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Robert Rowthorn  
Ramana Ramaswamy



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## Preface

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The Economic Issues series aims to make available to a broad readership of nonspecialists some of the economic research being produced in the International Monetary Fund on topical issues. The raw material of the series is drawn mainly from IMF Working Papers, technical papers produced by Fund staff members and visiting scholars, as well as from policy-related research papers. This material is refined for the general readership by editing and partial redrafting.

The following paper draws on material originally contained in IMF Working Paper 97/42, “Deindustrialization: Causes and Implications,” by Robert Rowthorn, Professor of Economics, Cambridge University, and Ramana Ramaswamy of the IMF’s Research Department. Neil Wilson prepared the present version. Readers interested in the original Working Paper may purchase a copy from IMF Publication Services (\$7.00).

## Deindustrialization— Its Causes and Implications

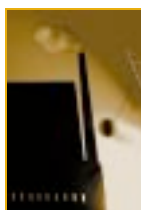
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During the past 25 years, employment in manufacturing as a share of total employment has fallen dramatically in the world's most advanced economies, a phenomenon widely referred to as "deindustrialization." The trend, particularly evident in the United States and Europe, is also apparent in Japan and has been observed most recently in the Four Tiger economies of East Asia (Hong Kong, China, Korea, Singapore, and Taiwan Province of China). Not surprisingly, deindustrialization has caused considerable concern in the affected economies and has given rise to a vigorous debate about its causes and likely implications. Many regard deindustrialization with alarm and suspect it has contributed to widening income inequality in the United States and high unemployment in Europe. Some suggest that deindustrialization is a result of the globalization of markets and has been fostered by the rapid growth of North-South trade (trade between the advanced economies and the developing world). These critics argue that the fast growth of labor-intensive manufacturing industries in the developing world is displacing the jobs of workers in the advanced economies.

This paper maintains that deindustrialization is primarily a feature of successful economic development and that North-South trade has very little to do with it. Measured in real terms, the share of domestic expenditure on manufactured goods has been comparatively stable over the two past decades. Consequently, deindustrialization is principally the result of higher productivity in manufacturing than in

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services. The pattern of trade specialization among the advanced economies explains why some countries deindustrialize faster than others. Finally, the paper suggests that advances in the service sector, rather than in the manufacturing sector, are likely to encourage the growth of living standards in the advanced economies in the future.



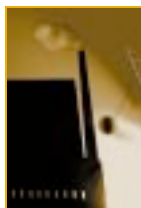
## The Evidence

In the 23 most advanced economies, employment in manufacturing declined from about 28 percent of the workforce in 1970 to about 18 percent in 1994. Among individual economies, deindustrialization started at different times and has progressed at varying speeds. It started earliest in the United States, with the share of manufacturing employment falling from a peak of 28 percent in 1965 to only 16 percent in 1994. In Japan, by contrast, the process started later and has been less dramatic, with manufacturing employment peaking at 27 percent of total employment in 1973 (eight years after the peak in the United States) and then slipping back to about 23 percent in 1994. In the 15 countries of the European Union, the share of manufacturing employment stood at a comparatively high level of more than 30 percent in 1970 but then fell steeply to only 20 percent by 1994.

On the other side of the coin, the share of employment accounted for by services in the advanced economies has increased fairly uniformly, with all advanced economies witnessing growth in service employment since 1960. The United States has led the way here too, with about 56 percent of the workforce employed in services in 1960 and about 73 percent in 1994, a higher share of employment in ser-

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vices than in any other advanced economy. The rise in employment in services has been accompanied by a decline in employment in manufacturing in all advanced economies.



### General Explanation

During deindustrialization, the declining share of employment in manufacturing appears to mirror a decline in the share of manufacturing value added in GDP. At first glance, this decline would suggest that domestic expenditure on manufactures has decreased while expenditure on services has increased.

Closer analysis, however, reveals that this conclusion is misleading. Expenditure on services in current price terms has indeed grown in the advanced economies. But this growth can be accounted for by the fact that labor productivity (output per worker) has grown more slowly in services than in manufacturing, pushing up the relative price of services and making manufactures relatively cheaper. When output in the manufacturing and service sectors is measured at constant rather than at current prices, however, the shift in expenditure away from manufacturing to services is nothing like the scale of the shift away from employment in manufacturing to services. Indeed, at constant prices (in contrast to its steeply falling current-price share), the share in GDP of value added by manufacturing in the advanced economies was roughly unchanged between 1970 and 1994.

Nevertheless, in contrast to this uniform trend in the advanced economies as a whole, the constant price share of manufacturing value added in GDP seems to exhibit different trends in Japan and the United

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States. There appears at first sight to have been a significant shift in the pattern of domestic expenditure—from services to manufacturing in the case of Japan, and from manufacturing to services in the case of the United States—that offers a potential explanation for the differences in the evolution of the share of manufacturing employment in these countries noted earlier. But in both cases, a shift in domestic expenditure was not the main driving force. The rise in share of manufacturing value added in GDP in Japan and the fall in this share in the United States actually reflect the rising manufacturing trade surplus in Japan and the growing trade deficit in manufacturing in the United States. This pattern of trade specialization in manufacturing explains why the United States has deindustrialized faster than Japan.

If a shift in domestic expenditure from manufacturing to services has not been a major determinant of deindustrialization, what explains this phenomenon? Two features of the process need to be explained. Why did the share of manufacturing employment in most advanced economies continue to rise until the late 1960s and then decline? Why was an increase in the share of services employment sustained throughout this period?

The rising share of employment in manufacturing in the industrialization stage of development represents to a large degree the movement of employment from agriculture to industry. Two factors explain this shift in employment. One—on the demand side—is what economists call Engel's law, which states that the relative amount of income that an individual spends on food declines as his income rises. In practice, this means that, as economies industrialize, people spend proportionally less on food and proportionally more on manufactured products and services. The second is on the supply side. The rapid growth of productivity in agriculture, as innovations make it possible to produce more food with ever fewer workers, leads to declining employment in that sector. The combined effect of these demand- and supply-side factors is a large-scale shift of employment from agriculture to manufacturing. Indeed, the overall proportion of employment in agriculture in the advanced economies fell from about 20 percent in the early 1960s to 11 percent in the early 1970s. Given the scale of contraction that has already taken place in the agricultural sector, a further expan-



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sion in the share of services employment will subsequently be at the expense of manufacturing employment, just as the earlier shift to manufacturing took place at the expense of the agricultural sector.

It is very difficult to measure precisely productivity in the service sector, and some have argued that the relatively lower rate of productivity growth in services is due to under measurement. Nevertheless, empirical evidence supports the conclusion that productivity in manufacturing has grown faster than productivity in services. Assuming that such productivity patterns continue, the service sector will inevitably have to keep absorbing an ever greater proportion of the workforce just to keep its output rising in line with manufacturing.

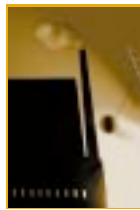
An important implication of this analysis is that deindustrialization is not necessarily a symptom of the failure of a country's manufacturing sector or, for that matter, of the economy as a whole. On the contrary, deindustrialization is simply the natural outcome of successful economic development and is generally associated with rising living standards. This is not to deny, however, that deindustrialization can be linked to difficulties within the manufacturing sector or in the economy as a whole. A country can lose manufacturing jobs directly as a result of such shocks to the system as a large appreciation in the real exchange rate. In these circumstances, the service sector may be unable to absorb a sudden increase in the supply of labor, causing higher unemployment or a fall in the growth of living standards.

The experience of deindustrialization has indeed differed in individual advanced economies. In the United States, the absolute numbers employed in manufacturing have remained roughly constant since 1970, while the overall workforce has grown enormously. In the European Union, by contrast, the absolute numbers employed in manufacturing have fallen sharply, while the total number at work has risen only marginally. There have been negative features of the process in both places, however, with stagnant earnings and widening income disparities in the United States, and rising unemployment in the European Union. Nevertheless, even if these countries had grown faster than they actually did during this period, deindustrialization would still have occurred, though with more

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favorable effects on living standards and employment during the adjustment period.

Deindustrialization has also varied in timing and in extent among the advanced economies of East Asia. In both Korea and Taiwan Province of China, it began in the mid-1980s after their per capita incomes surpassed the levels achieved by the “old” industrial countries in the early 1970s. In Hong Kong, China, the share of employment in manufacturing reached nearly 45 percent in the mid-1970s but has fallen continuously ever since—to little more than 20 percent by 1993. In Singapore, there has been no clear-cut pattern, with manufacturing employment ranging between 25 percent and 30 percent since the early 1970s. One possible explanation is that Hong Kong, China, and Singapore are both city economies and never had a large agricultural sector from which to draw workers in the first place. It seems clear that the deindustrialization taking place in these Tiger economies, so far at least, has been occurring without the negative effects on employment noted elsewhere.



### **More Specific Factors**

Regression analysis, a statistical method of determining the relative importance of various factors contributing to a given result, can be used to pin down more precisely the contribution various factors have made to deindustrialization. The analysis on which this paper is based assumes that between 1970 and 1994 real output in manufacturing and services remained constant, but that productivity in each sector grew at the rate actually observed in the advanced

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economies (productivity in manufacturing, of course, growing faster). This simulation exercise shows that the share of manufacturing employment would have fallen by about 6.3 percentage points during this period simply owing to the relative differences in productivity growth between the two sectors (since workers in manufacturing were more productive, fewer of them were needed). In other words, about two-thirds of the actual decline (10 percent) in the share of manufacturing employment can be explained purely by productivity effects. This also implies that the other third of the decline must be explained by relative output changes: the manufacturing and the service sectors did not, in practice, grow at exactly the same rate. Output in services grew somewhat faster than output in manufacturing in the advanced economies.

This could be due to a variety of reasons. The obvious reason, as suggested above, is that consumers to a certain extent shifted expenditure in favor of services. It is also possible, however, that the demand for domestic manufactures was lowered by changes in the trade balance (manufactures were imported) or by a decline in manufacturing investment. Another possibility is that some business activities previously conducted “in house” by manufacturing companies had been “hived off” to specialist subcontractors—with the result that these activities were reclassified as services. Regression analysis, however, suggests that of all these factors trade and investment were the most significant.

Trade has always been a controversial element in the debate about falling employment in manufacturing. It certainly has caused friction between the United States and Japan. Attracting even more concern, however, has been the growth of North-South trade between the old industrial economies and the developing world. According to one hypothesis, even if the increase in North-South trade were balanced, it still might reduce manufacturing employment within the advanced economies. This would occur, according to the hypothesis, because labor-intensive industries in the advanced economies are increasingly displaced by imports, which are traded for less labor-intensive exports.

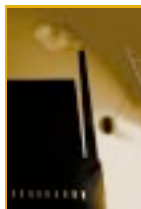
This hypothesis, however, does not stand up to a rigorous regression analysis. Indeed, contrary to popular perception,

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analysis shows that North-South trade has probably had only a limited role in deindustrialization. This is also consistent with the fact, mentioned above, that the manufacturing trade balance for the industrial world as a whole did not change much between 1970 and 1994. The trade balance effects were much stronger for the United States and Japan than they were for countries in the European Union, but this too reflects the changing pattern of trade between these two countries rather than trade with the developing world.

The decline in the rate of investment during this period also appears to have played some role in deindustrialization, except possibly in the United States. The impact of North-South trade is thus left as one of a number of factors, which, taken all together, account for only about 18 percent of the fall in manufacturing employment, according to the regression analysis. Other factors would include changes in the pattern of expenditures (from manufactures to services), the contracting-out of service activities from manufacturing to services, and any other unidentified influences.

The most important finding of this analysis remains the conclusion that differences in relative productivity growth have been by far the most significant factor and account for more than 60 percent of the fall in the share of manufacturing employment within the industrial world as a whole. This, in itself, raises some interesting questions for the future. If these patterns of productivity growth continue, the share of manufacturing employment will probably fall to as little as 12 percent in the industrial world within the next 20 years. In the United States, it could fall to as low as 10 percent. In the European Union and Japan, it would be about 14 percent.



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## Implications

Continued deindustrialization has important implications for long-term growth prospects in the advanced economies. Most obviously, as mentioned in the introduction, if more of the workforce moves into the service sector, productivity growth within services will probably determine the outlook for living standards overall.

Certain industries are more amenable to technological progress (that is, have high productivity growth rates, usually because of their potential for standardization), as opposed to those that are less amenable to such progress. Manufacturing would appear to be, by its nature, technologically progressive—with a systematic tendency to find ways to produce more goods with fewer workers. Of course, not all service industries are subject to slow technological progress. Indeed, some service sector industries—telecommunications is a good example—have attributes very similar to manufacturing and can be regarded as technologically progressive. Others, such as personal services like certain types of medical care, cannot be so easily standardized or subject to the same kind of mass production techniques used in manufacturing. These types of services are likely to experience slower productivity growth.

Over time, the long-term average rate of growth will be determined by the activity in which growth is slowest. The essence of this theory, called the theory of asymptotic stagnancy, can be demonstrated by an example from the computer industry. If, for the sake of argument, hardware production is technologically progressive and software production is technologically stagnant, the computer industry as a whole will over time become asymptotically stagnant. This will occur, the theory suggests, because the ratio of software to hardware producers will increase to such an extent that, even with extremely high rates of productivity growth in hardware, hardware production will only have a negligible impact on overall productivity growth within the industry as a whole.

Stretching this analogy to the economy as a whole suggests some interesting conclusions. If manufacturing is technologically progressive and services are, in general, less technologically progressive, the economy-wide growth rate in the long run will be determined

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increasingly by the growth of productivity in services. This implies, again contrary to popular perception, that the productivity growth in manufacturing will become less influential in improving living standards in the advanced economies. Hence, as deindustrialization continues, the overall growth of productivity will depend more and more on growth of productivity in services.

What does such a future hold? Common sense would suggest that the evolution of productivity growth in services will most likely depend on developments in technologically progressive areas such as information technology, as well as on changes in competitive structures within the service sector. Technological developments will likely make it feasible for some services to grow faster than others, and the service sector will thus undergo significant internal structural changes. Product innovation in manufacturing will continue to be important, inasmuch as it provides spillover effects to productivity growth in services.

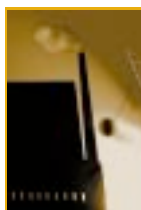
Deindustrialization is also likely to have important implications for industrial relations in the developed world, and particularly for the role played by trade unions. Trade unions have traditionally derived their strength from industry, where the modes of production and the standardized nature of the work have made it easier to organize workers. In services, workers are typically more difficult to organize (with the possible exception of public services) and unionization has thus been less prevalent, owing not least to wide differences in the types of work available.

As deindustrialization continues, countries that operate centralized wage-bargaining arrangements seem likely to face serious challenges. Such centralized wage-bargaining systems have in practice been associated with a conscious attempt to narrow wage differentials between different groups of workers. This may have proved benign in the manufacturing sector, where work requirements have traditionally been similar or comparable across different industries. In the service sector, by contrast, the nature of the work and the skill levels required vary a great deal. Some service jobs, in certain types of financial services, for example, require high skill levels. Others, as in certain types of retailing, require less skill. There are also wide variations in job security. Employment in public services, for instance, is generally

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thought to be more secure than employment in most retail markets. Consequently, it seems inevitable that appropriate wage differentials will be needed to compensate for the wide variations in skills and work intensity that this sheer diversity implies.

In a service-based economy with fast-changing market conditions, it seems difficult to imagine that a centralized, union-based system will be able to make decisions on appropriate wage differentials. To persist with centralized wage bargaining could, therefore, have adverse consequences for the growth of productivity.



## Conclusions

- Deindustrialization is not a negative phenomenon, but a natural consequence of further growth in advanced economies.
- The main reason for deindustrialization is the faster growth of productivity in manufacturing than in services.
  - North-South trade has played very little role in deindustrialization.
  - Trade among industrial countries (rather than between industrial countries and the developing world) accounts for some of the differences in employment structure between different advanced economies.
- Future growth within the developed world is likely to depend increasingly on productivity growth in services.
  - The nature of the service sector is less suited to centralized wage bargaining.

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Educated at Oxford University, **Robert Rowthorn** is a professor at the Faculty of Economics, Cambridge, and a Fellow of King's College, Cambridge.



**Ramana Ramaswamy** is an Economist in the Research Department of the International Monetary Fund. He holds a Ph.D. from Cambridge University and was previously a fellow of Queens' College, Cambridge.

