OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

SIN WORKING PAPER SERIES

FACTOR ENDOWMENTS AND THE DISTRIBUTION OF INDUSTRIAL PRODUCTION ACROSS THE WORLD

Thiam Hee Ng

Working Paper No 6
February 2002

Statistics and Information Networks Branch of UNIDO

This paper has not been edited. The author is a staff member of the United Nations Industrial Development Organization (UNIDO), Investment Promotion and Institutional Capacity Building Division, Statistics and Information Networks Branch (correspondence to t.ng@unido.org). The author thanks Helmut Forstner, Anders Isaksson and Ghislain Robyn for helpful comments and suggestions. The views expressed in the paper are those of the author and not necessarily those of UNIDO or its member states.

Abstract: The trend towards greater integration of the world economy suggests that we would expect manufacturing production to become more concentrated. In this paper, we will use industrial production data from a cross-section of developed and developing countries to analyse the distribution of industrial production. Using standard deviation and Gini index to measure concentration, we find evidence of higher concentration in several industries. However, for most industries, the concentration is relatively unchanged or lower. Traditional theory of location predicts the location of industry based on factor endowments. We conduct regression analysis to determine if factor endowments are significant in explaining the location of industrial production. Our results show that factor endowments are significant in explaining the location for about one-third of the industries.

Keywords: Manufacturing Sector, Distribution of Industrial Production, Factor Endowments.

JEL Classification: F15, L60, R30.

1. Introduction

In recent years we have witnessed a trend towards growing integration of the world economy. This trend is likely to affect how industrial production is distributed across the world. In an integrated world economy, one would expect companies to shift their production to the country with the lowest cost. The extent to which this takes place will depend partly on the economies of scale of a particular industry. Industries with substantial economies of scale might be expected to be concentrated in a few countries, while industries with less economies of scale will more likely be distributed across several countries. Further, the growing integration of the world economy may also lead to clustering of industrial sectors that share synergies. For example, in the Silicon Valley, the computer industry has clustered together in a single location where access to new technologies is easily accessible and disseminated.

There are both positive and negative implications from such a trend. The growing integration of the world economy is likely to lead to production being concentrated in countries with the lowest cost. As a result, these countries benefit through exploiting economies of scale. Furthermore, the clustering together of firms can lead to greater synergy and collaboration among themselves that would lead to higher innovation and productivity. However, against these benefits, there are adjustment costs that will have to be borne. For example, workers in the sectors that have relocated will have to be retrained. Another drawback is that when one country specialises in a limited number of industries, it makes itself more susceptible to external economic shocks. This point has been highlighted recently by the slump in the technology sector causing sharp reduction in industrial production in Singapore and Taiwan whose industries rely heavily on the technology sector. Hence, the trends towards greater concentration of industrial production could lead to larger fluctuations in the business cycles.

In recent years, new theories of the location of production based on spatial distance and increasing returns to scale have been developed. These theories, known as the

"new economic geography" [1], argue that distance affects production in two ways. First, larger distances from the market make it more expensive to transport goods and acquire information about the market. Second, larger distances from the suppliers of intermediate goods also make for more costly to obtain inputs for the production process. Both these factors suggest that firms tend to agglomerate in regions or locations with large domestic markets. The presence of increasing returns to scale is another factor that pushes production to be concentrated near areas with large markets. These results are in contrast with the traditional theories on the location of industry, which are based on the endowments of resources[2].

We have two main objectives for this paper. First, we aim to collect and analyse the data on industrial production across a cross-section of developing and developed countries. In particular, we wish to see how the distribution of industrial production across the world has changed. Previous studies on the distribution of industry have concentrated almost solely on the developed countries and we feel that this gap should be filled. We will use detailed industrial sector data for a broad cross-section of countries to examine the trend in world industrial production.

The second objective of this paper is to analyse whether the distribution of factor endowments is significant in explaining the location of industrial production. We will do this at two different levels of aggregation. In the first part, we will examine how the distribution of the broad aggregate sectors[3] in the economy – agriculture, manufacturing, mining and services – are affected by the factor endowments in the economy. In the second part, we will examine how factor endowments influence the location of production of each manufacturing industry. Our decision to examine the manufacturing sector is driven by two factors. One is the availability of data and the other is that manufacturing activity is the only one that can easily be relocated to other countries[4].

[1] See Krugman (1991) and Fujita and Thisse (1996) for a survey of the theories of "new economic geography.
[2] For example, see Leamer (1984).
[3] We will use sector to refer to broad aggregate sector in the economy such as manufacturing, mining, services and agriculture. We will use industry to refer to the ISIC 3-digit level disaggregated manufacturing sector such as food industries etc.
[4] With the improvement of communications technology, certain types of services such as customer support can also be relocated to other countries.

Our results on the distribution of industrial production show that there are certain industries that have become more concentrated between 1980 and 1990. However, for most of the industries, there is little change in concentration or even a decline. For the manufacturing sector as a whole, there is a very slight increase in concentration. Hence, our results suggest that there has been little change in the distribution of industrial production between 1980 and 1990 despite the globalisation trend.

Our regression results for the broad aggregate sectors in the economy show that factor endowments are significant in determining the location of the production of agriculture, manufacturing and services. However, factor endowments have low explanatory power for the mining sector. The regression results on individual manufacturing industries show that factor endowments are significant in explaining the location of production in about one-third of the industries. There is no change in the number of industries for which factor endowments are significant between 1980 and 1990.

In the next section, we will review some of the literature and empirical results of related studies. Section 3 will describe the dataset and also provide a summary of the data. The next section will present the results of the distribution analysis and regression. It will also present the empirical methodology used in our estimation. Concluding remarks will be given in Section 5.

2. Literature Review

The trend towards integration in the world economy has prompted the emergence of several studies that examine the distribution of industrial production. Most of these studies were conducted using European data. Midelfart-Knarvik *et al* (2000) examine the trend in the location of industrial production in Europe. By examining the manufacturing industry shares for each country compared with the EU average, they find that although industries in Europe showed signs of convergence in the 1970s, the industries began to diverge since the early 1980s. Each country's industrial structure was becoming more dissimilar from that of their European partners. They point out

the rapid expansion of high-technology industries in Ireland and Finland as one of the dramatic changes in European industry. They find that slow-growing, labour-intensive industries are becoming more concentrated in the peripheral, low-wage economies. Brülhart (2001), also using European data, shows that industrial specialization has increased in Europe over the period 1972-1996. He finds that manufacturing employment has become more concentrated in a few countries. However, he does not find manufacturing exports to be more concentrated. He also shows that low-technology sectors are the ones that are the most geographically concentrated. Amiti (1999) using both production and employment data also finds that there has been a trend towards greater concentration in Europe.

Much of the traditional empirical studies on the location of production are based on the Heckscher-Ohlin theory. This theory can be seen as a combination of the Rybczynski theorem with the assumption of identical preferences. The Rybczynski theorem shows that as endowment of a given factor increases, the country will increase production of the good that uses that factor intensively. For example, suppose that China is relatively abundant in labour. An increase in labour endowment will then have the effect of increasing the production of labour-intensive goods such as textiles. Combining the results of the Rybcyznski theorem with identical preferences across countries gives us the conclusion that countries will export goods whose production are intensive in the factors that are relatively abundant in that countries.

Traditionally, empirical work on the Heckscher-Ohlin theory has been carried out using trade data. However, recently, there have been a number of papers that explored the implications of the Heckscher-Ohlin model from the production side. Harrigan (1995) uses data from a group of OECD countries to examine the importance of factor endowments to manufacturing. He finds that endowments of capital are a source of comparative advantage for most industries while the effects of endowments of skilled and unskilled labour on comparative advantage are ambiguous. Part of the reason for the ambiguity of the results of skilled labour may be due to the fact that the services sector is more skill-intensive than manufacturing. As a result, an increase in the endowment of skilled labour will lead to larger services sector and relative contraction

of manufacturing. Harrigan (1997) expands on this result and shows that technological differences are important in explaining the variation of output in a panel of OECD countries. Using a dataset containing a mixture of both OECD and non-OECD countries, Harrigan and Zakrajsek (2001) also find an important role for factor endowments in determining the location of production. We follow this strand of research in our paper and use data on industrial production in our empirical tests.

3. Data

3.1 Data Source and Definition

The source of our data for industrial production is the United Nations Industrial Development Organization (UNIDO) Industrial Statistics Database. This dataset provides us with data on industrial production for 44 countries for the years 1980 and 1990. Our sample includes both developed and developing countries. The list of countries in our sample is given in Appendix 1. The number of industries available for each country differs slightly from country to country since some of the developing countries do not have the full 28 manufacturing industries. The difference in the number of industries available for each country does not affect our analysis since we are interested in the distribution of industries across countries.

We choose to measure industrial production using value added. We feel that this reflects the true contribution of the country to the manufacturing process. Using gross output as the measure of industrial production will likely overstate the industrial production of countries that do only minimal value added on imported components. Our basic unit of analysis for industrial production will be the value added of industry *k* in country *i* at time *t* which we will denote $x_i^k(t)$. In our empirical analysis, we will be using the share of value added of the industry in the country's GDP, which can be written as:

$$s_i^k(t) = x_i^k(t) / GDP_i(t)$$

where $GDP_i(t)$ is the GDP of country *i* at time *t*. Using the share of value added allows us to make cross-country comparisons without the difficulties of converting the data to a common currency.

In addition to data on industrial production, we use data on the aggregate shares of agriculture, manufacturing, mining and services in the overall economy. Data for the breakdown by sectors in the overall economy are obtained from the World Bank *World Development Indicators*. For our regression analysis, we also require data on factor endowments. Data for arable land area are obtained from the World Bank *World Development Indicators*. Data on capital stock is from UNIDO's own estimates using the perpetual inventory method and a 15% depreciation rate. Finally, we classify labour endowments into three different categories, unskilled, semi-skilled and high-skilled, using data on educational attainment from Barro and Lee (1993). Unskilled labour is defined as workers without any education, semi-skilled labour are workers with primary and secondary education, and high-skilled labour are workers with tertiary education. The proportion of unskilled, semi-skilled and high-skilled labour is then multiplied by the total labour force to obtain the number of unskilled, semi-skilled and high-skilled labour in the economy. The data on total labour force for the country is obtained from the World Bank's *World Development Indicators* as well.

3.2 Summary of Data

Table 1 presents each country's value added share relative to the world's average, defined as:

$$r_i^k(t) = \frac{s_i^k(t)}{\frac{1}{n}\sum_i s_i^k(t)} \times 100$$

where $s_i^k(t)$ is the share of sector *k* value added in country *i*'s GDP at time *t*. We present the countries with the highest five and lowest fives values of the relative share for the years 1990 and 1980. A value of 100 means that the sector share in overall GDP is exactly the same as the world's average. A value greater than 100 means that the sector share is larger than the world average while a value less than 100 means

that the sector share is smaller than the world average. The relative share can also be viewed as an indicator of specialization. High values of the relative share indicate that the economy is relatively specialized in that sector.

Glancing through the figures, we can see that there are substantial differences between the top and bottom countries. Not surprisingly, the relative shares in individual industries are much more dispersed than the total manufacturing shares. Looking at total manufacturing, two Asian "tigers" – Singapore and Korea – hold the top two positions. Both of these countries have manufacturing sector shares that are roughly double that of the world average. We also observe the increase of manufacturing share in developing countries such as Chile and Tunisia. Another successful industrialiser, Indonesia, industrialised so rapidly over the ten-year period that it managed to move out of the bottom five list by 1990.

The production of low-technology manufacturing goods such as food products, beverages and tobacco are mostly concentrated in the developing countries. For a lot of these countries, these industries may be the only substantial manufacturing entities. In the textiles and wearing apparel industries, the importance of Hong Kong and Korea is diminishing over time as production of these industries are being moved to lower cost countries such as Mauritius and Tunisia. In fact, the growth of the Mauritian wearing apparel industry is spectacular. In 1990, the Mauritian wearing apparel industry had a share of GDP ten times as large as the world average.

Developing countries also tend to specialize in the production of resource-based products such as leather products, footwear and wood products. Tunisia has a very high concentration in leather products while Zimbabwe has a strong presence in footwear. The wood products industry tends to be dominated by countries with substantial endowment of forests such as Malaysia and Indonesia. However, the furniture industry is dominated by a different group of countries. Similarly, we find that countries with large endowments of softwood forests dominate the paper products industry.

Both developed countries and developing countries have substantial production of the industrial chemical and other chemical industries. It is surprising to note that Jamaica

is relatively specialized in the production of industrial chemicals and the Philippines is relatively specialized in other chemicals. Malaysia figures prominently in the production of rubber products probably due to the fact that it is a large rubber producer. Chile is highly specialized in the production of non-ferrous metals, with a relative share ten times the world average. This is most likely due to the large copper industry. Singapore is becoming much more specialized in the non-electrical machinery industry. Regarding the electrical machinery industry, both Korea and Malaysia are becoming increasingly specialized in this industry.

We will now turn our attention to the distribution of factor endowments. We present the relative share of factor endowments for 1980 and 1990 for the top five and bottom five countries in Table 2. The distribution of endowments was relatively stable over the ten-year period. China and India have the two largest labour endowments amounting to 26 times and 14 times the world average, respectively. The Nordic countries are highly capital intensive. Norway, Finland, Denmark and Sweden all have substantial amounts of capital per worker. Unsurprisingly, several African economies are relatively capital-scarce. The poor African economies have substantial endowments of unskilled labour while in the developed world the endowments of unskilled labour is negligible. There is a mix of developing countries and developed countries with substantial endowments of semi-skilled labour. The developed countries dominate the top rankings for relative endowments of high-skilled labour. The Philippines is the only developing country among the top five in that list. Since education takes a long time, we see little change in the relative endowments of the skilled-labour force over the period of ten years.

4. Empirical Results

4.1 Distribution of Industrial Production

One of the aims of the paper is to examine the change in the distribution between countries of industrial production over the period 1980 to 1990. Several papers have shown that there is a trend towards greater specialization in industrial production in European countries. We are interested in seeing whether this trend is also visible in a broader cross-section of countries.

We will use standard deviation and the Gini index as our measure of concentration. Chart 1 and Chart 2 present the standard deviation of the relative share for each of the 28 manufacturing industries and for the manufacturing sector as a whole. A high value of the standard deviations implies that the production of that industry is concentrated in only a few countries. On the other hand, a low value of the standard deviations suggests that the distribution of that industry is more dispersed with production spread out over many countries. Hence, an increase in the standard deviation implies that there is a trend towards greater concentration or specialization in that industry.

A quick look at the charts shows us that there is no uniform trend. Several manufacturing industries show an increase in the standard deviation while others show a decline. For quite a number of industries, the standard deviation remains roughly the same. The distribution of total manufacturing is quite even with a relatively low level of standard deviation. There is little change in the value of standard deviation over the period.

Low-technology industries such as food, beverages and tobacco have lower concentration than most other industries. These are relatively basic industries that usually cater to local tastes; so it is not surprising to see that their production is quite evenly distributed. While textiles production seems to be quite evenly distributed, the wearing apparel industry is quite concentrated. This is probably due to a few countries, notably Mauritius, that specialize heavily in producing wearing apparel for exports. Similarly, there is a high level of concentration in leather products, which also underwent a large increase in concentration over the period.

Other industries that have shown substantial increases in concentration include footwear, petroleum refining, pottery and china, iron and steel; fabricated metal products; and non-electrical machinery. Manufacturing industries whose concentration declined include professional equipment, plastic products, petroleum and coal products, industrial chemicals, and paper products.

We also calculate the Gini index, another measure of concentration, for each of the manufacturing industries. The Gini index has a minimum value of zero when the

distribution is perfectly even. This means that all countries have the same relative share in their manufacturing sector. As the distribution of industrial production becomes more concentrated, the value of the Gini index increases up to a maximum value of one. In this extreme case, one country has all the production of the industry in question. Hence, the Gini index can be interpreted in the same way as the standard deviation measure. An increase in the Gini index implies an increase in concentration while a decrease in the Gini index implies a decrease in concentration.

Chart 3 and Chart 4 present the value of the Gini indices for the various manufacturing industries for the years 1980 and 1990. We find that manufacturing as a whole is more evenly distributed than are the individual industries. This is consistent with the earlier results using standard deviations. As before, there are several industries whose concentration increased over the period while others decreased.

Overall, we observe no clear trend towards greater concentration. Several industries have become much more concentrated but most others remained roughly the same or have become less concentrated. This result more or less matches what we see using the standard deviation measure of distribution.

We will also attempt to analyse and identify the characteristics of industries whose concentration changed over the period. In order to facilitate analysis we will divide the 28 manufacturing industries into five groups following the typology of Midelfart-Knarvik *et al* (2000). First we take the nine industries that were most concentrated[5] in 1980 as and divide them into two groups. The first group, which will be called "Concentrated to Concentrated", consists of the industries that remained as one of the top nine most concentrated industries in 1990. The second group, called "Concentrated to Dispersed", is made up of industries that were no longer in the top nine most concentrated industries in 1990. We perform a similar classification exercise for the nine least concentrated industries in 1980 where we divide them again into a group made up of industries that remain as one of the bottom nine least concentrated industries in 1990 ("Dispersed to Dispersed") and another group consisting of industries that did not remain in the bottom nine ("Dispersed to

[5] The ranking of industries by concentration is based on the Gini index.

Concentrated"). The final group known as the "Residual" consists of industries that do not meet the above criteria.

We will attempt to characterise the industries by using three indicators – the degree of economies of scale, the level of technology and the growth of the industry. For each indicator, we divide the industries into three categories, High, Medium and Low. The indicator for the degree of economies of scale is obtained from Pratten (1988), where the minimum efficient scale for 36 industries is given. We divide those industries into three groups. The 12 industries with the highest degree of economies of scale are classified as "High", the middle 12 are called "Medium" and the bottom 12 called "Low". We then map the 36 industries into the 28 industrial sectors used in this paper. The measure for the technology level is from OECD (1997), which classifies industries based on their technology intensity. We classify as "High" the OECD categories of 'high technology' and 'medium-high technology', as "Medium" the OECD category of 'medium-low technology' and as "Low" for the OECD category of "low technology". Finally, we will classify the nine manufacturing industries with the highest growth[6] as "High", the next ten as "Medium" and the last nine as "Low".

We first examine the group of industries called "Concentrated to Concentrated". The first observation is that this group of industries has either a high degree of economies of scale or a high technology level, with only one exception. This is not surprising, since we would expect the production of industries with a high degree of economies of scale to be concentrated in a few locations in order to minimize production costs. Similarly, we would also expect industries with a high technology level to have higher barriers to entry and hence likely to be concentrated in only a few countries. The wearing apparel industry is the only exception to the high degree of economies of scale or high technology level. What we are probably witnessing in this case is that wearing apparel production is being concentrated in only a few countries with low labour cost. It is also interesting to note that these industries are relatively fast-growing with four of them classified as fast-growers and two as medium-growers.

[6] First, we calculate the growth rate in terms of value added in US dollars for each manufacturing industry in each country over the period 1980-1990. Then we calculate the unweighted average growth rate for each manufacturing industry and rank them.

We next turn to the group of industries that went from “Concentrated to Dispersed”. This group consists of the wood products, beverages, and petroleum and coal products industries. Two out of the three industries are low-technology and have a low degree of economies of scale. The exception is petroleum and coal products, which has a high degree of economies of scale and medium-level technology. The growth rate for this group ranges from high to low.

The industries that are in the “Dispersed to Dispersed” group are characterised by low or medium levels of economies of scale and technology with one exception, the “other chemical” industries. They are also relatively slow-growing industries. The “Dispersed to Concentrated” group is also characterized by low or medium-level economies of scale and technology. The group called the “Residual” is a diverse group without any dominant characteristics.

Summarizing the results, we can say that both the standard deviation and the Gini coefficient results show that certain industries have become more concentrated. However, there is little evidence that the manufacturing sector as a whole is becoming much more concentrated. There are several industries for which production has become less concentrated over the period. We also find that there are substantial variations in concentration across the various industries. In terms of industry characteristics, we find that – by and large – the geographically concentrated industries have higher degrees of economies of scale, technology levels and growth rates, while the geographically more dispersed industries have lower economies of scale, technology level and growth rate.

4.2 Regression Results

In this section we aim to find out about the importance of factor endowments in explaining the location of manufacturing production. In order to do this, we will perform regression analyses on the aggregate share of sectors in the economy and on individual manufacturing industries.

Our empirical framework is based on that developed by Harrigan and Zakrajsek (2001). Assume that the production side of the economy can be described by a translog revenue function:

$$\ln r(\mathbf{p},\mathbf{v}) = \mathbf{b}_0 + \mathbf{b}_1 \ln(\mathbf{p}) + \mathbf{b}_2 \ln(\mathbf{v}) + \frac{1}{2}\ln(\mathbf{p})\mathbf{B}_3 \ln(\mathbf{p}) + \frac{1}{2}\ln(\mathbf{v})\mathbf{B}_4 \ln(\mathbf{v}) + \ln(\mathbf{p})\mathbf{B}_5 \ln(\mathbf{v})$$

where r is the revenue function, **p** is a vector of final goods prices and **v** is a vector of endowments. Taking into account that the matrices B_3 and B_4 are symmetric and that the revenue function is homogeneous of degree one, we can differentiate the above revenue function with respect to prices to obtain:

$$s_i^k(t) = \beta_0 + \beta_1 \sum_k \ln(p_i^k(t)) + \beta_2 \sum_m \ln(v_i^m(t))$$

where $s_i^k(t)$ is the sector share of industry *k* in country *i*'s GDP at time *t*, $p_i^k(t)$ is the relative price of industry *k* in country *i* at time *t* and $v_i^m(t)$ is the endowment of factor *m* in country *i* at time *t*.

However, data on relative prices across industries for a cross-section of countries are not available. Therefore, we assume that relative prices are uncorrelated with factor endowments. This assumption is plausible if we believe that all goods are tradable and each country is small and faces an exogenous relative goods price. We feel that manufacturing goods fit this assumption relatively well. With the above assumption we can proceed to estimate the following equation using OLS:

$$s_i^k(t) = \beta_0 + \beta_1 \sum_m \ln(v_i^m(t)) + \varepsilon_i^k(t)$$

We will perform the above regression both at the broad economic sector level and at the manufacturing industry level. First we regress aggregate sector shares of the economy– agriculture, manufacturing, mining and services – on factor endowments for 1990 and 1980. The factor endowments we use for this regression are the share of semi-skilled labour in total labour force, the share of skilled labour in total labour

force[7] and capital per worker. Table 4 and Table 5 present the results from this regression. The coefficients presented in the tables are related to the Rybczynski derivatives. A positive coefficient for a given factor means that an increase in that factor will lead to a higher share of the sector in question while a negative coefficient means that it will lead to a lower share. Another way to view it is that a positive coefficient for the factor means that the factor is a source of comparative advantage while a negative coefficient for the factor means that the factor is a source of comparative disadvantage.

We find that increases in semi-skilled labour, high-skilled labour and capital all lead to a lower share of agriculture in 1990. In 1980, only capital leads to a lower share of agriculture. For the manufacturing sector, we find that increases in semi-skilled labour raise the share of manufacturing in GDP in 1990. This is in contrast to 1980 when an increase in high-skilled labour contributed to a higher share of manufacturing. For 1990, none of the endowments are significant in explaining the share of mining. However, for 1980, we find that higher high-skilled labour leads to a lower mining share while higher capital leads to a higher mining share. Interestingly, we find that both capital and high-skilled labour are a strong positive factor for the share of services in GDP in 1990. Semi-skilled labour, however, has a negative coefficient in 1980 while the positive coefficient for high-skilled labour is no longer significant.

In short, we find that factor endowments are a strong determinant for the agriculture sector. Over time, the importance of factor endowments has also become stronger as evidenced by the higher R-square. Factor endowment is less important for the manufacturing sector and has become less important over the years. The mining sector does not seem to be affected much by factor endowment while factor endowments are becoming more important for the services sector. The changing nature of the services industry where more technology is being used now probably leads to the growing importance of high-skilled workers.

Table 6 and Table 7 present the results of the regressions for individual manufacturing industries and total manufacturing. Due to the large number of coefficients, we have

[7] We cannot include the share of unskilled labour in the regression since it is linearly dependent on the shares of semi-skilled and, of skilled labour.

decided to present just the summary of the results. The tables show the signs of the coefficients that are significant at the 5% level. This allows us to see the factors that are significant in explaining the share of a given industry in GDP.

Looking at the result for 1990, we find that out of the 29 industries, 11 have significant coefficients. Several low-technology industries such as food products, beverages, tobacco and footwear have significantly negative coefficients for capital. This means that as a country accumulates capital, the share of these manufacturing industries will decline. The endowment of semi-skilled labour is also significant in several of the low-technology industries. Interestingly, high-skilled labour is not significant even for high-technology industry such as electrical machinery. Capital is significant for the printing and publishing, fabricated metal products and professional equipment industries. These are all relatively capital-intensive. However, we did not find significant coefficients for other capital-intensive industries such as petroleum refining.

Turning to the results of the regression for 1980, we find that 10 out of the 29 industries have significant coefficients. Capital is significant for several capital-intensive industries such as fabricated metal products, non-electrical machinery, electrical machinery and transport equipment. For rubber products and tobacco industries, increases in semi-skilled labour increases the industry's share.

Overall, the results of the regressions show that factor endowments are important only for about one-third of the manufacturing industries. There is also substantial change in the importance of factor endowments between 1980 and 1990. We find that for some of the capital-intensive industries such as transport equipment, electrical machinery and non-electrical machinery, the importance of capital disappears over time. We also find that endowment of semi-skilled labour is becoming more important in explaining the location of low-technology manufacturing industries. This could be due to a trend of moving production of low-technology goods from rich countries to developing countries. High-skilled labour has limited importance in explaining the location of manufacturing production.

5. Conclusions

We find that the distribution of industrial production in our cross-section of countries has shown limited change over time. A few industries have become more concentrated but for most of them concentration remained the same or even declined. We also find that factor endowments are significant in explaining the share of agriculture, manufacturing and services in the overall economy. However, we find that factor endowment is not significant in explaining the share of mining in the economy. Results for the individual industries show that factor endowments are significant in only one-third of the industries in both 1980 and 1990. We also find that the set of industries for which factor endowments are significant changes between the two periods.

References

Amiti, M. (1999), "Specialization Patterns in Europe," *Weltwirtschaftliches Archiv,* 135, 573-593.

Barro, R. and W.J. Lee (1993), "International Comparisons of Educational Attainment," *NBER Working Paper,* No. 4349.

Brülhart, M. (2001), "Evolving Geographical Concentration of European Manufacturing Industries", *Weltwirtschaftliches Archiv,* 137, 215-243.

Fujita, M. and J-F Thisse (1996), "Economics of Agglomeration," *Centre for Economic Policy Research Discussion Paper No. 1344.*

Harrigan, J. (1995), "Factor Endowments and the International Location of Production: Econometric Evidence for the OECD, 1970-86," *Journal of International Economics,* 39, 123-41.

Harrigan, J. (1997), "Technology, Factor Supplies, and International Specialization: Estimating the Neoclassical Model," *American Economic Review*, 87, 475-94.

Harrigan, J. and E. Zakrajsek (1999), " Factor Supplies and Specialization in the World Economy," NBER Working Paper, No. 7848.

Krugman, P. (1991), *Geography and Trade,* MIT Press, Cambridge, Massachusetts.

Leamer, E. (1984), *Sources of International Comparative Advantage,* MIT Press, Cambridge, Massachusetts.

Midelfart-Knarvik, K.H., H.G. Overman, S.J. Redding and A.J. Venables (2000), "The Location of European Industry," *Report prepared for the Directorate General for Economic and Financial Affairs,* European Commission, mimeo.

OECD (1997), *Science, Technology and Industry: Scoreboard of Indicators 1997,* OECD, Paris.

Pratten, C. (1988), "A Survey of the Economies of Scale," in *Commission of the European Communities: Research on the "cost of non-Europe"* vol.2: Studies on the economics of integration.

Appendix 1

List of Countries in the Sample

Algeria
Australia
Austria
Bangladesh
Belgium
Canada
Chile
Colombia
Costa
Cyprus
Denmark
Ecuador
Egypt
Gambia
Greece
Hong Kong
India
Indonesia
Iran
Jamaica
Jordan
Kenya
Korea
Malawi
Malaysia
Mauritius
Netherlands
New Zealand
Pakistan
Peru
Philippines
Senegal
Singapore
South Africa
Sri Lanka
Sweden
Tunisia
Turkey
United Kingdom
Cameroon
United States
Venezuela
Zambia
Zimbabwe

Chart 1: Standard Deviation of Relative Share by Manufacturing Sector

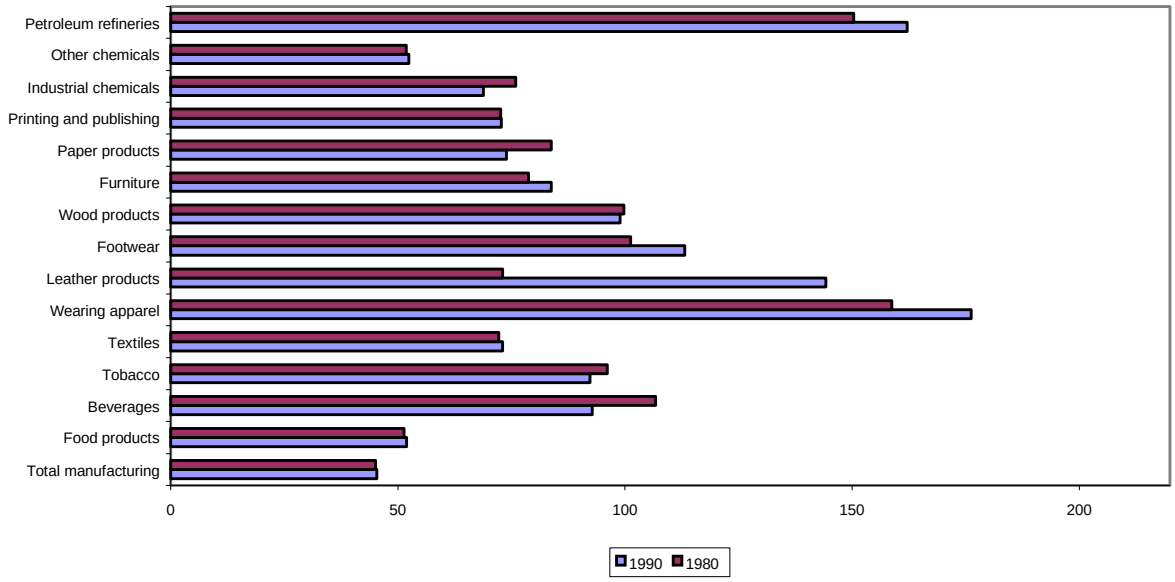
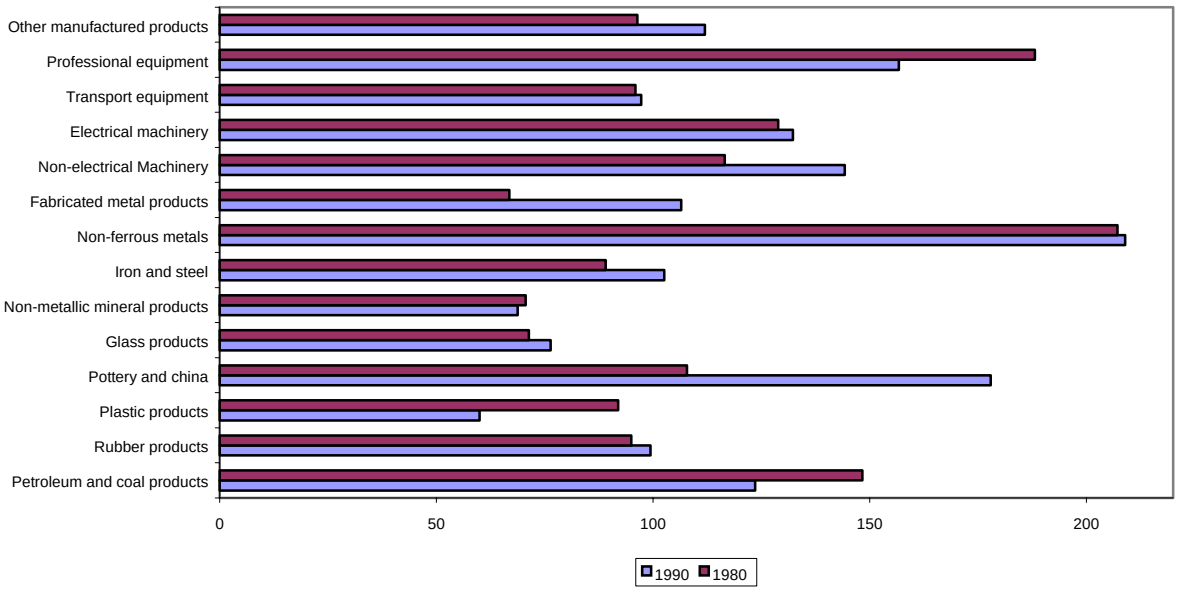


Chart 2: Standard Deviation of Relative Share by Manufacturing Sector



Note: The charts show the standard deviation of the relative value added share for each industry.

Chart 3: Gini index for Distribution of Industries

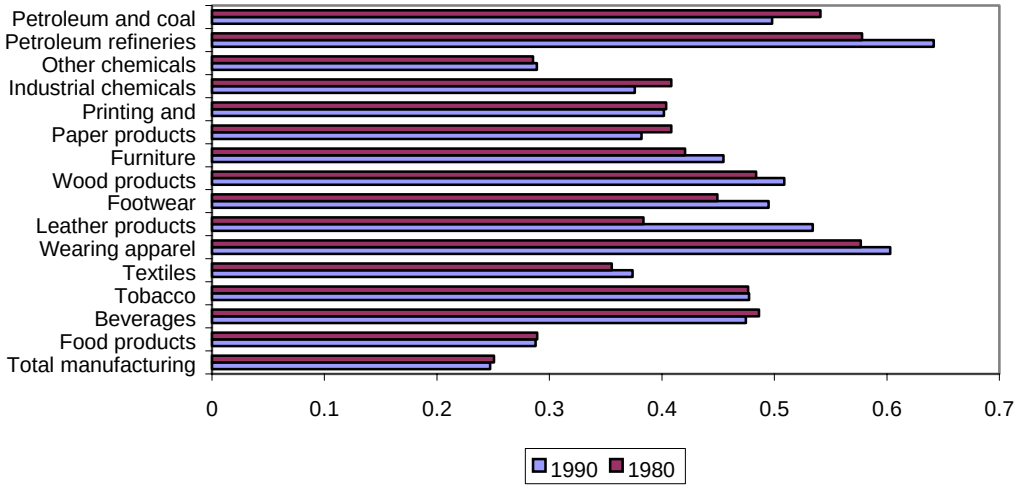
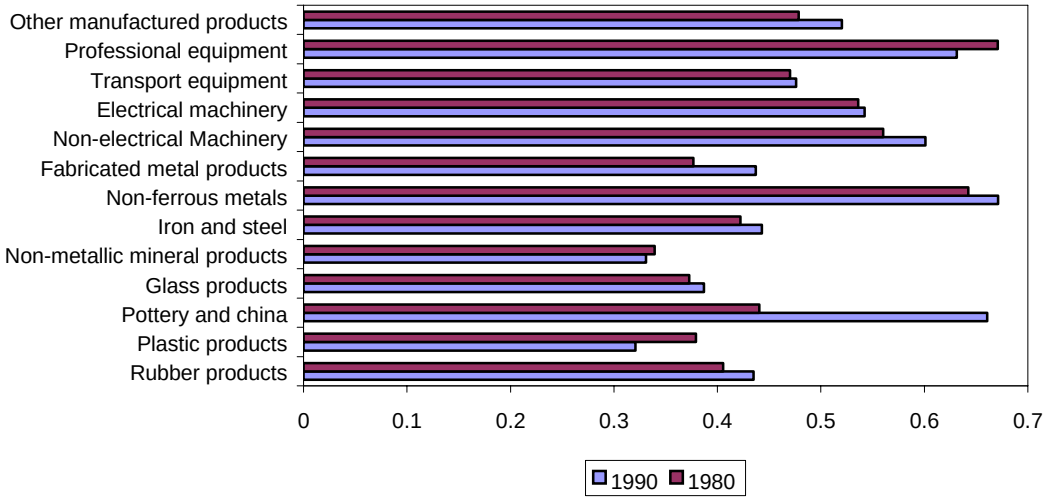


Chart 4: Gini Index for Distribution of Industries



Note: The charts show the Gini coefficient for the relative value added share for each industry.

Table 1: Distribution of Industrial Production Across Countries

Total Manufacturing			
Lowest	**1990**		**1980**
Gambia	30.1	Indonesia	25.9
Bangladesh	34.0	Bangladesh	27.2
Malawi	34.7	Gambia	31.2
Cameroon	37.5	India	45.4
Senegal	43.7	Sri Lanka	47.0
Highest			
Korea	244.3	Singapore	212.0
Singapore	194.4	Korea	203.4
Chile	166.7	United Kingdom	175.9
Peru	165.6	Peru	165.8
Tunisia	165.1	United States	159.9
Food Products			
Lowest	**1990**		**1980**
Hong Kong	22.0	Bangladesh	18.5
Malawi	27.1	Indonesia	20.8
India	30.2	India	22.6
Iran Islamic Republic	34.0	Mexico	23.3
Mexico	36.0	Hong Kong	24.9
Highest			
Philippines	215.4	New Zealand	204.8
Chile	213.8	Malawi	203.3
Jamaica	199.1	Costa Rica	187.6
Costa Rica	182.9	Peru	185.4
Zambia	182.0	Senegal	177.3
Beverages			
Lowest	**1990**		**1980**
Bangladesh	1.3	Bangladesh	4.3
India	8.1	India	6.2
Egypt	9.6	Indonesia	7.1
Indonesia	10.0	Egypt	8.3
Iran Islamic Republic	16.9	Iran Islamic Republic	16.6
Highest			
Zimbabwe	365.6	Zambia	561.8
Zambia	362.4	Colombia	329.6
Jamaica	267.7	Cameroon	313.1
Mauritius	247.2	Jamaica	273.4
Cameroon	234.2	Peru	230.7

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Tobacco			
Lowest	**1990**		**1980**
Ecuador	2.2	Sweden	13.3
South Africa	13.1	Egypt	19.5
Iran Islamic Republic	15.3	India	19.6
New Zealand	16.7	New Zealand	22.1
Sweden	17.4	South Africa	24.2
Highest			
Jordan	347.5	Jamaica	417.3
Sri Lanka	346.3	Korea	344.3
Tunisia	305.5	Sri Lanka	280.5
Indonesia	260.7	Cyprus	274.7
Jamaica	247.2	Jordan	235.0

Textiles			
Lowest	**1990**		**1980**
Singapore	18.9	Jordan	22.1
Senegal	21.0	Mexico	27.6
Sweden	23.0	Netherlands	31.5
Mexico	28.1	Sweden	31.6
Netherlands	29.9	Denmark	41.1
Highest			
Zimbabwe	284.6	Korea	368.9
Pakistan	277.1	Hong Kong	292.5
Korea	269.4	Egypt	219.5
Peru	235.1	Peru	207.7
Hong Kong	221.6	Colombia	190.2

Wearing Apparel			
Lowest	**1990**		**1980**
Senegal	0.4	Bangladesh	0.0
Netherlands	8.9	Indonesia	2.6
Sweden	9.5	Egypt	4.4
Iran Islamic Republic	11.1	Pakistan	4.5
Ecuador	12.0	India	5.0
Highest			
Mauritius	1036.5	Hong Kong	950.8
Tunisia	392.9	Mauritius	394.8
Hong Kong	386.7	Cyprus	329.4
Cyprus	238.1	Korea	219.3
Sri Lanka	221.4	Tunisia	162.5

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Leather Products			
Lowest	**1990**		**1980**
Egypt	13.6	Indonesia	7.2
Malaysia	13.7	Malaysia	14.3
Denmark	17.3	Egypt	15.0
Sweden	20.6	Philippines	26.2
Netherlands	22.0	Sri Lanka	29.8
Highest			
Tunisia	803.6	Peru	329.5
Korea	477.7	Cyprus	260.3
Algeria	357.4	Korea	257.8
Mauritius	223.7	New Zealand	205.8
Cyprus	181.6	Pakistan	197.1

Footwear			
Lowest	**1990**		**1980**
Malaysia	6.2	Pakistan	11.8
Sweden	7.8	Bangladesh	12.2
Netherlands	16.7	India	12.9
Singapore	18.5	Indonesia	19.8
India	24.5	Philippines	25.8
Highest			
Zimbabwe	575.0	Cyprus	566.8
Cyprus	363.6	Zimbabwe	302.6
Chile	288.5	Chile	205.5
South Africa	211.9	Jamaica	183.2
Sri Lanka	185.2	Venezuela	166.4

Wood Products			
Lowest	**1990**		**1980**
Senegal	2.7	Bangladesh	3.7
Mexico	5.7	Pakistan	4.6
India	8.9	India	10.8
Egypt	9.4	Mexico	11.2
Pakistan	9.6	Egypt	12.2
Highest			
Tunisia	357.1	Malaysia	468.8
Malaysia	339.2	Sweden	392.4
Indonesia	329.7	New Zealand	274.8
Sweden	327.3	Canada	270.8
Chile	240.7	Cyprus	218.9

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Furniture			
Lowest	**1990**		**1980**
India	1.1	India	1.8
Senegal	1.7	Bangladesh	2.5
Sri Lanka	4.5	Indonesia	2.8
Pakistan	7.9	Pakistan	4.8
Cameroon	8.8	Sri Lanka	5.4
Highest			
Belgium	345.4	Belgium	345.4
Cyprus	271.8	Cyprus	288.2
Austria	259.4	Austria	251.4
Jamaica	213.2	Jamaica	189.5
Denmark	203.9	Costa Rica	178.2

Paper Products			
Lowest	**1990**		**1980**
Senegal	14.2	Indonesia	10.5
Cameroon	15.0	Mauritius	22.4
Iran Islamic Republic	25.0	Bangladesh	24.3
Mauritius	26.1	Pakistan	25.2
Pakistan	30.0	Iran Islamic Republic	27.2
Highest			
Chile	323.3	Canada	394.7
Sweden	314.4	Sweden	366.9
Canada	252.7	Chile	241.2
New Zealand	211.9	New Zealand	218.6
South Africa	196.3	United States	197.5

Printing And Publishing			
Lowest	**1990**		**1980**
Cameroon	7.3	Bangladesh	5.3
Bangladesh	11.6	Indonesia	10.3
India	16.5	Iran Islamic Republic	13.2
Iran Islamic Republic	18.7	Sri Lanka	14.2
Indonesia	19.8	Pakistan	17.4
Highest			
United Kingdom	280.3	United Kingdom	278.8
United States	254.3	United States	243.9
Singapore	217.9	Sweden	215.7
Canada	189.8	Netherlands	210.6
Sweden	188.1	New Zealand	200.3

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Industrial Chemicals			
Lowest	**1990**		**1980**
Cyprus	6.7	Algeria	6.0
Hong Kong	10.4	Iran Islamic Republic	15.3
Sri Lanka	15.7	Cyprus	20.5
Cameroon	16.5	Malawi	21.7
Ecuador	20.8	Hong Kong	22.0
Highest			
Jamaica	282.0	Belgium	298.2
Belgium	264.7	Korea	271.5
Netherlands	220.6	Jamaica	270.6
Korea	218.2	United Kingdom	230.8
Singapore	203.8	United States	211.1
Other Chemicals			
Lowest	**1990**		**1980**
Cameroon	17.6	Senegal	24.9
Hong Kong	21.9	Cameroon	25.0
Sri Lanka	46.2	Hong Kong	35.2
Senegal	46.5	Iran Islamic Republic	37.7
Mauritius	48.1	Indonesia	39.8
Highest			
Korea	225.3	Korea	228.6
Chile	220.3	Peru	206.4
Philippines	193.0	Chile	188.3
Singapore	183.7	United Kingdom	174.2
Peru	180.3	Singapore	163.5
Petroleum Refining			
Lowest	**1990**		**1980**
Iran Islamic Republic	1.3	Bangladesh	1.2
Bangladesh	2.3	Denmark	8.1
Denmark	6.4	Austria	10.5
Kenya	6.9	New Zealand	12.3
Cyprus	8.8	India	12.9
Highest			
Venezuela	713.4	Singapore	666.3
Tunisia	576.1	Venezuela	659.7
Peru	418.8	Colombia	251.0
Jamaica	294.9	Jamaica	238.7
Ecuador	275.4	Turkey	218.8

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Petroleum And Coal Products			
Lowest	**1990**		**1980**
Costa Rica	2.1	Iran Islamic Republic	2.4
Bangladesh	3.1	Costa Rica	8.4
Philippines	10.8	Philippines	10.8
Australia	16.7	Bangladesh	12.0
Hong Kong	27.7	Malaysia	13.5
Highest			
Turkey	500.3	Korea	542.6
Chile	363.1	Egypt	488.0
Korea	347.6	Turkey	485.0
South Africa	321.2	South Africa	206.7
Denmark	233.6	United Kingdom	191.3

Rubber Products			
Lowest	**1990**		**1980**
Egypt	6.1	Jordan	2.5
Bangladesh	7.0	Bangladesh	7.0
Hong Kong	8.4	Egypt	24.2
Jordan	11.5	Netherlands	30.1
Cyprus	19.7	Malawi	31.1
Highest			
Korea	506.3	Malaysia	512.8
Malaysia	443.8	Korea	411.1
Sri Lanka	179.8	Zambia	192.8
Zambia	174.9	Zimbabwe	164.4
Zimbabwe	171.5	United Kingdom	151.5

Plastic Products			
Lowest	**1990**		**1980**
Bangladesh	10.8	Bangladesh	0.7
Pakistan	15.1	Indonesia	8.8
India	23.0	India	15.1
Sri Lanka	28.2	Pakistan	15.2
Egypt	35.6	Sri Lanka	28.5
Highest			
Korea	275.0	Hong Kong	560.7
Hong Kong	238.3	Singapore	208.2
Singapore	219.8	United Kingdom	185.7
United Kingdom	187.0	Korea	174.9
United States	146.1	Venezuela	157.3

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Pottery And China			
Lowest	**1990**		**1980**
Mauritius	3.5	Kenya	11.7
Hong Kong	5.1	Bangladesh	12.7
Kenya	7.0	Indonesia	14.9
Canada	7.0	Cyprus	21.7
India	10.7	Canada	22.3
Highest			
Algeria	783.3	Jamaica	643.5
Jamaica	666.5	United Kingdom	252.3
Belgium	527.3	Korea	222.9
Tunisia	359.1	Tunisia	207.9
New Zealand	348.2	Turkey	198.4

Glass Products			
Lowest	**1990**		**1980**
Mauritius	6.6	Cyprus	2.8
Bangladesh	17.6	Mauritius	5.4
Cyprus	19.1	Bangladesh	17.5
Hong Kong	19.7	Hong Kong	29.0
India	27.8	India	32.1
Highest			
Korea	322.9	Korea	284.3
Turkey	280.9	Austria	233.8
Austria	232.5	Peru	222.6
Colombia	211.9	Mexico	214.6
South Africa	209.1	United Kingdom	213.8

Non-Metallic Mineral Products			
Lowest	**1990**		**1980**
Malawi	13.7	Bangladesh	10.7
Bangladesh	15.1	Cameroon	25.1
Hong Kong	18.2	Hong Kong	26.8
Cameroon	18.2	Philippines	27.7
Sri Lanka	43.6	India	31.6
Highest			
Jordan	331.8	Jordan	365.6
Tunisia	330.5	Tunisia	271.7
Korea	226.4	Cyprus	266.6
Cyprus	169.7	Korea	199.8
Zambia	138.8	United Kingdom	140.0

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Iron And Steel			
Lowest	**1990**		**1980**
Hong Kong	7.3	Sri Lanka	10.6
Sri Lanka	12.9	Hong Kong	14.4
Bangladesh	18.2	Indonesia	17.6
Kenya	20.4	Kenya	23.2
Mauritius	22.9	Bangladesh	27.2
Highest			
Algeria	506.9	Zimbabwe	377.4
Korea	334.1	South Africa	349.5
Jamaica	318.5	Korea	283.1
Zimbabwe	281.6	Jamaica	262.1
South Africa	278.1	Belgium	235.9

Non-Ferrous Metal			
Lowest	**1990**		**1980**
Bangladesh	0.0	Pakistan	1.4
Pakistan	0.6	Costa Rica	5.8
Costa Rica	3.0	Ecuador	10.2
Ecuador	4.5	Zambia	10.6
Zambia	6.0	India	10.7
Highest			
Chile	1062.6	Chile	993.4
Peru	680.0	Peru	771.7
Venezuela	292.0	Australia	195.8
Australia	216.8	Canada	181.5
Tunisia	176.2	South Africa	161.0

Farbricated Metal Products			
Lowest	**1990**		**1980**
Bangladesh	7.6	Bangladesh	4.9
Pakistan	11.5	Indonesia	15.7
Sri Lanka	13.0	Sri Lanka	17.6
India	20.4	Pakistan	18.0
Senegal	21.0	Cameroon	21.7
Highest			
Belgium	660.0	Hong Kong	235.7
Korea	221.8	South Africa	206.6
Singapore	210.6	Zimbabwe	205.3
Sweden	180.4	Sweden	199.3
Zimbabwe	165.3	United States	191.4

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Non-Electrical Machinery			
Lowest	**1990**		**1980**
Bangladesh	2.5	Bangladesh	2.6
Ecuador	2.8	Tunisia	3.3
Senegal	3.4	Ecuador	3.8
Kenya	7.0	Indonesia	7.8
Malawi	8.7	Kenya	10.1
Highest			
Singapore	804.1	United Kingdom	441.8
Korea	307.6	United States	411.8
United Kingdom	297.6	Sweden	336.2
Sweden	257.2	Singapore	325.9
United States	247.9	Denmark	262.2

Electrical Machinery			
Lowest	**1990**		**1980**
Senegal	4.0	Senegal	3.2
Cameroon	6.0	Cameroon	5.4
Sri Lanka	7.8	Jordan	5.4
Cyprus	16.8	Bangladesh	8.9
Bangladesh	17.0	Cyprus	19.3
Highest			
Singapore	644.4	Singapore	740.4
Korea	536.0	Hong Kong	309.7
Malaysia	351.8	Korea	243.5
Austria	192.6	United Kingdom	240.4
United Kingdom	179.2	United States	228.9

Transport Equipment			
Lowest	**1990**		**1980**
Jordan	2.0	Jordan	0.8
Cameroon	2.2	Cameroon	4.9
Cyprus	15.6	Bangladesh	6.0
Mauritius	17.0	Sri Lanka	9.5
Bangladesh	19.5	Senegal	18.2
Highest			
Korea	453.7	Singapore	447.3
United Kingdom	288.9	United Kingdom	317.5
Sweden	269.1	United States	285.1
United States	265.5	Sweden	273.1
Singapore	263.8	Canada	216.0

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 1: Distribution of Industrial Production Across Countries (continued)

Professional Equipment			
Lowest	**1990**		**1980**
Bangladesh	0.6	Bangladesh	0.1
Cyprus	1.4	Indonesia	1.8
Sri Lanka	3.0	Turkey	7.4
Indonesia	5.1	Sri Lanka	8.8
Greece	10.5	Philippines	9.3
Highest			
United States	729.4	Hong Kong	820.3
Hong Kong	409.5	United States	617.0
Singapore	328.5	Singapore	452.3
Mauritius	320.8	United Kingdom	252.2
Korea	280.2	Denmark	245.9

Other Manufactured Products			
Lowest	**1990**		**1980**
Senegal	1.0	Egypt	3.6
Egypt	8.2	Iran Islamic Republic	5.9
India	14.4	Indonesia	8.3
Iran Islamic Republic	14.9	Sri Lanka	13.0
Ecuador	16.3	Turkey	20.1
Highest		Highest	
Belgium	567.7	Hong Kong	439.7
Korea	361.0	Korea	315.3
Mauritius	325.8	Singapore	299.7
Hong Kong	274.9	South Africa	259.0
South Africa	201.1	Belgium	210.6

Note: This table shows the industry value added share relative to GDP for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each industry is shown in the table. A value of more than 100 means that the industry share in GDP is higher than the cross-country average and a value of less than 100 means that the industry share in GDP is less than the average.

Table 2: Distribution of Factor Endowments Across Countries

Total Labour Force			
Lowest	**1990**		**1980**
Iceland	0.6	Iceland	0.6
Guyana	1.2	Guyana	1.2
Cyprus	1.3	Cyprus	1.4
Mauritius	1.7	Gambia	1.6
Gambia	1.8	Mauritius	1.7
Highest			
China	2599.3	China	2568.0
India	1384.8	India	1439.0
United States	484.0	United States	519.0
Indonesia	304.4	Indonesia	275.2
Japan	249.3	Japan	272.3

Capital Per Worker			
Lowest	**1990**		**1980**
Uganda	1.4	Uganda	1.4
Malawi	2.6	Bangladesh	2.4
Sierra Leone	2.7	Rwanda	2.4
Bangladesh	3.4	China	2.5
Mali	3.5	Gambia	2.8
Highest			
Norway	522.0	Norway	508.5
Finland	484.5	Finland	440.5
Japan	404.8	Denmark	376.0
Denmark	334.7	Netherlands	348.8
Sweden	333.1	Japan	348.7

Share Of Unskilled Labour			
Lowest	**1990**		**1980**
Denmark	0.0	Austria	0.0
New Zealand	0.0	Japan	1.0
Finland	0.0	Australia	2.6
Japan	0.8	United States	3.0
Canada	3.2	France	3.3
Highest			
Mali	351.2	Gambia	294.5
Gambia	300.1	Mali	292.2
Benin	289.6	Benin	274.5
Sierra Leone	280.0	Sierra Leone	253.2
Bangladesh	239.7	Pakistan	245.6

Table 2: Distribution of Factor Endowments Across Countries (continued)

Share Of Semi-Skilled Labour			
Lowest	**1990**		**1980**
Mali	18.5	Gambia	16.0
Gambia	38.0	Mali	16.8
Benin	38.9	Benin	25.3
Sierra Leone	44.6	Sierra Leone	35.3
Bangladesh	57.6	Pakistan	36.9
Highest			
Jamaica	140.3	Austria	152.5
Trinidad And Tobago	139.6	Trinidad And Tobago	151.5
Guyana	136.0	Jamaica	150.1
Austria	134.0	Guyana	145.7
France	133.9	France	143.2

Share Of High-Skilled Labour			
Lowest	**1990**		**1980**
Gambia	1.2	Gambia	1.7
Rwanda	3.6	Malawi	3.4
Uganda	4.8	Rwanda	3.4
Malawi	4.8	Uganda	3.4
Mali	4.8	Mali	3.4
Highest			
Canada	551.8	Canada	613.9
United States	511.3	New Zealand	503.6
New Zealand	431.5	United States	484.6
Australia	269.4	Australia	351.8
Philippines	224.1	Philippines	279.4

Note: This table shows the value of factor endowment for the countries divided by the cross-country mean and multiplied by 100. The highest five and the lowest five values for each factor is shown in the table. A value of more than 100 means that the factor endowment is higher than the cross-country average and a value of less than 100 means that the factor endowment is less than the average.

Table 3: Changes in Concentration, 1980-1990

	Economies of Scale	Technology	Growth
Concentrated to Concentrated			
Electrical machinery	Medium	High	Medium
Non-electrical machinery	Medium	High	High
Petroleum refining	High	Medium	High
Non-ferrous metal	High	Medium	Medium
Wearing apparel	Low	Low	High
Professional equipment	Medium	High	High
Concentrated to Dispersed			
Wood Products	Low	Low	Low
Beverages	Low	Low	Medium
Petroleum and coal products	High	Medium	High
Dispersed to Dispersed			
Other chemicals	High	High	Medium
Food products	Low	Low	Low
Non-metallic mineral products	Medium	Medium	Low
Textiles	Low	Low	Low
Glass products	Medium	Medium	Medium
Printing and publishing	Medium	Low	Low
Plastic products	Low	Medium	High
Dispersed to Concentrated			
Fabricated metal products	Medium	Medium	Low
Leather products	Low	Low	Medium
Residual			
Rubber products	Low	Medium	Low
Paper products	Medium	Low	Medium
Industrial chemicals	High	High	High
Furniture	Low	Low	Low
Iron and steel	Medium	Medium	Low
Pottery and china	Medium	Medium	High
Footwear	Low	Low	Medium
Transport equipment	High	High	Medium
Tobacco	Low	Low	Medium
Other manufactured products	Low	Medium	High

Note: Please refer to pages 10-12 of the text for the description of the classifications and indicators.

Table 4: Regression of Sector Shares on Economy-wide Endowments, 1990

	Agriculture	Manufacturing	Mining	Services
Semi-skilled Labour	-5.099*	6.828**	3.451	-5.180
	(2.452)	(2.225)	(2.738)	(2.813)
High-skilled Labour	-1.857*	1.572	-1.850	2.135*
	(0.911)	(0.827)	(1.017)	(1.045)
Land	0.729	-0.651	0.353	-0.430
	(0.529)	(0.480)	(0.591)	(0.607)
Capital	-5.364**	-0.553	1.426	4.492**
	(0.734)	(0.666)	(0.819)	(0.842)
Constant	66.979**	-31.562*	-5.282	69.865**
	(14.901)	(13.521)	(16.634)	(17.095)
Observations	72	72	72	72
R-squared	0.81	0.31	0.08	0.63
Standard errors in parentheses				
* significant at 5%; ** significant at 1%				

Table 5: Regression of Sector Shares on Economy-wide Endowments, 1980

	Agriculture	Manufacturing	Mining	Services
Semi-skilled Labour	-2.313	5.397**	2.032	-5.115*
	(2.491)	(1.736)	(2.666)	(2.405)
High-skilled Labour	-1.475	2.076**	-2.414*	1.812
	(1.053)	(0.734)	(1.127)	(1.017)
Land	0.388	-0.983*	0.662	-0.067
	(0.692)	(0.482)	(0.740)	(0.668)
Capital	-6.273**	-0.481	2.506*	4.248**
	(0.929)	(0.647)	(0.994)	(0.897)
Constant	49.411**	-23.555*	5.090	69.054**
	(14.571)	(10.157)	(15.594)	(14.071)
Observations	72	72	72	72
R-squared	0.74	0.44	0.12	0.52
Standard errors in parentheses				
* significant at 5%; ** significant at 1%				

Note: Table 4 and Table 5 present the results of the OLS regressions. The dependent variable is the sector value added as a percentage of GDP. The independent variables are the log of factor endowments as a percentage of total labour.

Table 6: Regression of Manufacturing Industries on Factor Endowments, 1990

	Semi-skilled Labour	High-skilled Labour	Capital	R^2
Total manufacturing	+			0.32
Food products	+	+	-	0.34
Beverages	+		-	0.45
Tobacco			-	0.13
Textiles				0.11
Wearing apparel				0.11
Leather products				0.02
Footwear	+		-	0.31
Wood products				0.05
Furniture	+			0.41
Paper products				0.21
Printing and publishing			+	0.51
Industrial chemicals				0.13
Other chemicals		+	-	0.21
Petroleum refineries				0.02
Petroleum and coal products				0.03
Rubber products	+			0.15
Plastic products				0.39
Pottery and china				0.05
Glass products				0.21
Non-metallic mineral products				0.03
Iron and steel				0.02
Non-ferrous metals				0.08
Fabricated metal products			+	0.28
Non-electrical Machinery				0.37
Electrical machinery				0.16
Transport equipment				0.25
Professional equipment			+	0.28
Other manufactured products				0.19

Note: Table 6 presents the summary of the result from OLS regression. The dependent variables are the industry value added as a share of GDP. The independent variables are the factor endowments as a percentage of total labour force. + denotes that the coefficient is significantly positive at the 5% level. – denotes that the coefficient is significantly negative at the 5% level.

Table 7: Regression of Manufacturing Industries on Factor Endowments, 1980

	Semi-skilled Labour	High-skilled Labour	Capital	R^2
Total manufacturing			+	0.41
Food products				0.11
Beverages				0.16
Tobacco	+		-	0.20
Textiles				0.09
Wearing apparel				0.07
Leather products				0.03
Footwear				0.09
Wood products				0.19
Furniture			+	0.44
Paper products		+		0.36
Printing and publishing			+	0.60
Industrial chemicals				0.18
Other chemicals				0.17
Petroleum refineries				0.01
Petroleum and coal products				0.05
Rubber products	+			0.10
Plastic products				0.23
Pottery and china				0.13
Glass products				0.28
Non-metallic mineral products				0.12
Iron and steel				0.09
Non-ferrous metals				0.09
Fabricated metal products			+	0.53
Non-electrical Machinery			+	0.43
Electrical machinery			+	0.19
Transport equipment			+	0.35
Professional equipment				0.21
Other manufactured products				0.21

Note: Table 7 presents the summary of the result from OLS regression. The dependent variables are the industry value added as a share of GDP. The independent variables are the factor endowments as a percentage of total labour force. + denotes that the coefficient is significantly positive at the 5% level. – denotes that the coefficient is significantly negative at the 5% level.