

LEADING SECTORS IN ECONOMIC DEVELOPMENT: THE ROLE OF MANUFACTURING IN PAKISTAN'S RECENT EXPANSION

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ONE OF THE MORE RAPIDLY GROWING AREAS OF ECONOMIC RESEARCH INVOLVES identifying the major factors contributing to national economic growth and expansion¹. For the advanced market economies a consensus has emerged that measured technological change explains a significant share of total economic growth as well as growth in labour productivity. Unfortunately, the precise determinants of technological change are poorly understood. Some economists have focused on the role of research and development, as influenced by government patent protection, in producing new technological breakthrough. Others have studied learning-by-doing and diffusion of production knowledge among workers, industries, and countries, and even across generations. Still others have considered how better education becomes embodied in human capital and how better technology becomes embodied in physical capital.²

While considerable disagreement exists as to the determinants of technological change, there is a consensus that the scope for technological progress is greatest in the manufacturing sector.³ Put differently, we might imagine that during a period of structural change during which time a country's manufacturing sector grows and becomes more established, its scope for

¹ A good overview is provided in 'Economic Growth: Explaining the Mystery', *The Economist*, 4 Jan. 1992, pp. 15-18.

² Cf. Alan J. Auerbach and Laurence J. Kotlikoff, *Macroeconomics: An Integrated Approach* (Cincinnati, Ohio, 1995), pp. 110-111.

³ Cf. Richard Nelson and Gavin Wright, 'The Rise and Fall of American Technological Leadership: The Postwar Era in Historical Perspective', *Journal of Economic Literature*, Vol. XXX (Dec. 1992), pp. 1931-1964 and J. Bradford De Long and Lawrence H. Summers, 'Macroeconomic Policy and Long Run Growth', *Federal Reserve Bank of Kansas City Economic Review* (Fourth Quarter, 1992), pp. 5-29.

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contributing to long-run national economic growth would increase. In the case of Pakistan the figures in Table A-1 (page 89 below) are consistent with this assumption.

Regarding the sectoral contributions to growth in Pakistan, Burney⁴ found that over the 1960-85 period commodity producing sectors (agriculture and manufacturing) accounted for than forty per cent of the growth in GDP. The major crops were the main source of the varying contribution of agriculture. In the case of manufacturing, the large-scale sector's output accounted for more than sixty per cent of the contribution.

The economy has gone through a number of major changes since 1985. In particular (but especially from 1988 onwards) progress has been particularly strong in the area of freeing the private sector from regulation and artificial price distortions. In addition, a complementary privatisation program was launched with the aim of reducing the role of the public sector in manufacturing and services, thereby alleviating the government's financial and administrative burden and creating new opportunities for the private sector.

The purpose of this paper is to attempt to assess whether manufacturing's contribution to the country's economic growth has altered from its historical pattern during this period of economic reform and liberalisation. Has manufacturing increased its relative contribution to aggregate economic expansion? Have the growth patterns experienced by large and small-scale manufacturing differed significantly in recent years? And, if so, in what manner? Has manufacturing initiated the period of recent growth, or instead, has the sector simply responded to the needs created by expanding markets?

Recent developments

Although Pakistan's growth performance during the 1980s was healthy (averaging more than six per cent per annum in real terms), increasing macroeconomic imbalances, growing public sector indebtedness and underlying structural weaknesses convinced the government that without corrective action the economy's growth performance could not be sustained. Accordingly, in early FY89, the government embarked on a macroeconomic and structural adjustment program.⁵ This set of policy initiatives was implemented reasonably continuously until FY92.⁶

⁴ Nadeem A. Burney, 'Sources of Pakistan's Economic Growth', *The Pakistan Development Review*, Vol. XXV, no. 4 (1986), pp. 573-587.

⁵ The program was supported by the IMF, the Asian Development Bank, Japan, the World Bank, and other multilateral and bilateral donors.

⁶ For detailed examination of these reforms see Robert Looney 'An Assessment of Pakistan's Attempts at Economic Reform', *Journal of South Asian and Middle Eastern Affairs*, Vol. XV, no. 3 (1992), pp.1-28.

Economic reforms

The government realised that the economy's main weaknesses were low savings/investment rates, particularly in the public sector, structural rigidities and distortions in the incentive system which reduced efficiency and depressed economic activity. Among the most important issues to be addressed through the reform effort were:

Fiscal constraints. Pressures on the fiscal accounts increased during the 1980s and the budget deficit reached an unsustainable eight and a half per cent of GDP in FY88. One factor behind this deterioration was stagnant public revenues heavily dependent on trade taxes and inelastic domestic taxes. Despite the growing deficits, expenditures to build, and maintain and operate key development program/ projects in the social sectors and infrastructure were inadequate.⁷ Non-Development expenditures, in particular interest, defence,⁸ and subsidies (mainly food and agricultural input price subsidies) absorbed an increasing proportion of current outlays (about two thirds by FY88).

Pressure on the external accounts. Despite a healthy export performance, the external accounts were also under increasing pressuring during this period and the current account deficit reached 4.3 per cent of GNP in FY88. In large part the deterioration of the external accounts was due to declining remittances and a growing interest burden. Credit worthiness indicators deteriorated as excessive borrowing led to an increase in the debt service ratio from twenty per cent of exports of goods and services in FY81 to twenty-five to thirty per cent during the mid-1980s.

Constraints on the private sector. The private sector was confronted with pervasive regulatory controls in manufacturing and burdened by large public enterprises suffering from poor performance and inefficiency. It was also unable to fully exploit its growth potential due to insufficient infrastructure and a poorly educated and trained workforce. The incentive system was distorted by high tariff and non-tariff barriers, a domestic tax system that taxed production rather than consumption and administered interest rates and prices. As a result, innovation was discouraged. In addition the industrial structure remained narrow.

⁷ See for example, Robert E. Looney, 'Infrastructural Constraints on Energy Development: the Case of Pakistan', *The Journal of Energy and Development*, Vol. XVI, no. 2 (1991) pp. 267-286. See also Robert Looney 'Infrastructural Constraints on Transport and Communications: The Case of Pakistan', *International Journal of Transport Economics*, Vol. XIX, no 3 (1992), pp. 287-306, and Robert Looney 'Infrastructure and Private Sector Investment: The Case of Pakistan's Transportation and Communications Sector, 1972-1990', *Rivista Internazionale di Scienze Economiche e Commerciali*, Vol. XXXIX, no. 9 (1992), pp. 771-792.

⁸ Robert Looney 'Defense Expenditures and Economic Performance in South Asia: Tests of Causality and Interdependence', *Conflict Management and Peace Science*, Vol. 11, no. 2 (1991), pp. 37-68.

Faced with the need to address these challenges, the government's adjustment program sought to improve financial balance, increase average savings rates (especially public) and promote private sector investment and activity. In particular, measures were introduced to:

- Achieve an overall GDP growth rate of about 5.5-6 per cent per annum
- Stabilise inflation at about 6 per cent per annum
- Reduce the current account deficit to 2.4 per cent of GNP while increasing gross external reserves to about six weeks of imports.

The measures selected to meet these goals included those aimed at

- Deregulating economic activity and investment
- Liberalising the trade and exchange systems
- Rationalising the tariff system
- Adjusting regulated prices, especially in the energy and agricultural sectors
- Reforming the financial system, and
- Promoting foreign direct and portfolio investments.

These reforms were to be complemented by improvements in the structure of public finance to reduce the distortionary impact of taxes, increase the buoyancy of the tax system and redirect resources to key projects and programs in the social sectors and infrastructure. In addition these policies were to be supported by a reduction in the overall fiscal deficit to 4.8 per cent of GDP to reduce excessive aggregate demand pressures and improve financial stability.

Patterns of growth

In general the implementation of the adjustment program in the real sectors was positive and the economy responded well to these policy reforms. Although there was some deceleration in growth during the first three years of adjustment (compared to the pre-adjustment period), growth targets were met and GDP grew at about 5.4 per cent per annum between FY89 and FY92 (Table 1 page 85 below). Part of the initial slowdown in the growth of economic activity could be attributed to adverse external and internal factors (e.g. in terms of trade shocks, political instability and the Gulf crisis):

- In the external sector the terms of trade fell by 7 per cent in FY89, and again by 13 per cent in FY91, mainly because of increases in oil prices and declines in cotton prices.

- Domestically, the poor law and order situation in Sindh and the political uncertainties associated with the changes in administration no doubt reduced the rate of investment below what it would have been in a more stable setting.

Partially as a result of these developments, the growth rate of the large scale manufacturing sector dropped from 8.16 per cent in FY88 to 1.48 per cent in FY89, a rate considerably below the average of 9.37 per cent for 1980-85 (Table 2 page 86 below). However, with the subsequent improvement in the industrial climate, the growth rate of this sector gradually increased to 9.12 per cent in 1990 only to fall again to 8.26 per cent in 1991 and 5.85 per cent in 1992. In terms of its contribution to growth, large scale manufacturing accounted for 13.25 per cent of the observed increase in GDP during the 1988-92 period. This was somewhat over the 11.24 per cent for the period as a whole, but below the 16.85 per cent figure for the 1980-85 period. On the other hand, the growth pattern of manufacturing became much more stable (as indicated by the variance in the growth rate) in the late 1980s. While not definitive, this pattern does suggest that this sector was becoming less subject to erratic shocks in the domestic and external economies.

While suffering some decline in growth during the initial years of the program, the growth in small scale manufacturing did not decline below 4.5 per cent (Table 3 page 87 below). On the other hand the growth during the 1988-92 period was only slightly greater than that achieved for the entire 1974-92. In fact the average rate of growth in this sector was remarkably similar in each of the sub-periods examined. As with large scale manufacturing, the growth patterns of this sector became much more stable in the late 1980s and early 1990s, again suggesting increased resiliency of firms to changing economic conditions.

The patterns of growth for the other major sectors are also of interest⁹:

- Agriculture's share of GDP has declined gradually. This trend appeared to be secular, but the sectors rapid growth in the last several years may indicate a new pattern of expansion. Clearly one of the factors suppressing the relative contribution of manufacturing to GDP was the revitalisation in agriculture. As with manufacturing, the growth of agricultural output has stabilised with time.
- Commerce has increased its share of GDP slightly over time, from an average of 15.16 per cent in the 1974-79 period to 16.89 in 1988-92. Since 1980, commerce has accounted for slightly less than one fifth of the growth in GDP. However this figure increased to 20.64 per cent in the last five years. However unlike agriculture and manufacturing, the growth rate and

⁹ The findings here were derived as in Tables 1-3. A complete set of results is available upon request from the author.

contribution of commerce to GDP does not appear to be stabilising with time. This suggests that commerce is still largely affected by developments in other sectors over which it has little control.

- In contrast to many developing countries, the construction sector does not account for a significant share of GDP. In fact the share of construction in GDP has been remarkably stable, averaging slightly over 4 per cent for most of the sub periods. During the 1988-92 period, construction accounted for slightly over 4 per cent of the growth in GDP, slightly below the 5.2 per cent for the 1974-92 period as a whole.
- Transport has also maintained a very stable share of GDP, averaging around 8.5 per cent of total economic activity. In addition its rate has been remarkable with its average of slightly over 6 per cent per annum for the main sub-periods accounting for approximately eight per cent of the overall expansion of the economy. Again in contrast to manufacturing and agriculture, there does not appear to be any tendency toward stabilisation with time (as measured by the variance in each of the four key series).
- As intended in the 1988-92 program, public administration and defence have been cut back significantly, with their contribution to GDP growth down to 3.03 per cent (compared with 11.62 per cent during the 1980-85 period). Also during the 1988 program there has been a remarkable increase in the stability of this sector, suggesting that the government is gaining control over the budgetary process.
- The other government services have not been significant under the program. These expenditures have maintained the patterns established in the early 1980s. If anything, there has been a slight increase in the contribution to growth accounted for by this sector.

It is apparent from these patterns that relative to other sectors both the agricultural and manufacturing sectors have undergone the most significant changes in the post 1988 period. In both sectors government programs have been instrumental in affecting their growth patterns.

Agriculture. As noted above, agricultural value added expanded at about 5.4 per cent during FY88-FY92. Cotton was the crop leading this increase (10.2 per cent in volume terms) due to improved technology and attractive incentives. In FY92, about one-fifth of the growth of GDP was contributed by the cotton crop alone. Government price policies and especially productivity enhancement programs contributed significantly to this expansion.

The steady depreciation of the rupee (together with lower export duties) has contained the decline in the average cotton export price to about 12 per cent per cent between FY90 and FY92, despite the 29 per cent drop (in US dollars) in international cotton prices; official procurement prices increased by 8 per cent in

real terms during this period. However the most important factor was the increased use of significantly improved bio-chemical and agronomic technology (fertiliser, seeds, chemicals and the like).

Net returns to cotton farmers rose very quickly and, in response, the acreage allocated to cotton has also increased. In addition, the elimination of the public sector's monopoly in the procurement and export of cotton may have helped increase the effective farm gate price. Performance of the other main agricultural sub sectors was not strong, with the significant exception of livestock which expanded rapidly during this period (5.7 per cent per annum).

Manufacturing. Industrial value-added grew by 6.3 per cent per annum during this period. Manufacturing, electricity and water that explain most (86 per cent) of this growth expanded by 5.9 per cent and 11.3 per cent per annum on average respectively. Large investments in the energy sector led to significant increases in all major energy sources during this period. Crude oil grew by 5 per cent per annum, gas by 6 per cent per annum and electricity by 9 per cent. Despite this impressive expansion power shortages continue to be a significant problem.

Construction. Construction activity was relatively subdued perhaps reflecting the stagnation in public investment. In manufacturing, cotton industries again dominated the sector. However, the strong performance of small-scale manufacturing (which accounts for about one-third of total manufacturing value-added), and non-traditional large scale industry is encouraging. Traditional large-scale manufacturing industries: petroleum products, fertilisers, cement, iron and steel and automobiles, heavily dominated by public enterprises have performed marginally despite in general high effective rates of protection. The infusion of new capital and management capacity into these industries as they are privatised should improve the aggregate performance of the manufacturing sector.

As noted above, developments in the cotton-related industries have dominated macroeconomic movements. Output of cotton yarn increased at an average rate of more than 15 per cent and was mainly responsible for the exceptional growth performance of the country's exports during FY91 and FY92. The share of raw cotton and cotton related industry in total GDP and GDP growth increased markedly. The share of cotton (raw, ginned, yarn and cloth) in GDP increased from an average of 5.4 per cent during FY82-88 to 7.6 per cent by FY92. While GDP growth attributable to raw cotton and cotton manufacturing during FY82-FY88 was less than one-thirteenth, by FY92 more than one-fourth of GDP growth originated in these sub-sectors.

As a result of these developments, Pakistan was able to recapture the world market-share it lost during the mid-1980s in cotton products. Several factors are believed to explain these results. The rapid expansion in cotton output and the duty on raw cotton exports have ensured a steady domestic supply of raw cotton

at prices lower than international prices. Effective protection rates for the more traditional lower value-added cotton industries are in fact generally positive. Finally, these sectoral policies were complemented by the depreciation of the real exchange rate during this period.

To sum up, the economic reforms initiated in 1988 have strengthened the private sector. Improved performance is evidenced by strong GDP and export growth and rising private savings and investment. Since 1988, GDP growth has average around 5.5 per cent per annum and real per-capita GDP has increased by over ten per cent. Exports have expanded by an average of fourteen per cent per annum in volume terms (twelve per cent in US dollars), facilitating the liberalisation of the trade and payments system. Private gross fixed capital formation and gross domestic savings have growth from 7.7 per cent to 9.4 per cent of GDP and from 10.5 per cent to 12.2 per cent of GDP between 1988 and 1992, respectively. Foreign investment, both direct and portfolio, has also responded very favourably. These are encouraging trends, indicating a gradual strengthening of the underlying productive and savings base of the economy.

Leading sectors

As noted, a main thrust of the government's post-1988 program has been to accelerate the rate of growth in manufacturing in the hope that this sector will act as a leading sector through imparting its growth momentum to other areas of the economy. Here it is instructive to compare the relative per centage contribution made to GDP growth over time by manufacturing. For large scale manufacturing the picture is somewhat mixed (Table 2). For the 1988-92 period manufacturing's average contribution to GDP growth was 13.25 per cent. That is 13.25 per cent of GDP growth was accounted for by the expansion in large scale manufacturing. However if we leave out 1988 this average increases to 15.59 per cent. This compares favourably to 11.24 per cent for the 1974-92 period as a whole. It is however still below the 16.85 per cent for the 1980-85 period.

The patterns for small scale manufacturing are more stable (Table 3). During the 1988-92 period this sector contributed an average of 7.51 per cent to GDP growth, up slightly over the 7.26 per cent for the 1974-92 period as a whole. However the growth of this sector is considerably above its average of 4.53 per cent for the 1980-85 period.

In short, there does not appear to be a major shift in recent years in growth generating capability to the manufacturing sector. The simple growth comparisons presented above do not, however, tell the whole story. The true test of whether manufacturing is evolving into a leading sector is its casual relationship with GDP (and other sectors).

According to Currie, leading sectors have two critical characteristics: an unexploited or latent demand that can be actualised, and a sufficiently large demand as to cause its satisfaction to have a significant impact on the whole

economy. Another qualification is that an increase in the sector's growth can be exogenous and occur independently of the current overall rate of growth of the economy¹⁰. On the basis of this approach, one could conclude that the manufacturing sector was beginning to assume the role of a leading sector if it can be shown that its recent performance reflects an increasing level of exogenous growth. To be a true leading sector this growth must have a significant (and positive) impact on the country's overall economic expansion.

The issue of causation

The issue of causation is an integral element in Currie's view of the critical elements needed by an activity to be a leading sector¹¹. That is, growth in the leading sector must be exogenous and in turn lead the expansion in output of other major areas of the economy. Has expanded manufacturing output occurred independently of GDP? In turn has this expansion in manufacturing output created through demand linkages sufficient demand to stimulate other areas of economic activity?

It follows that before drawing any definitive conclusions as to the impact of the government's recent policy packages toward the private sector, one must satisfactorily address the issue of causation. Fortunately, several statistical tests using regression analysis for this purpose are gaining wider acceptance.

The original and most widely used causality test was developed by Granger.¹² According to this test, increased manufacturing output causes (say) growth in GDP, if rates of expansion in GDP can be predicted more accurately by past values of manufacturing output than by past rates of growth of GDP. To be certain that causality runs from manufacturing to GDP, past values of manufacturing must also be more accurate than past values of GDP in predicting the observed rates of growth in manufacturing output over time.

Four cases are possible: (a) Manufacturing growth causes GDP Growth when the prediction error for GDP decreases when manufacturing is included in the GDP growth equation. In addition, when GDP growth is added to the manufacturing equation, the final prediction error should increase. (b) GDP growth causes manufacturing growth when the prediction error for GDP increases when manufacturing is added to the regression equation for GDP growth, and is reduced when GDP growth is added to the regression equation for manufacturing. (c) Feedback occurs when the final prediction error decreases when manufacturing is added to the GDP equation, and the final prediction error

¹⁰ Lauchlin Currie, "'The Leading Sector' Model of Growth in Developing Countries', *Journal of Economic Studies*, Vol. 1, no. 1 (1974), p. 6.

¹¹ Clearly the size of the sector is also important. As Currie notes, leading sectors 'should have two characteristics; an unexploited or latent demand that can be actualized, and a sufficiently large demand as to cause its satisfaction to have a significant impact on the whole economy'. *Loc. cit.*

¹² C.W.J. Granger, 'Investigating Causal Relations by Econometric Models and Cross-Spectral Methods', *Econometrica* (1969), pp. 424-438.

decreases when GDP is added to the manufacturing equation. (d) No relationship exists when the final prediction error increases both when manufacturing is added to the GDP equation and when GDP growth is added to the manufacturing equation.

Operational procedures

The data for manufacturing and GDP used to carry out the causation tests were derived from various World Bank reports¹³. These series were deflated by the GDP price deflator¹⁴ and defined in terms of their annual rates of growth¹⁵ are in 1985 prices. To determine if the results were sensitive to the definition of manufacturing, both small and large scale firms were included in the analysis. For comparative purposes similar tests were performed on the other major sectors of economic activity. Relationships were considered valid if they were statistically significant at the ninety-five per cent level of confidence. That is, if ninety-five per cent of the time we could conclude that they had not occurred by pure chance, we considered them statistically significant.

As noted above, there is no theoretical reason to believe that manufacturing (or other sectors) and GDP have a set lag relationship – that is they impact on one another over a fixed time period. The period could be rather short run involving largely the spin-off from generalised demand and income increases or longer term direct linkage creation. To find the optimal adjustment period of impact, lag structures of up to four years were estimated. The lag structure with the highest level of statistical significance was the one which best depicted the relationship under consideration (the optimal lag reported in Table 4 page 88 below).

To summarise the causality results presented below examine the linkage between overall-sectoral output and GDP. That is have any of the major sectors assumed a clear role in initiating an overall expansion of the economy? Has this pattern changed over time? Here again we are especially interested in examining the impact of the post 1988 reform program.

Because of the need to include as many observations as possible in each causality test, three regressions tests were made for each sector: (1) for the entire period (1974-1992), (2) the pre-reform years 1974-1988, and (3) the inclusion of

¹³ World Bank, *Pakistan: Current Economic Situation and Prospects—Report No. 10223-PAK* (16 Mar. 1992). World Bank, *Pakistan: Current Economic Situation and Prospects—Report No. 9283-PAK* (22 Mar. 1991); World Bank, *Pakistan: Progress Under the Sixth Plan* (1984) and World Bank, *Pakistan: Country Economic Memorandum FY93, Progress Under the Adjustment Program—Report No. 11590-PAK* (23 Mar. 1993).

¹⁴ This series is taken from the International Monetary Fund, *International Financial Statistics* (Washington: IMF), various issues.

¹⁵ The reasons underlying involve the assumption of stationary conditions. See: C. Hsiao, 'Autoregressive Modeling and Money-Income Causality Detection', *Journal of Monetary Economics* (1981), pp. 85-106 and W. Joerding, 'Economic Growth and Defense Spending: Granger Causality', *Journal of Development Economics* (1986), pp. 35-40.

the pre-reform years (1978-82). We concluded that the reforms had an impact on the relationship between sector output and overall economic activity if the results in (3) above were significantly different from those reported for the years covered in (2).

Several interesting patterns¹⁶ occur between the individual sectors and overall GDP (Table 4):

- Contrary to what one might imagine (given its overall size), there do not appear to be any predictable links between agriculture and the economy as a whole. In fact GDP growth appears completely unrelated to developments in the agricultural sector. This pattern characterises the period as a whole and both sub periods.
- For the period as a whole a feedback relationship existed between large scale manufacturing and GDP. That is increases in manufacturing stimulated resulted in increased rates of GDP growth. In turn increased GDP provided a stimulus for further increases in manufacturing output. While positive, these linkages were rather weak.
- The relationship between large scale manufacturing and GDP has changed somewhat over time. During the 1974-88 period the main links were from GDP to manufacturing. This relationship was moderately strong with increased rates of GDP stimulating manufacturing growth over a four year period. The more recent period however is again characterised as one of feedback between manufacturing and GDP. In contrast to the period as a whole, however, the links from manufacturing to GDP were quite strong.
- Interestingly, these patterns are enforced using the growth in large scale manufacturing relative to manufacturing as a whole. That is increases in the proportion of manufacturing accounted for by large-scale units provided a relatively strong stimulus to GDP in the more recent (1978-92) period.
- Small scale manufacturing accounts for a relatively small share of GDP (averaging around four per cent for the 1974-92 period as a whole). Hence, this sector is not likely to be a major factor in stimulating GDP. The causality tests suggest that changes in the growth patterns of small scale manufacturing tend to precede those of GDP. However the impact is negative. This pattern is not completely unexpected given the positive pattern between increases in large scale manufacturing in total manufacturing and subsequent increases in GDP.
- Other than large scale manufacturing, no other sectors have (using the definition developed here) acted as leading sectors. Commerce comes the closest. During 1974-1988 expansion in this sector produced a follow on

¹⁶ A process along the lines of that outlined in 'Economic Growth: Explaining the Mystery', *The Economist*, 14 Jan. 1992, p. 16.

increase in GDP. This pattern however broke down in the more recent period, with increases in the rate of growth in commerce actually impacting negatively on GDP.

Conclusions

The purpose of the foregoing analysis has been to assess whether the period of economic reform and liberalisation has altered the manner in which manufacturing contributes to the country's economic growth. Our main finding is that while the growth in large scale manufacturing output has not accelerated in recent years (nor has its overall contribution to GDP growth increased) there is some evidence this activity has begun to take on some of the classic characteristics associated with leading sectors. Specifically, the growth of manufacturing in recent years appears to be more exogenous than in earlier periods. While conjectural at this point, this pattern of growth may reflect increased rates of technological progress occurring in the sector. If this is the case, it may reflect past government decisions as to increased allocations to research and development or expanded funding of technical education.

What is certain, however is that large scale manufacturing appears to be the only sector large and dynamic enough to transfer its momentum to the economy as a whole. As noted in the introduction, this may stem from the sector developing to the point to which it is capable of drawing on its accumulated knowledge. Specifically, a mechanism might be developing where past investment in capital may make it more profitable to accumulate knowledge and in turn increased knowledge spurs further investment¹⁷.

While it is tempting to attribute manufacturing's changing role to the post 1988 reforms, the evidence presented above is only suggestive and not conclusive proof of the success of the government's liberalisation program. These patterns may in part simply reflect the gradual acceleration in productivity likely to be taking place in the sector.

¹⁷ It should be stressed that causality is used here in the statistical sense. While highly suggestive, the results can not be considered as absolute proofs of the relevant linkages. See Jurgen A. Doornik and David F. Hendry, *PcGive 8.0: An Interactive Econometric Modeling System* (Oxford, Institute of Economics and Statistics, Oxford Univ. Press, 1994) for a discussion of the manner in which these tests are interpreted.

Table 1: Pakistan, summary of sectoral contributions to GDP growth, 1989-1992

Sectors	Average 82-88	1989	1990	1991	1992	Average 89-92
Agriculture	1.07	1.77	0.79	1.31	1.64	1.38
Wheat	0.06	0.44	-0.04	0.10	0.01	0.13
Rice	0.00	0.02	0.02	0.05	-0.11	-0.01
Cotton	0.35	-0.06	0.04	0.52	1.23	0.41
Sugar Cane	0.00	0.24	-0.01	0.04	-0.08	0.02
Livestock	0.41	0.44	0.46	0.38	0.45	0.44
Mining and Quarry	0.04	0.01	0.05	0.06	0.02	0.04
Manufacturing	1.44	0.67	1.00	1.11	1.36	1.03
Large Scale	1.09	0.29	0.06	0.07	0.94	0.63
Food	0.15	0.03	0.04	0.03	0.02	0.08
Textiles	0.14	0.09	0.28	0.26	0.38	0.25
Fertilise	0.09	0.02	0.03	-0.02	-0.04	-0.01
Petroleum	0.04	-0.03	0.03	0.09	0.00	0.02
Cement	0.02	0.00	0.01	0.01	0.01	0.01
Pig-Iron	0.05	-0.02	-0.01	0.03	0.01	0.00
Automobiles	0.05	0.03	0.04	0.00	0.03	0.02
Other Manuf	0.57	0.16	0.17	0.31	0.35	0.25
Small-Scale	0.36	0.38	0.40	0.41	0.42	0.40
Construction	0.22	0.01	0.13	0.24	0.25	0.18
Electricity	0.21	0.37	0.44	0.34	0.24	0.35
Transport/Commun	0.73	-0.41	0.61	0.52	0.66	0.35
Commerce	1.26	0.87	0.58	0.91	1.25	0.90
Finance	0.21	0.08	0.09	0.08	0.04	0.07
Public Admin and Defence	0.40	0.57	0.02	0.24	0.13	0.28
Other Services	0.69	0.77	0.78	0.78	0.79	0.78
GDP	6.51	4.79	4.67	5.59	6.38	5.35

Source: Computations based on data provided by the Federal Bureau of Statistics.

Note: Sectoral contribution to growth rate are computed by weighting the sectoral growth rates by the previous years sectoral share (in GDP).

Table 2: Pakistan, contribution of large-scale manufacturing to GDP growth, 1974-1992

Year	Growth in GDP	Growth	Contribution to GDP		
			(absolute)	(per cent)	
1974	7.42	11.02	7.33	0.81	10.90
1975	5.68	11.39	9.21	1.02	17.87
1976	3.28	11.02	-0.04	-0.01	-0.16
1977	1.08	10.63	-2.48	-0.27	-25.31
1978	6.36	10.46	4.62	0.49	7.72
1979	8.04	10.19	5.23	0.55	6.80
1980	6.66	10.89	13.97	1.42	21.36
1981	6.96	11.08	8.87	0.97	13.87
1982	7.81	11.33	10.24	1.14	14.54
1983	6.89	11.37	7.30	0.83	12.00
1984	3.85	12.16	11.02	1.25	32.56
1985	8.66	11.73	4.82	0.59	6.76
1986	6.20	11.76	6.45	0.76	12.20
1987	5.72	12.00	7.87	0.92	16.16
1988	6.45	12.19	8.16	0.98	15.16
1989	4.64	11.82	1.48	0.18	3.90
1990	4.65	12.32	9.12	1.08	23.16
1991	8.11	12.34	8.26	1.02	12.55
1992	6.28	12.29	5.85	0.72	11.49
Averages					
1974-92	6.04	11.47	6.70	0.76	11.24
1974-79	5.31	10.79	3.98	0.43	2.97
1980-92	6.38	11.79	7.96	0.91	15.06
1980-85	6.81	11.43	9.37	1.03	16.85
1986-92	6.01	12.10	6.74	0.81	13.52
1988-92	6.03	12.19	6.57	0.80	13.25
Variances					
1974-92	3.35	0.42	14.50	0.17	125.05
1974-79	5.86	0.16	16.42	0.20	188.67
1980-92	1.83	0.22	8.62	0.09	49.57
1980-85	2.21	0.18	8.32	0.08	67.77
1986-92	1.22	0.05	5.68	0.08	28.85
1988-92	1.68	0.04	7.65	0.11	38.58

Note: Computed from World Bank Data. Sectoral contribution to growth rate is computed by weighing the sectoral growth rates by the previous years sectoral share of GDP.

Table 3: Pakistan, contribution of small-scale manufacturing to GDP growth, 1974-1992

Year	Growth in GDP	Share of GDP	Growth	Contribution to GDP	
				(absolute)	(per cent)
1974	7.42	3.31	7.20	0.24	3.21
1975	5.68	3.72	19.06	0.63	11.09
1976	3.28	3.89	7.92	0.03	8.99
1977	1.08	4.14	7.49	0.29	26.99
1978	6.36	3.96	1.86	0.08	1.21
1979	8.04	4.00	8.98	0.36	4.42
1980	6.66	4.10	9.43	0.38	5.66
1981	6.96	4.03	5.22	0.21	3.07
1982	7.81	3.80	1.53	0.06	0.79
1983	6.89	3.91	10.01	0.38	5.52
1984	3.85	3.97	5.57	0.22	5.66
1985	8.66	4.17	14.09	0.56	6.47
1986	6.20	4.52	14.91	0.62	10.04
1987	5.72	4.66	9.12	0.41	7.20
1988	6.45	4.60	5.14	0.24	3.72
1989	4.64	4.80	9.04	0.42	8.97
1990	4.65	5.08	10.72	0.51	11.05
1991	8.11	5.12	9.16	0.46	5.73
1992	6.28	5.30	9.92	0.51	8.09
Averages					
1974-92	6.04	4.27	8.76	0.36	7.26
1974-79	5.31	3.84	8.75	0.31	9.32
1980-92	6.38	4.47	8.76	0.38	6.30
1980-85	6.81	4.00	7.64	0.30	4.53
1986-92	6.01	4.87	9.72	0.45	7.83
1988-92	6.03	4.98	8.80	0.43	7.51
Variances					
1974-92	3.35	0.27	16.87	0.03	30.35
1974-79	5.86	0.07	6.44	0.03	73.74
1980-92	1.83	0.24	12.45	0.02	7.45
1980-85	2.21	0.02	16.31	0.03	3.89
1986-92	1.22	0.08	7.15	0.01	5.48
1988-92	1.68	0.06	3.70	0.01	6.51

Note: Computed from World Bank Data. Sectoral contribution to growth rate is computed by weighing the sectoral growth rates by the previous years sectoral share of GDP.

Table 4: Pakistan: Gross domestic product/sectoral causality patterns

Sector	Direction of Causation	Optimal Lag (Years)	Impact	Relative Strength ¹⁸
Agriculture				
No Relationships				
Large-Scale Manufacturing				
1974-1992 Feedback		2,4	+,+	w,w
1974-1988 GDP-->Manuf		2	+	s
1978-1992 Manuf-->GDP		1	+	m
Large-Scale Manufacturing (Share of GDP)				
1974-1992 Feedback		1,4	+,+	w,m
1974-1988 GDP-->Manuf		4	+	m
1978-1992 Feedback		1,4	+,+	m,w
Large-Scale Manufacturing (Share of Total Manufacturing)				
1974-1992 Feedback		2,4	+,+	w,m
1974-1988 GDP-->Manuf		2	+	s
1978-1992 Manuf-->GDP		1	+	m
Small-Scale Manufacturing				
1974-1992 Manuf-->GDP		4	(-)	m
1974-1988 Manuf-->GDP		2	(-)	s
1978-1992 Manuf-->GDP		4	(-)	m
Construction				
1974-1992 No Relationship		—	—	—
1974-1988 No Relationship		—	—	—
1978-1992 GDP-->Construct		3	(-)	w
Electricity, Gas and Water				
No Relationships				
Transport				
1974-1992 Feedback		1,1	+,-	w,w
1974-1988 GDP-->Transport		2	(-)	w
1978-1992 No Relationship		—	—	—
Commerce				
1974-1992 GDP-->Commerce		4	(-)	w
1974-1988 Feedback		3,4	+,-	w,w
1978-1992 Comm-->GDP		4	(-)	w
Public Administration/Defence				
1974-1992 No Relationship		—	—	—
1974-1988 GDP-->Admin		4	+	w
1978-1992 Feedback		3,2	-,+	w,m

¹⁸ Note: See text for a description of the computational method. In the case of feedback, the first term refers to the impact from Sector--->GDP. The second term depicts the relationship from GDP--->Sector. All variables are defined in terms of their year-to-year rate of growth. The strength assessment is somewhat subjective and is based largely on size of the standardised regression coefficient(s) of the lagged independent variables.

Table A-1: Pakistan: summary of sectoral contributions to GDP growth, 1974-1992

	Growth in GDP	Share of GDP	Growth	Contribution to GDP absolute	per cent
Large Scale Manufacturing					
AV 74-79	5.31	10.79	3.98	0.43	2.97
AV 80-92	6.38	11.79	7.96	0.91	15.06
per cent Change	20.15	9.26	100.00	111.63	407.07
Small Scale Manufacturing					
AV 74-79	5.31	3.84	8.75	0.31	9.32
AV 80-92	6.38	4.47	8.76	0.38	6.30
per cent Change	20.15	16.41	0.11	22.58	-32.40
Agriculture					
AV 74-79	5.31	32.69	3.37	1.09	30.96
AV 80-92	6.38	28.04	4.48	1.26	17.50
per cent Change	20.15	-14.22	32.93	15.60	-43.47
Commerce					
AV 74-79	5.31	15.16	6.14	0.09	8.50
AV 80-92	6.38	15.96	7.45	1.17	18.60
per cent Change	20.15	5.28	21.33	1,200.00	118.23
Construction					
AV 74-79	5.31	4.66	11.66	0.46	8.52
AV 80-92	6.38	4.28	5.67	0.24	3.67
per cent Change	20.15	-8.15	-51.37	-47.83	-59.92
Transport					
AV 74-79	5.31	8.98	6.36	0.57	8.79
AV 80-92	6.38	8.88	6.02	0.52	8.03
per cent Change	20.15	-1.11	-5.34	-8.77	-8.64
Administration and Defence					
AV 74-79	5.31	7.92	6.60	0.50	7.36
AV 80-92	6.38	8.62	6.68	0.56	9.64
per cent Change	20.15	8.84	1.21	12.00	30.98
Other Public Services					
AV 74-79	5.31	7.11	7.40	0.51	10.55
AV 80-92	6.38	7.35	6.70	0.49	7.89
per cent Change	20.15	3.37	-9.45	-3.92	-0.25

Note: Computed from World Bank Data. The sectoral contribution to growth rate is computed by weighing the sectoral growth rates by the previous year's sectoral share of GDP.