) sector relative to the "traditional" (small-scale) sector. Examining the sources of labor productivity growth in Mexican manufacturing, however, does not provide support for such a conclusion. Although we find that labor productivity levels vary almost in direct relation to establishment size, labor productivity growth shows no systematic variation by size class. In fact, small establishments have had the same rate of labor productivity growth as larger ones, partly because of the "excise-effect" (i.e. the exiting of low-productivity, small firms). We also find that most of the variation in labor productivity across plant class sizes is due to differences in capital intensity. The variation in TFP levels across size classes tends to be small[9].

An examination of the data on the individual industry level also indicates no clear pattern of dualism. In some industries, labor productivity growth was greater for small plants than for large ones; in some, employment shifts had a negative effect on overall industry productivity; and in some industries, all the growth in employment and output was concentrated in the smaller establishments. In other words, we find no systematic relation between productivity growth and plant size when we repeat the analysis for individual broad industry groups. However, regression analysis of industry productivity growth suggests that rapid output growth, coupled with the exit of inefficient establishments from an industry, are the key to rapid industry labor productivity growth. The diffusion of technology between the United States and Mexico (the catch-up effect) also plays a major role for large plants, but not for small, traditional ones.

Our finding that small firms in Mexico have been doing well, despite unfavorable growth conditions because of the import-substitution policy followed during the period studied, removes some justification of the policy measures that favor large firms in developing countries. This was suggested many years ago by Hla Myint, who concluded that the most significant aspect of economic dualism is that scarce inputs, such as capital funds, foreign exchange, and public economic facilities, are made available on excessively favorable terms to the largest units in the modern sector, and on excessively unfavorable terms to the smaller economic units in the traditional sector (see Myint, 1970).

Notes

1. For instance, in their sensitivity analysis of cross-country growth regressions, Levine and Renelt (1992) examined over 50 variables that have been found to be significantly correlated with growth in at least one regression.

2. The data on Mexico used in this study come from the Mexican Census of Manufactures 1965, 1970, and 1975, supplemented by unpublished Census data on ownership and concentration. The data are gathered at plant level and cover the entire manufacturing industry, divided into individual 4-digit industries. For a fuller description of the data, see Blomström (1989). The classification of Mexican 4-digit industries into 2-digit SIC codes is provided in Blomström and Wolff (forthcoming).

3. Results using beginning period and end period weights were very similar to those using average period weights.

4. Capital here is measured at acquisition cost, so that it is not possible to compare capital-labor ratios over time or, consequently, TFP levels over time.

5. Other variables that we felt might prove to be important as determinants of industry productivity growth are (i) export growth, (ii) the degree of import protection, (iii) the ratio of white collar to blue collar employment by industry, and (iv) the payment of royalties and foreign licenses by industry. Unfortunately, the requisite data for these variables were not available on the industry level.

6. The index shown in Table 12 is computed as an unweighted average of Herfindahl indexes of four-digit industries in 1970 within the two-digit industry. Three other concentration measures were used, with similar results. The first of these is the output-weighted average of Herfindahl indexes of four-digit industries in 1970 within the two-digit industry; the second is the unweighted average of CR4 indexes of four-digit industries in 1970 within the two-digit industry; and the third is the output-weighted CR4 indexes of four-digit industries in 1970 within the two-digit industry.

7. We also contemplated repeating the same analysis on the 4-digit industry level. However, because of the reclassification of industries on the 4-digit level in both 1970 and 1975, it proved almost impossible to develop a consistent series over the 1965-70 and the 1970-75 periods.

8. Results are almost identical for the other three concentration indexes used in the analysis. See the footnote 6.

9. This finding is consistent with those reported in Meller (1976) for Chilean establishments. He found no systematic differences in technical efficiency between large and small establishments.

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Table 1

Labor Productivity Levels for Total Industry
By 12 Size Classes, 1970 and 1975

Size Class[b]	GDP Per Employee (in 1000s of US$1975)[a]			Gross Output Per Employee (in 1000s of US$1975)[a]		
	1970	1975	1975/70	1970	1975	1975/70
1 to 5	2.79	3.16	1.13	6.73	7.89	1.17
6 to 15	4.17	4.67	1.12	10.35	12.16	1.17
16 to 25	5.69	5.69	1.00	15.04	15.44	1.03
26 to 50	5.84	6.53	1.12	15.73	17.56	1.12
51 to 75	6.63	7.55	1.14	17.93	20.58	1.15
76 to 100	7.02	7.34	1.04	19.22	21.08	1.10
101 to 175	7.73	8.62	1.12	20.45	23.72	1.16
176 to 250	8.71	9.73	1.12	22.47	26.65	1.19
251 to 350	9.12	9.82	1.08	22.86	24.36	1.07
351 to 500	9.46	11.02	1.17	25.01	27.75	1.11
501 to 750	10.22	10.28	1.01	26.95	22.60	0.84
750 or more	10.98	12.01	1.09	27.13	31.04	1.14
Total Manuf.	7.92	9.02	1.14	20.42	23.34	1.14
Coeff. of Variation	0.322	0.321		0.319	0.306	
Mex./U.S. Lab Prod.	0.51	0.50				

a. Industry includes both manufacturing and mining. This table excludes self-employed workers. Mexico 1970 GDP was converted to 1975 pesos using the Mexican GDP deflator. 1975 pesos were converted to 1975 dollars using the actual exchange rate in 1975.

b. Establishments are classified by the number of employees.

Table 2

Percentage Shares of Employment, GDP, and Establishments
By 12 Size Classes, 1970 and 1975[a]

Size Class	Employment 1970	Employment 1975	Employment Change	GDP 1970	GDP 1975	GDP Chng	Number of Establishments 1970	Number of Establishments 1975	Number of Establishments Change	Number of Establishments Abs Chg
1 to 5	7.2	5.6	-1.6	2.5	2.0	-0.6	62.9	59.2	-3.7	-5763
6 to 15	6.6	5.8	-0.8	3.5	3.0	-0.5	17.6	19.0	1.4	-223
16 to 25	4.5	4.1	-0.4	3.2	2.6	-0.6	5.3	6.1	0.7	93
26 to 50	8.5	7.4	-1.1	6.3	5.3	-0.9	5.7	6.0	0.3	-165
51 to 75	6.6	6.0	-0.5	5.5	5.1	-0.4	2.5	2.8	0.3	4
76 to 100	5.3	4.8	-0.6	4.7	3.9	-0.8	1.5	1.6	0.1	-24
101 to 175	10.9	10.5	-0.4	10.6	10.0	-0.6	2.0	2.3	0.3	75
176 to 250	8.2	7.6	-0.6	9.0	8.2	-0.8	0.9	1.0	0.1	4
251 to 350	7.3	7.3	-0.0	8.4	7.9	-0.5	0.6	0.7	0.1	30
351 to 500	8.0	8.5	0.5	9.6	10.4	0.8	0.5	0.6	0.1	41
501 to 750	8.1	8.5	0.4	10.5	9.7	-0.8	0.3	0.4	0.1	26
750+	18.9	24.1	5.2	26.3	32.1	5.8	0.3	0.5	0.1	53
Total	100.0	100.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	-5849
Average Establishment Size							23.9	28.4		4.5
Total Number of Establishments (1,000s)							108.9	107.2		

a. This table excludes self-employed workers. All figures are in percentages, except absolute changes in the number of establishments, which are actual numbers of plants.

Table 3

Decompositions of the Change in Labor Productivity
And Employment Growth for Total Manufacturing, 1970-75[a]

Size Class	GDP/Employment[b] Prod. Change $\Delta(\pi_i)$	GDP/Employment[b] Prod Effect $[\beta_i\Delta\pi_i]$	GDP/Employment[b] Employ. Effect $[\Delta\beta_i\pi_i]$	Gross Output/Employ.[b] Prod. Change $\Delta(\pi_i)$	Gross Output/Employ.[b] Prod Effect $[\beta_i\Delta\pi_i]$	Gross Output/Employ.[b] Employ. Effect $[\Delta\beta_i\pi_i]$	Employment Change Empl. Chng. ΔL_i	Employment Change Establ. Chng. $[\Delta N_i E_i]$	Employment Change Ave. Empl Chg $[N_i \Delta E_i]$
12 Size Classes									
1 to 5	0.37	0.02	-0.05	1.15	0.07	-0.12	-17,497	-15,571	-1,926
6 to 15	0.49	0.03	-0.04	1.81	0.11	-0.10	-5,920	-1,969	-3,951
16 to 25	0.00	0.00	-0.02	0.40	0.02	-0.06	-621	1,823	-2,444
26 to 50	0.69	0.06	-0.07	1.83	0.15	-0.19	-8,047	-5,864	-2,183
51 to 75	0.92	0.06	-0.04	2.65	0.17	-0.10	-693	246	-939
76 to 100	0.32	0.02	-0.04	1.86	0.09	-0.11	-2,662	-2,083	-579
101 to 175	0.89	0.09	-0.03	3.27	0.35	-0.09	6,097	9,857	-3,760
176 to 250	1.02	0.08	-0.05	4.18	0.33	-0.14	47	836	-789
251 to 350	0.70	0.05	-0.00	1.50	0.11	-0.00	8,201	8,862	-661
351 to 500	1.56	0.13	0.05	2.74	0.23	0.12	16,852	17,019	-167
501 to 750	0.05	0.00	0.04	-4.34	-0.36	0.10	16,001	15,711	290
750 or more	1.02	0.22	0.59	3.90	0.84	1.50	104,833	73,951	30,882
Total	1.10	0.76	0.34	2.92	2.10	0.82	116,591	102,818	13,773
% Change	100.0%	69.1%	30.9%	100.0%	72.0%	28.0%	100.0%	88.2%	11.8%
2 Size Classes									
Total	1.10	1.01	0.09	2.92	2.67	0.25			
% Change	100.0%	91.4%	8.6%	100.0%	91.4%	8.6%			

a. See equations (2') and (4). Self-employed workers are excluded from the table.

b. In 1000s of US$1975.

Table 4

TFP Levels and Capital-Labor Ratios
By Size Class for All Manufacturing, 1970 and 1975[a]

Size Class	Capital/Labor Ratios[b]			TFP Levels[c]		
	1970	1975	1975/70	1970	1975	1975/70
1 to 5	0.19	0.22	1.17	0.93	0.84	0.91
6 to 15	0.40	0.38	0.96	0.90	0.90	1.00
16 to 25	0.51	0.50	0.98	1.06	0.94	0.89
26 to 50	0.57	0.58	1.02	1.02	0.99	0.97
51 to 75	0.71	0.66	0.92	1.02	1.07	1.05
76 to 100	0.83	0.68	0.82	0.99	1.02	1.03
101 to 175	0.86	0.88	1.03	1.07	1.03	0.96
176 to 250	1.03	0.98	0.96	1.08	1.09	1.01
251 to 350	1.27	1.07	0.84	1.00	1.05	1.04
351 to 500	1.25	1.39	1.11	1.05	1.01	0.96
501 to 750	1.58	1.29	0.81	0.99	0.99	1.00
750 or more	1.59	1.49	0.94	1.06	1.06	0.99
Total	1.00	1.00	1.00	1.00	1.00	1.00
Coeff. of Var.	0.484	0.464		0.054	0.070	

a. Capital is measured by gross fixed capital (at acquisition cost). Self-employed workers are excluded from the table.

b. The capital-labor is standardized to equal unity for total manufacturing in each of the two years.

c. The TFP level is measured by equation (5), which is standardized to equal unity for total manufacturing in each of the two years. Output is measured by value added, and the wage share is equal to the wage share in total manufacturing, averaged over the two years.

Table 5

Decomposition of the Change in Labor Productivity into
A Technology and Capital Intensity Effect for Total Manufacturing, 1970-75[a]

(in percentage points)

Size Class	Change in Labor Productivity $[\hat{\sigma}_k]$	Technology Effect $[\hat{\tau}_k]$	Capital Intensity Effect $[(1 - \bar{\alpha})\hat{\kappa}_k]$
1 to 5	-0.7	-8.5	7.8
6 to 15	-1.9	0.3	-2.3
16 to 25	-13.0	-11.6	-1.4
26 to 50	-1.8	-2.9	1.0
51 to 75	-0.1	5.1	-5.2
76 to 100	-8.7	2.7	-11.4
101 to 175	-2.2	-3.8	1.6
176 to 250	-2.0	0.6	-2.5
251 to 350	-5.7	4.4	-10.1
351 to 500	2.3	-4.0	6.2
501 to 750	-12.5	-0.5	-12.1
750 or more	-4.1	-0.6	-3.5
Total	0.0	0.0	0.0

a. See equation (7). Capital is measured by gross fixed capital (at acquisition cost). Self-employed workers are excluded from the table.

Table 6

Labor Productivity Levels by Manufacturing Industry
And 5 Size Classes, 1970 and 1975

Size Class[b]	GDP Per Employee (in 1000s of US$1975)[a]			GDP Per Employee (in 1000s of US$1975)[a]		
	1970	1975	1975/70	1970	1975	1975/70
Food and Food Products				Textiles and Apparel		
5 or less	2.57	2.82	1.09	3.85	4.79	1.24
6 to 15	3.93	3.92	1.00	4.40	5.14	1.17
6 to 50	6.17	5.87	0.95	4.10	4.80	1.17
51 to 100	8.68	8.01	0.92	4.05	4.32	1.07
100 or more	7.35	7.86	1.07	5.83	6.03	1.03
Total	6.75	7.07	1.05	4.96	5.30	1.07
Coeff. of Variation	0.387	0.364		0.161	0.114	
Chemicals and Chemical Products				Metals and Metal Products		
5 or less	11.19	8.99	0.80	2.94	2.82	0.96
6 to 15	7.54	9.09	1.21	3.89	4.41	1.13
6 to 50	10.48	11.72	1.12	5.53	5.90	1.07
51 to 100	10.30	12.72	1.23	6.24	6.99	1.12
100 or more	14.50	16.99	1.17	11.15	14.36	1.29
Total	13.25	15.78	1.19	8.92	11.26	1.26
Coeff. of Variation	0.206	0.246		0.479	0.578	
Non-electrical Machinery				Electrical Machinery		
5 or less	3.68	3.92	1.07	4.73	4.68	0.99
6 to 15	5.22	5.69	1.09	4.64	5.87	1.26
6 to 50	5.68	7.20	1.27	5.88	7.47	1.27
51 to 100	7.77	9.49	1.22	6.07	6.81	1.12
100 or more	9.24	10.38	1.12	7.48	7.76	1.04
Total	7.10	8.58	1.21	7.16	7.60	1.06
Coeff. of Variation	0.310	0.324		0.180	0.173	
Transport Equipment				Other Manufacturing		
5 or less	4.00	3.89	0.97	3.11	3.14	1.01
6 to 15	2.85	3.35	1.18	3.73	4.28	1.15
6 to 50	5.20	7.51	1.45	4.58	5.34	1.17
51 to 100	4.45	3.91	0.88	5.39	5.96	1.11
100 or more	6.12	5.84	0.95	7.77	7.95	1.02
Total	5.70	5.75	1.01	6.29	6.69	1.06
Coeff. of Variation	0.244	0.317		0.329	0.304	

Table 6 (continued)

Size Class[b]	GDP Per Employee 1970	1975	1975/70
Total Manufacturing[c]			
5 or less	3.15	3.24	1.03
6 to 15	4.15	4.65	1.12
6 to 50	5.55	6.11	1.10
51 to 100	6.63	7.19	1.08
100 or more	8.83	10.14	1.15
Total	7.47	8.60	1.15
Coeff. of Variation	0.349	0.375	

Notes to Table 6

a. This table excludes self-employed workers. Mexico 1970 GDP was converted to 1975 pesos using the Mexican GDP deflator. 1975 pesos were converted to 1975 dollars using the actual exchange rate in 1975. Industries included in each sector are as follows (based on the 1970 industry codes):

Food and Food Products: 2011,2012,2021,2022,2032,2041,2051,2057,2061,2062, 2082,2093,2098,2113,2141

Textiles and Apparel: 2311,2312,2319,2323,2331,2346,2422,2423,2427

Chemicals and Chemical Products: 3113,3122,3131,3141,3151,3161,3162,3195

Metals and Metal Products: 3411,3511,3513,3517,3531,3541,3542, 3543,3545,3547,3549

Non-electrical Machinery: 3611,3621,3632,3653,3655,3659

Electrical Machinery: 3711,3721,3722,3724,3743,3749

Transport Equipment: 3811

Other Manufacturing: 2413,2511,2711,2722,2811,2813,2911,3013,3342,3343, 3354,3521,3921,3985,3988

b. Establishments are classified by the number of employees.

c. This includes only the 4-digit industries included in this table.

Table 7
Percentage Shares of Employment, GDP, and Establishments
By Industrial Sector and Five Size Classes, 1970 and 1975[a]

Size Class	Employment 1970	Employment 1975	Employment Change	GDP 1970	GDP 1975	GDP Change	Number of Establishments 1970	Number of Establishments 1975	Number of Establishments Change	Number of Establishments Abs Chg
Food and Food Products										
5 or less	6.7	5.2	-1.5	2.6	2.1	-0.5	55.7	50.5	-5.2	-911
6 to 15	8.0	7.1	-0.8	4.6	3.9	-0.7	22.1	24.0	1.8	-111
6 to 50	14.3	13.0	-1.3	13.1	10.8	-2.3	13.1	14.8	1.7	-27
51 to 100	11.8	10.6	-1.2	15.2	12.0	-3.2	4.1	4.4	0.2	-28
100 or more	59.2	64.1	4.9	64.5	71.2	6.7	4.9	6.3	1.4	41
Total	100.0	100.0	-0.0	100.0	100.0	-0.0	100.0	100.0	-0.0	-1036
Average Establishment Size							25.0	29.4		4.4
Textiles and Apparel										
5 or less	1.2	1.3	0.1	1.0	1.2	0.2	17.2	19.2	1.9	-33
6 to 15	4.6	3.5	-1.1	4.1	3.4	-0.7	22.8	18.4	-4.4	-132
6 to 50	22.7	21.6	-1.0	18.7	19.6	0.8	34.7	34.7	0.0	-115
51 to 100	22.0	24.5	2.5	18.0	20.0	2.0	14.5	16.6	2.1	-21
100 or more	49.5	49.1	-0.4	58.2	55.8	-2.4	10.9	11.2	0.3	-32
Total	100.0	100.0	-0.0	100.0	100.0	-0.0	100.0	100.0	-0.0	-333
Average Establishment Size							46.9	47.1		0.2
Chemicals and Chemical Products										
5 or less	1.1	0.8	-0.3	0.9	0.4	-0.5	23.5	19.3	-4.2	-47
6 to 15	3.4	2.8	-0.6	1.9	1.6	-0.3	23.0	23.6	0.6	5
6 to 50	10.7	8.0	-2.7	8.5	6.0	-2.5	24.5	22.6	-2.0	-23
51 to 100	13.0	11.9	-1.1	10.1	9.6	-0.5	11.8	13.2	1.4	14
100 or more	71.8	76.5	4.7	78.6	82.4	3.8	17.1	21.4	4.2	45
Total	100.0	100.0	-0.0	100.0	100.0	-0.0	100.0	100.0	0.0	-6
Average Establishment Size							65.5	78.2		12.8
Metals and Metal Products										
5 or less	6.2	5.6	-0.7	2.1	1.4	-0.7	60.2	58.3	-1.9	9
6 to 15	6.1	6.0	-0.2	2.7	2.3	-0.3	18.5	19.8	1.3	88
6 to 50	12.0	12.3	0.3	7.4	6.4	-1.0	11.9	13.1	1.2	73
51 to 100	12.2	11.1	-1.1	8.6	6.9	-1.7	4.8	4.5	-0.3	-5
100 or more	63.4	65.1	1.7	79.3	82.9	3.7	4.5	4.3	-0.3	-5
Total	100.0	100.0	-0.0	100.0	100.0	0.0	100.0	100.0	-0.0	160
Average Establishment Size							27.6	28.5		0.9
Non-electrical Machinery										
5 or less	10.9	9.6	-1.3	5.7	4.4	-1.3	57.8	59.5	1.7	293
6 to 15	12.6	11.6	-1.0	9.3	7.7	-1.6	22.8	23.5	0.7	116
6 to 50	20.5	16.2	-4.3	16.4	13.6	-2.8	12.4	10.5	-1.9	19
51 to 100	20.0	13.1	-6.9	21.9	14.5	-7.4	4.6	3.3	-1.3	-5
100 or more	35.9	49.4	13.5	46.7	59.8	13.1	2.4	3.2	0.8	27
Total	100.0	100.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	450
Average Establishment Size							16.2	17.1		0.9

Table 7 (continued)

Size Class	Employment 1970	Employment 1975	Employment Change	GDP 1970	GDP 1975	GDP Change	Number of Establishments 1970	Number of Establishments 1975	Number of Establishments Change	Number of Establishments Abs Chg
Electrical Machinery										
5 or less	0.8	0.8	0.1	0.5	0.5	0.0	21.4	27.2	5.8	92
6 to 15	2.1	1.9	-0.3	1.4	1.4	0.1	20.7	20.0	-0.7	34
6 to 50	7.1	6.6	-0.5	5.8	6.5	0.7	22.0	21.1	-0.9	35
51 to 100	8.5	7.7	-0.8	7.2	6.9	-0.3	11.3	9.8	-1.5	9
100 or more	81.5	83.0	1.5	85.0	84.6	-0.4	24.6	21.9	-2.7	24
Total	100.0	100.0	-0.0	100.0	100.0	-0.0	100.0	100.0	-0.0	194
Average Establishment Size							94.6	91.0		-3.6
Transport Equipment										
5 or less	2.0	2.5	0.5	1.4	1.7	0.3	35.4	33.3	-2.1	4
6 to 15	6.4	7.1	0.7	3.2	4.1	0.9	35.4	33.3	-2.1	4
6 to 50	10.4	13.5	3.1	9.5	17.7	8.2	20.0	24.7	4.7	7
51 to 100	4.6	4.8	0.2	3.6	3.3	-0.3	4.6	3.7	-0.9	0
100 or more	76.6	72.1	-4.5	82.4	73.3	-9.1	4.6	4.9	0.3	1
Total	100.0	100.0	-0.0	100.0	100.0	-0.0	100.0	100.0	-0.0	16
Average Establishment Size							54.5	46.9		-7.6
Other Manufacturing										
5 or less	5.9	5.1	-0.7	2.9	2.4	-0.5	49.2	48.3	-0.9	-262
6 to 15	8.9	7.9	-1.1	5.3	5.0	-0.3	25.3	24.2	-1.1	-179
6 to 50	16.4	16.7	0.3	12.0	13.3	1.4	15.4	16.4	1.0	11
51 to 100	13.2	14.5	1.3	11.3	12.9	1.6	4.9	5.6	0.7	32
100 or more	55.5	55.8	0.3	68.5	66.3	-2.2	5.2	5.5	0.3	1
Total	100.0	100.1	0.1	100.0	100.0	0.0	100.0	100.0	0.0	-397
Average Establishment Size							26.0	27.1		1.2
Total Manufacturing[b]										
5 or less	4.9	4.2	-0.7	2.1	1.6	-0.5	49.6	48.0	-1.6	-855
6 to 15	6.8	6.0	-0.8	3.8	3.2	-0.5	22.6	22.8	0.2	-175
6 to 50	14.6	13.4	-1.1	10.8	9.5	-1.3	15.8	16.3	0.6	-20
51 to 100	13.3	12.7	-0.7	11.9	10.6	-1.3	5.8	6.0	0.2	-4
100 or more	60.4	63.7	3.3	71.5	75.1	3.6	6.3	7.0	0.7	102
Total	100.0	100.0	0.0	100.0	100.0	-0.0	100.0	100.0	0.0	-952
Average Establishment Size							30.5	33.1		2.6

a. This table excludes self-employed workers. All figures are in percentages, except absolute changes in the number of establishments, which are actual numbers of plants. Industries included in each sector are as shown in footnote a of Table 6.

b. This includes only the 4-digit industries included in this table.

Table 8

Decompositions of the Change in Labor Productivity
By Industrial Sector, 1970-75[a]

	Productivity Change $[\Delta\pi]$	Productivity Effect $\Sigma[\beta_i\Delta\pi_i]$	Employment Effect $\Sigma[\Delta\beta_i\pi_i]$
Food and Food Products	0.33	0.21	0.12
Percentage Contribution	100.0	64.3	35.6
Textiles and Apparel	0.34	0.36	-0.02
Percentage Contribution	100.0	104.9	-4.9
Chemicals & Chemical Products	2.53	2.29	0.23
Percentage Contribution	100.0	90.8	9.2
Metals and Metal Products	2.35	2.22	0.13
Percentage Contribution	100.0	94.5	5.5
Non-electrical Machinery	1.48	1.13	0.35
Percentage Contribution	100.0	76.4	23.6
Electrical Machinery	0.44	0.42	0.02
Percentage Contribution	100.0	95.8	4.2
Transport Equipment	0.05	0.07	-0.02
Percentage Contribution	100.0	147.7	-47.7
Other Manufacturing	0.40	0.36	0.04
Percentage Contribution	100.0	89.1	10.9
Total Manufacturing[b]	1.14	0.99	0.14
Percentage Contribution	100.0	87.3	12.7

a. See equation (2'). Self-employed workers are excluded from the table. Industries included in each sector are as shown in footnote a of Table 6. Labor productivity is measured by the ratio of GDP (in 1000s of US$1975) to employment.

b. This includes only the 4-digit industries included in this table.

Table 9

Labor productivity Levels (GDP per Employee)
By Two-Digit Manufacturing Sector and 2 Size Classes, 1965, 1970, and 1975[a]

		1965	1970	1975	1970/65	1975/70	1975/65
SIC20	Total	5.13	6.33	7.46	1.23	1.18	1.46
	5 or less	1.46	1.65	2.20	1.13	1.33	1.51
	6 or more	6.53	8.10	9.40	1.24	1.16	1.44
SIC21	Total	22.61	24.95	36.70	1.10	1.47	1.62
	5 or less	1.81	1.36	3.38	0.75	2.48	1.87
	6 or more	22.72	25.04	36.85	1.10	1.47	1.62
SIC22	Total	5.25	5.39	5.82	1.03	1.08	1.11
	5 or less	3.97	2.11	2.16	0.53	1.02	0.54
	6 or more	5.28	5.49	5.94	1.04	1.08	1.12
SIC23	Total	3.59	4.09	4.09	1.14	1.00	1.14
	5 or less	2.49	2.09	2.00	0.84	0.96	0.80
	6 or more	3.94	4.57	4.50	1.16	0.99	1.14
SIC24	Total	3.03	3.59	4.09	1.19	1.14	1.35
	5 or less	1.38	1.66	1.80	1.20	1.09	1.31
	6 or more	3.45	3.90	4.31	1.13	1.11	1.25
SIC25	Total	6.22	7.01	6.60	1.13	0.94	1.06
	5 or less	2.94	4.52	3.10	1.54	0.69	1.05
	6 or more	6.28	7.06	6.69	1.12	0.95	1.07
SIC26	Total	9.20	10.11	11.25	1.10	1.11	1.22
	5 or less	2.15	2.84	3.07	1.32	1.08	1.43
	6 or more	9.30	10.21	11.34	1.10	1.11	1.22
SIC27	Total	6.66	6.68	7.59	1.00	1.14	1.14
	5 or less	3.60	3.18	3.55	0.88	1.12	0.99
	6 or more	7.10	7.25	8.30	1.02	1.15	1.17
SIC28	Total	12.27	13.35	15.02	1.09	1.12	1.22
	5 or less	7.29	7.40	7.51	1.01	1.02	1.03
	6 or more	12.39	13.47	15.11	1.09	1.12	1.22
SIC29	Total	12.20	21.74	17.55	1.78	0.81	1.44
	5 or less	7.29	7.21	5.84	0.99	0.81	0.80
	6 or more	12.37	22.20	17.70	1.79	0.80	1.43
SIC30	Total	6.97	8.36	10.05	1.20	1.20	1.44
	5 or less	2.39	2.37	3.60	0.99	1.52	1.51
	6 or more	7.56	9.14	10.20	1.21	1.12	1.35

Table 9 (continued)

		1965	1970	1975	1970/65	1975/70	1975/65
SIC31	Total	2.98	4.10	4.40	1.38	1.07	1.47
	5 or less	1.45	1.83	1.86	1.26	1.02	1.28
	6 or more	3.56	4.43	4.64	1.24	1.05	1.30
SIC32	Total	5.74	7.30	8.56	1.27	1.17	1.49
	5 or less	1.08	1.71	1.42	1.59	0.83	1.32
	6 or more	6.58	7.97	9.36	1.21	1.17	1.42
SIC33	Total	14.07	14.47	15.56	1.03	1.08	1.11
	5 or less	8.52	4.50	6.23	0.53	1.39	0.73
	6 or more	14.07	14.49	15.57	1.03	1.07	1.11
SIC34	Total	5.17	6.24	7.40	1.21	1.19	1.43
	5 or less	1.67	2.27	2.14	1.36	0.95	1.28
	6 or more	5.85	6.86	8.19	1.17	1.19	1.40
SIC35	Total	5.89	7.79	9.41	1.32	1.21	1.60
	5 or less	2.66	3.33	3.20	1.25	0.96	1.20
	6 or more	6.52	8.23	10.06	1.26	1.22	1.54
SIC36	Total	6.43	8.15	7.99	1.27	0.98	1.24
	5 or less	2.37	4.29	3.84	1.81	0.90	1.62
	6 or more	7.13	8.18	8.03	1.15	0.98	1.13
SIC37	Total	6.12	10.62	9.48	1.73	0.89	1.55
	5 or less	1.71	2.92	3.16	1.71	1.08	1.85
	6 or more	8.22	10.72	9.54	1.30	0.89	1.16
SIC38	Total	5.06	7.86	8.29	1.55	1.05	1.64
	5 or less	2.70	3.05	3.39	1.13	1.11	1.26
	6 or more	5.64	8.45	8.65	1.50	1.02	1.53
SIC39	Total	4.89	4.81	5.39	0.98	1.12	1.10
	5 or less	2.11	2.22	2.24	1.05	1.01	1.06
	6 or more	6.27	5.35	5.82	0.85	1.09	0.93
Total Manufacturing							
	Total	6.27	7.68	8.69	1.22	1.14	1.39
	5 or less	1.83	1.99	2.31	1.09	1.13	1.26
	6 or more	7.19	8.53	9.51	1.19	1.11	1.32

a. This table excludes self-employed workers. Mexico 1965 and 1970 GDP were converted to 1975 pesos using the Mexican GDP deflator. 1975 pesos were converted to 1975 dollars using the actual exchange rate in 1975. Industries included in each two-digit (U.S.) SIC code are indicated in the Appendix. Productivity is measured in 1,000s of 1975 US dollars per employee.

Table 10

Percentage Shares of Establishments, Employment, and GDP
By Two-Digit Industry and Two Size Classes, 1965, 1970 and 1975[a]

	Number of Establishments					Employment				GDP			
	1965	1970	1975	75/65	Abs Chg	1965	1970	1975	75/65	1965	1970	1975	75/65
SIC 20													
1-5	89.6	90.4	91.0	1.4	8160	27.6	27.5	26.9	-0.7	7.8	7.2	7.9	0.1
6+	10.4	9.6	9.0	-1.4	46	72.4	72.5	73.1	0.7	92.2	92.8	92.1	-0.1
Total					8206								
SIC 21													
1-5	47.5	20.6	24.6	-22.9	-5	0.5	0.4	0.5	-0.1	0.0	0.0	0.0	-0.0
6+	52.5	79.4	75.4	22.9	22	99.5	99.6	99.5	0.1	100.	100.	100.0	0.0
Total					17								
SIC 22													
1-5	38.6	41.4	43.3	4.7	-241	2.2	2.9	3.0	0.8	1.7	1.1	1.1	-0.6
6+	61.4	58.6	56.7	-4.7	-662	97.8	97.1	97.0	-0.8	98.3	98.9	98.9	0.6
Total					-903								
SIC 23													
1-5	86.0	83.1	81.8	-4.1	-1079	24.3	19.3	16.6	-7.7	16.9	9.9	8.2	-8.7
6+	14.0	16.9	18.2	4.1	335	75.7	80.7	83.4	7.7	83.1	90.1	91.8	8.7
Total					-744								
SIC 24													
1-5	90.8	85.3	76.4	-14.5	-3511	20.5	13.9	8.7	-11.8	9.4	6.4	3.9	-5.5
6+	9.2	14.7	23.6	14.5	35	79.5	86.1	91.3	11.8	90.6	93.6	96.1	5.5
Total					-3476								
SIC 25													
1-5	31.5	37.6	35.9	4.4	136	1.7	2.0	2.4	0.7	0.8	1.3	1.1	0.3
6+	68.5	62.4	64.1	-4.4	207	98.3	98.0	97.6	-0.7	99.2	98.7	98.9	-0.3
Total					343								
SIC 26													
1-5	29.5	31.6	45.5	16.0	94	1.4	1.3	1.0	-0.3	0.3	0.4	0.3	-0.0
6+	70.5	68.4	54.5	-16.0	-71	98.6	98.7	99.0	0.3	99.7	99.6	99.7	0.0
Total					23								
SIC 27													
1-5	66.7	69.6	72.8	6.0	922	12.4	13.9	15.1	2.7	6.7	6.6	7.1	0.4
6+	33.3	30.4	27.2	-6.0	27	87.6	86.1	84.9	-2.7	93.3	93.4	92.9	-0.4
Total					949								

Table 10 (continued)

	Number of Establishments					Employment				GDP			
	1965	1970	1975	75/65	Abs Chg	1965	1970	1975	75/65	1965	1970	1975	75/65
SIC 28													
1-5	39.5	38.3	32.4	-7.2	-172	2.3	1.9	1.2	-1.1	1.4	1.0	0.6	-0.8
6+	60.5	61.7	67.6	7.2	76	97.7	98.1	98.8	1.1	98.6	99.0	99.4	0.8
Total					-96								
SIC 29													
1-5	48.1	40.7	32.8	-15.3	-4	3.4	3.1	1.2	-2.2	2.0	1.0	0.4	-1.6
6+	51.9	59.3	67.2	15.3	16	96.6	96.9	98.8	2.2	98.0	99.0	99.6	1.6
Total					12								
SIC 30													
1-5	77.4	78.9	33.0	-44.4	-1871	11.4	11.5	2.3	-9.2	3.9	3.3	0.8	-3.1
6+	22.6	21.1	67.0	44.4	278	88.6	88.5	97.7	9.2	96.1	96.7	99.2	3.1
Total					-1593								
SIC 31													
1-5	87.6	71.1	69.3	-18.3	-5369	27.5	12.6	8.9	-18.6	13.4	5.6	3.8	-9.6
6+	12.4	28.9	30.7	18.3	-160	72.5	87.4	91.1	18.6	86.6	94.4	96.2	9.6
Total					-5529								
SIC 32													
1-5	76.7	53.1	74.3	-2.4	-1012	15.3	10.8	10.1	-5.2	2.9	2.5	1.7	-1.2
6+	23.3	46.9	25.7	2.4	-151	84.7	89.2	89.9	5.2	97.1	97.5	98.3	1.2
Total					-1163								
SIC 33													
1-5	5.2	14.7	12.6	7.3	31	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0
6+	94.8	85.3	87.4	-7.3	104	99.9	99.8	99.9	-0.1	100.0	99.9	100.0	-0.0
Total					135								
SIC 34													
1-5	82.4	77.7	77.6	-4.8	-315	16.2	13.6	13.0	-3.2	5.2	4.9	3.8	-1.5
6+	17.6	22.3	22.4	4.8	424	83.8	86.4	87.0	3.2	94.8	95.1	96.2	1.5
Total					109								
SIC 35													
1-5	78.1	65.0	73.0	-5.1	126	16.4	8.9	9.5	-6.8	7.4	3.8	3.2	-4.2
6+	21.9	35.0	27.0	5.1	283	83.6	91.1	90.5	6.8	92.6	96.2	96.8	4.2
Total					409								

Table 10 (continued)

	Number of Establishments					Employment				GDP			
	1965	1970	1975	75/65	Abs Chg	1965	1970	1975	75/65	1965	1970	1975	75/65
SIC 36													
1-5	90.2	28.3	37.8	-52.5	-5847	14.8	0.9	1.0	-13.8	5.5	0.5	0.5	-5.0
6+	9.8	71.7	62.2	52.5	82	85.2	99.1	99.0	13.8	94.5	99.5	99.5	5.0
Total					-5765								
SIC 37													
1-5	90.5	41.3	37.1	-53.4	-12135	32.3	1.3	0.9	-31.4	9.0	0.4	0.3	-8.7
6+	9.5	58.7	62.9	53.4	-754	67.7	98.7	99.1	31.4	91.0	99.6	99.7	8.7
Total					-12889								
SIC 38													
1-5	78.6	72.0	66.1	-12.5	-26	19.7	11.0	6.8	-12.9	10.5	4.3	2.8	-7.7
6+	21.4	28.0	33.9	12.5	87	80.3	89.0	93.2	12.9	89.5	95.7	97.2	7.7
Total					61								
SIC 39													
1-5	89.8	76.3	74.1	-15.7	-2991	33.4	17.3	12.0	-21.3	14.4	8.0	5.0	-9.4
6+	10.2	23.7	25.9	15.7	-34	66.6	82.7	88.0	21.3	85.6	92.0	95.0	9.4
Total					-3025								
Total Manufacturing													
1-5	84.5	80.0	80.7	-3.8	-25109	17.2	13.0	11.3	-5.8	5.0	3.4	3.0	-2.0
6+	15.5	20.0	19.3	3.8	190	82.8	87.0	88.7	5.8	95.0	96.6	97.0	2.0
Total					-24919								

a. This table excludes self-employed workers. All figures are in percentages, except absolute changes in the number of establishments, which are actual numbers of plants. Industries included in each two-digit (U.S.) SIC code are indicated in the Appendix.

Table 11

Decomposition of the Change in Labor Productivity (GDP per Employee) By Two-Digit Manufacturing Industry and Two Size Classes, 1965-75[a]

	1965-1970			1970-1975			1965-1975		
	Prod. Change $\Delta(\lambda_i)$	Prod Effect $[\beta_i \Delta\pi_i]$	Employ. Effect $[\Delta\beta_i \pi_i]$	Prod. Change $\Delta(\lambda_i)$	Prod Effect $[\beta_i \Delta\pi_i]$	Employ. Effect $[\Delta\beta_i \pi_i]$	Prod. Change $\Delta(\lambda_i)$	Prod Effect $[\beta_i \Delta\pi_i]$	Employ. Effect $[\Delta\beta_i \pi_i]$
<u>SIC 20</u>	1.20	1.20	0.01	1.13	1.09	0.04	2.34	2.29	0.04
% Change	100.0%	99.4%	0.6%	100.0%	96.4%	3.6%	100.0%	98.1%	1.9%
<u>SIC 21</u>	2.34	2.30	0.04	11.75	11.78	-0.03	14.09	14.07	0.02
% Change	100.0%	98.4%	1.6%	100.0%	100.2%	-0.2%	100.0%	99.9%	0.1%
<u>SIC 22</u>	0.14	0.15	-0.02	0.43	0.44	-0.00	0.57	0.59	-0.02
% Change	100.0%	111.3%	-11.3%	100.0%	100.7%	-0.7%	100.0%	103.4%	-3.4%
<u>SIC 23</u>	0.50	0.40	0.10	-0.00	-0.07	0.07	0.50	0.34	0.15
% Change	100.0%	80.3%	19.7%	100.0	--	--	100.0%	69.4%	30.6%
<u>SIC 24</u>	0.56	0.42	0.14	0.50	0.38	0.12	1.06	0.79	0.27
% Change	100.0%	74.3%	25.7%	100.0%	75.8%	24.2%	100.0%	74.6%	25.4%
<u>SIC 25</u>	0.79	0.80	-0.01	-0.41	-0.39	-0.01	0.38	0.41	-0.03
% Change	100.0%	101.1%	-1.1%	100.0%	96.7%	3.3%	100.0%	106.7%	-6.7%
<u>SIC 26</u>	0.91	0.91	0.00	1.14	1.11	0.02	2.05	2.02	0.03
% Change	100.0%	99.7%	0.3%	100.0%	97.9%	2.1%	100.0%	98.7%	1.3%
<u>SIC 27</u>	0.02	0.08	-0.06	0.91	0.96	-0.05	0.92	1.03	-0.11
% Change	100.0%	--	--	100.0%	105.6%	-5.6%	100.0%	112.1%	-12.1%
<u>SIC 28</u>	1.08	1.06	0.02	1.67	1.62	0.05	2.75	2.68	0.07
% Change	100.0%	97.8%	2.2%	100.0%	97.3%	2.7%	100.0%	97.5%	2.5%
<u>SIC 29</u>	9.54	9.50	0.04	-4.19	-4.44	0.25	5.35	5.17	0.19
% Change	100.0%	99.6%	0.4%	100.0%	105.9%	-5.9%	100.0%	96.5%	3.5%
<u>SIC 30</u>	1.39	1.40	-0.01	1.69	1.07	0.62	3.08	2.54	0.54
% Change	100.0%	100.5%	-0.5%	100.0%	63.3%	36.7%	100.0%	82.5%	17.5%
<u>SIC 31</u>	1.12	0.77	0.35	0.29	0.19	0.10	1.42	0.96	0.45
% Change	100.0%	68.9%	31.1%	100.0%	65.7%	34.3%	100.0%	67.9%	32.1%
<u>SIC 32</u>	1.55	1.29	0.26	1.26	1.21	0.05	2.82	2.47	0.35
% Change	100.0%	83.0%	17.0%	100.0%	96.0%	4.0%	100.0%	87.6%	12.4%

SIC 33	0.40	0.41	-0.01	1.09	1.08	0.01	1.49	1.49	-0.00
% Change	100.0%	102.3%	-2.3%	100.0%	99.5%	0.5%	100.0%	100.3%	-0.3%
SIC 34	1.06	0.95	0.11	1.17	1.13	0.03	2.23	2.07	0.16
% Change	100.0%	89.4%	10.6%	100.0%	97.3%	2.7%	100.0%	92.7%	7.3%
SIC 35	1.90	1.57	0.33	1.62	1.65	-0.03	3.52	3.15	0.37
% Change	100.0%	82.9%	17.1%	100.0%	102.1%	-2.1%	100.0%	89.6%	10.4%
SIC 36	1.72	1.12	0.60	-0.16	-0.15	-0.00	1.56	0.94	0.62
% Change	100.0%	65.0%	35.0%	100.0%	97.9%	2.1%	100.0%	60.4%	39.6%
SIC 37	4.49	2.28	2.21	-1.13	-1.16	0.03	3.36	1.34	2.02
% Change	100.0%	50.8%	49.2%	100.0%	102.8%	-2.8%	100.0%	39.9%	60.1%
SIC 38	2.80	2.44	0.36	0.43	0.21	0.22	3.23	2.70	0.53
% Change	100.0%	87.0%	13.0%	100.0%	48.5%	51.5%	100.0%	83.7%	16.3%
SIC 39	-0.08	-0.66	0.58	0.58	0.40	0.18	0.50	-0.32	0.82
% Change	100.0%	--	--	100.0%	69.5%	30.5%	100.0%	-64.2%	164.2%
Total Manuf	1.41	1.16	0.25	1.01	0.90	0.11	2.42	2.05	0.37
% Change	100.0%	82.2%	17.8%	100.0%	88.9%	11.1%	100.0%	84.8%	15.2%

a. See equation (2'). Self-employed workers are excluded from the table. Industries included in each two-digit (U.S.) SIC code are indicated in the Appendix. Productivity is measured in 1,000s of 1975 US dollars per employee.

Table 12

Descriptive Statistics of Variables Used in the Regression Analysis For Two-Digit SIC Industries, 1965-75[a]

SIC Code	LPGR	CHANGE ESTAB	%CHNGE ESTAB	CHG EST 5 LESS	OUTPGR	1970 CAP/LAB	1970 MNC/TOT	1970 HERF	1965 MEX/US
20	3.75	8206	17	1.4	5.21	12.1	24.6	0.47	0.43
21	4.84	17	43	-22.9	4.85	22.4	96.8	0.53	0.48
22	1.03	-903	-28	4.7	-4.58	11.0	16.0	0.42	0.52
23	1.29	-744	-7	-4.1	3.60	6.1	6.6	0.33	0.57
24	3.01	-3476	-59	-14.5	2.53	6.3	8.8	0.44	0.46
25	0.60	343	117	4.4	5.10	11.8	6.5	0.35	0.51
26	2.01	23	4	16.0	4.41	24.5	32.9	0.30	0.49
27	1.30	949	25	6.0	1.47	10.5	7.9	0.27	0.46
28	2.02	-96	-5	-7.2	5.86	27.6	53.2	0.38	0.51
29	3.64	12	23	-15.3	11.02	51.2	37.6	0.64	0.39
30	3.66	-1593	-53	-44.4	6.92	11.3	44.9	0.43	0.40
31	3.89	-5529	-66	-18.3	4.13	6.0	4.5	0.38	0.41
32	3.99	-1163	-19	-2.4	4.86	16.9	22.6	0.51	0.35
33	1.01	135	71	7.3	5.52	30.1	42.6	0.52	0.42
34	3.58	109	1	-4.8	5.41	10.8	25.0	0.41	0.35
35	4.68	409	12	-5.1	10.25	15.9	54.4	0.46	0.34
36	2.17	-5765	-82	-52.5	6.32	13.0	51.1	0.40	0.50
37	4.38	-12889	-94	-53.4	6.81	20.1	61.2	0.57	0.35
38	4.94	61	11	-12.5	15.21	19.8	52.9	0.57	0.40
39	0.98	-3025	-63	-15.7	1.35	7.3	22.1	0.45	0.60
Total[b]	3.26	-24919	-19	-3.8	4.88	14.4	35.4	0.41	0.41
Average[c]	2.84	-1246	-8	-11.7	5.3	16.7	33.6	0.44	0.45
Std Dev[d]	1.43	3834	51	18.8	3.9	10.5	23.2	0.09	0.07
Correl w LPGR[e]		-0.096	-0.217	-0.403	0.614	0.168	0.526	0.585	-0.732

a. Key:

LPGR - average annual rate of growth of GDP (US$1975) per employee, 1965-75 (in percent per annum).

CHANGE-ESTAB - absolute change in the number of establishments in the industry between 1965 and 1975.

%CHNGE-ESTAB - percentage change in the number of establishments in the industry between 1965 and 1975 (in percent, with 1965 as the base).

CHG EST 5 LESS - change in the percent of establishments in the industry with five or fewer employees between 1965 and 1975 (in percentage points).

OUTPGR - average annual rate of growth of GDP (US$1975), 1965-75 (in percent per annum).

1970 CAP/LAB - fixed capital per employee per industry in 1970 (index).

1970 MNC/TOT - gross output produced by multinational corporations as a percent of total gross output of the industry in 1970 (percent).

1970 HERF - Herfindahl index for industry in 1970 computed as an unweighted average of Herfindahl indexes of four-digit industries within the two-digit industry (index).

1965 MEX/US - ratio of productivity level (GDP in US$1975 per employee) of Mexican industry to corresponding U.S. industry in 1965.

b. Total manufacturing (weighted average)

c. Unweighted average.

d. Standard deviation.

e. Correlation of LPGR with indicated variable.

Table 13

Regression Analysis of Industry Productivity Growth on Change in Number of Establishments, Output Growth, and Catch-Up Effect[a]

Independent Variables	Dependent Variable: LPGR	LPGR	LPGR	LPGR	LPGR	LPGR	LPGRSM
Constant	-0.125** (6.32)	0.130** (6.35)	0.124** (6.38)	0.125** (6.22)	0.126** (6.38)	0.125** (5.98)	0.059 (1.05)
CHPESTAB	-0.023** (3.11)						-0.081** (3.83)
CH50RLES		-0.044* (2.41)					
CHESTAB			-3.365** (3.26)	-3.389** (3.22)	-3.328** (3.20)	-3.374** (3.17)	
OUTPGR	0.260** (3.93)	0.172* (2.72)	0.196** (3.27)	0.201** (3.11)	0.215** (3.30)	0.198** (2.93)	0.437* (2.32)
MEX/US	-0.228** (6.22)	-0.233** (6.10)	-0.224** (6.14)	-0.225** (6.06)	-0.222** (6.02)	-0.224** (6.05)	-0.141 (1.34)
MNC/TOT				-0.027 (0.83)			
CAP/LAB					-0.022 (0.77)		
HERFWTD						-0.010 (0.05)	
R^2	0.72	0.69	0.72	0.73	0.73	0.72	0.37
$\bar{R}^2$	0.70	0.67	0.70	0.69	0.70	0.70	0.32
Std Err σ	0.017	0.018	0.017	0.017	0.017	0.017	0.050
Sample Size	40	40	40	40	40	40	40

a. Estimated coefficients are shown together with the absolute value of the t-statistic in parentheses. We use two periods, 1965-70 and 1970-75, and 20 2-digit SIC industries. Key:

LPGR - average annual rate of growth of GDP (US$1975) per employee, by period (in percent per annum).

CHPESTAB - percentage change in the number of establishments in the industry by period (in percent, with 1965 as the base).

CH5ORLES - change in the percent of establishments in the industry with five or fewer employees over the period (in percentage points).

CHESTAB - absolute change in the number of establishments in the industry over the period (in millions).

OUTPGR - average annual rate of growth of GDP (US$1975), by period (in percent per annum).

MEX/US - ratio of productivity level (GDP in US$1975 per employee) of Mexican to corresponding U.S. industry at beginning of period.

MNC/TOT - gross output produced by multinational corporations as a percent of total gross output of the industry in 1970 (percent).

CAP/LAB - fixed capital per employee per industry in 1970 (index).

HERFWTD - Herfindahl index for industry in 1970 computed as an output-weighted average of Herfindahl indexes of four-digit industries within the two-digit industry (index).

LPGRSM - average annual rate of growth of GDP (US$1975) per employee, for establishments with 5 or less employees in the industry by period (in percent per annum).

* Significant at the .05 level (two-tailed test).

** Significant at the .01 level (two-tailed test).